

# INTERNATIONAL CONFERENCE

„Financial and monetary policies  
in European Union”



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# THEORIES AND APPROACHES REGARDING THE COST – BENEFIT ANALYSIS ROLE AND PRINCIPLES



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**Abstract.** *Cost-benefit analysis, used for the first time by the French engineer Jules Dupuit, is a practical method for measuring costs and benefits of investment projects. Costs and benefits arise both today and the future, and for that reason, in order to be aggregated and brought into comparison, it is essential that all are expressed in a common measurement unit, money, and discounted at a certain moment in time. If aggregation and discounting are simple exercises of algebra, choosing the discounting rate and converting some non-monetary costs and benefits into monetary equivalent, such as the time saved or the human lives saved, represent complex calculations and intense analysis, making use of other academic fields.*

**Key words:** allocative efficiency; cost-benefit analysis; net present value; discount rate; intangible costs and benefits.

**REL classification:** 13 J

## 1. Government intervention in the economy

Government intervention in the economy is as old as the market economy itself. If the economy in which we live was a perfect one, where there was perfect competition in all economic activities; all the effects regarding individual welfare could be reported in market price and there weren't scale economies, then the government presence wouldn't make sense. Individuals who desire maximum profit would guarantee, in the same time, the social benefit of the whole community. Because in the real life there aren't such economies, markets deal with imperfections, sometimes markets that are needed do not exist, there are externalities, such as global warming, smoking in public places, alcohol or drugs consumption (Moșteanu, Iacob, 2007). This means that rather than maximizing the social welfare of the whole community, the price mechanism inefficiently allocates resources and generates income and wealth distribution unjust inequity. The government intervenes in the economy for two reasons: *market failure* and *income distribution*.

The *market failure* concept depicts the market economy failure in accomplishing efficient resources allocation. John Stuart Mill was among the first to note market failure, generated by the difficulties encountered by collecting financial resources from the users of the services supplied by a lighthouse. In literature, this is the most cited pure public good.

*Income distribution*, meaning resources collecting from the citizens and allocation for various social groups, represents the second reason for government intervention in the economy.

The state's functions throughout the time had suffered profound changes, however, one has remained the same: *monopoly of violence*, suggesting that the state is needed for imposing the law and order (Lipsey, Chrystal, 2004, p. 317).

Although Adam Smith is the one who introduced the slogan „*laissez faire, laissez passer*“, he realised the government role in providing minimal public goods. He considered that public finance, described as resources flows, meaning their collection, transfer and management by the state authorities, are the responsibility of a sovereign or lawmaker. From his point of view, these responsibilities intended reaching two distinct objectives: providing *income for citizens*, more likely setting a framework that would grant citizens accomplishment of this income and providing *income for the government*, in a sufficient quantity for provision of public goods and services. The aim is both social welfare and welfare of the state administrator.

The goods and services that Adam Smith was talking about in his work, *The Wealth of Nations*, better known as government functions, are national defence, justice and building and maintaining public works and institutions. (Smith, 1992).

In a modern economy, characterized by complexity, provision of such goods and services by the state authority is not in any case a simple task and the countries where governments couldn't achieve that, often hadn't developed from the economic point of view.

All the services provided by the government and by the public institutions can be considered, generally speaking, public goods and services, because they determine the general premises of the daily life and provide an instrument of order and regularity in people's lives. Because of the free rider behavior, these goods can not be provided by the market mechanism or by voluntary contributions.

## 2. A brief history and the cost – benefit analysis role

With the public investment projects, a state's government doesn't aim to maximize the profit, as is the case of private sector, but to maximize the social welfare, that is providing national defence, law and order, education, road construction, and so on. This doesn't mean that public investment projects don't go through an efficient appraisal. Cost – benefit analysis allows the public authorities to achieve what a perfect market does, that is to allocate resources for a project entirely when the marginal social benefit exceeds the marginal social cost. Ruben P. Mendez regards that cost-benefit analysis, as a method of evaluating public investment projects, is much more advanced than corporation profitability analysis, but is not accurately applied (Mendez, 1992).

*Cost-benefit analysis estimates and aggregates the monetary equivalent of the present and future social costs and benefits, from the citizens' point of view, for the public investment projects, in order to decide if these are in the public interest.* Investment projects can be dams and motorway construction, training programmes or medical services. The field which has received the highest attention concerning the studies using cost-benefit analysis is the public transport.

The idea of this economic accountancy belongs to Jules Dupuit, a French engineer whose 1848 article „*Etudes theoritiques et pratiques sur le mouvement des eaux coutants*“ is still worth reading today. The English economist Alfred Marshall gave form to some of the concepts that today represent the cost-benefit analysis foundation. Cost-benefit analysis has known a practical development after the regulation The Federal Navigation Act in 1936, in the United States. This regulation required that the American Corps of Engineers had to carry out projects for the waterway system improvement when the total benefits exceeded the total costs of the projects. Based on this, the engineers created wellorganized methods for measuring such benefits and costs, and, highly important, did



this without any assistance from the economists. Only after approximately 20 years, in the 1950's, did economists try to identify a set of accurate methods for rigorously measuring costs and benefits and for making a decision with respect to financing or not a public investment project.

Cost-benefit analysis can be used each time there has to be made a decision and is not limited to a single academic field or to a certain sector, addressing elements from management, finance or social science.

### 3. Cost-benefit analysis principles

Apparently, cost-benefit analysis creates the impression of a simple accounting exercise that requests the comparison of the present and future costs and benefits, discounted and aggregated, and decide on a public investment project if its net present value is positive or choose the project that has the highest net present value, when there has to be implemented only one of many projects (Văcărel, 2004, p. 171).

$$NPV = -I_0 + \frac{(B-C)_1}{(1+r)} + \frac{(B-C)_2}{(1+r)^2} + \dots + \frac{(B-C)_n}{(1+r)^n} > 0.$$

NPV = net present value;

$I_0$  = initial investment capital;

$n$  = investment life expectancy;

$B_0, B_1, \dots, B_N$  : benefits generated by the public investment project every year;

$C_0, C_1, \dots, C_N$  : costs of the public investment project every year.

But, in practice, the analysis requires more complex economic and financial computation, sometimes economists also consider empirical studying methods. One of the cost – benefit analysis problems is that the aggregation of many cost and benefit's parts is sometimes intuitive and for other parts not even the intuition can suggest measurement methods. For that reason, a series of basic principles is desired as a guide.

#### 3.1. A common measurement unit

In order to reach a pertinent conclusion with regard to the usefulness of a project, all its positive or negative costs and benefits have to be recorded in a common measurement unit, the most convenient one being money, have to be adjusted with the inflation rate and to be calculated in present values.

A program can provide benefits that are not directly measured in money, such as time saved by the travelers, increased security and the reduced injuries, the human lives saved because of a motorway public project. The question of how this benefits can be measured in money arises.

Having in mind the genuine saying „time is money”, to accomplish the cost – benefit analysis we have to know how much. In the last decade, in Boston (Rosen et al., 2008, p.150), the „Big Dig” project had been implemented, which intended the construction of new roads and a tunnel to Logan Airport. A main part of this project was a new motorway whose cost reached 6,5 billion dollars. It has been estimated that, once that motorway was build, the trip from the town to the airport would be reduced from 45 minutes to 8 minutes. It is here where the great challenge of measuring saved time emerges.

A way to estimate the time value is to make use of *theS income – free time theory*. People who have control over the number of labor hours, would work untill the individual valuation of free time equals the net hourly income. If the valuation of free time is greater than the income, there would be less work, cutting down the leisure marginal benefit. But if

free time valuation is lesser, people would work harder and the leisure marginal benefit increases, because the free time diminishes. In a perfect labor force market, that allows independent adjustment of working hours, the time value is always the income, even when a fraction of the saved time due to better conditions on the motorway is used for recreation. Jonathan Gruber names this method *the market – based method* and the tool used is the net income (Gruber, 2005, p. 199). Although this approach is useful, it has two major limits. Firstly, people can not freely adjust the working hours and the leisure time and, secondly, not all free time values are equivalent. To avoid more time on the motorway, a person who dislikes driving is ready to pay a sum of money that exceeds the net income. But, it is possible that the time opportunity cost for a person that used to love driving on the weekend doesn't matter, because he didn't work then anyway. Additionally, during the summer, the working place can be equipped with air conditioning, facility the employee doesn't benefit from at home. This can mean a greater valuation of the time spent at the office than the net income. More over, it can be valued the fact that there is a comfortable environment. In such wise, the complete satisfaction from the job exceeds the income. The value of the free time is composed of that complete satisfaction, not only the tangible part, the income being lesser than time saved total benefit.

Another method for valuing time saved is to analyze *the choice from different means of transportation that imply different time travel*. Suppose that in a certain community, people can commute to work by bus or by train. The train travels faster, but it is more expensive. Figuring out the sum of money they are willing to pay extra to travel by train, it can be estimated how much they are willing to pay to reduce commuting time, giving this way a value for time. Obviously, other features, like income, influence people's choice regarding means of transportation.

*The evaluation of a human life is the most difficult aspect of the cost-benefit analysis.*

The first method of valuation is *the market-based method* or *lost earnings method*, which refers to determining the present value of the future cash-flows. If a person dies because of a certain project, the cost for society is exactly the expected present value of the earnings that person would have achieved. This approach is most frequently used in court to determine the compensation the victim's relatives should receive. The problem with this method is that using the income as future cash-flows, each moment that is not spent working is not valued, the method being rejected by most economists.

The second method is *the survey-based method*, that questions individuals in order to find out how they value their own lives. This of course is a puzzling question, a more general approach being addressing questions regarding aspects that can change the probability of death. Certain public investment projects don't really affect people's lives, but on the other hand modify the probability of death. For example (Rosen et al., 2008, p. 164), it is not known that cancer research can save lives and all that can be said is that it can reduce the probability of death. The reason this distinction is so important is that although people consider their lives have an infinite value, they constantly accept death probability increases for limited sums of money. A person driving a smaller and lighter car is exposed to a greater probability of death from a car accident than another in a bigger and heavier car, all other aspects being identical. People are willing to accept an increase in the death risk because of the money saved from buying a cheaper car.

The third method for valuing the human life is based on *the risk preference*, depending on the choice made. Some jobs have a death probability greater than other. Bringing into comparison two workers that have identical qualifications for the job, regarding education, experience, etc., but one has a more risky job, it is expected this last worker has a bigger income to compensate the higher death probability. Human life can be given a value by estimating the price

people would pay to reduce their death probability, this price being the difference between the two revenues. This method's limitations are represented by the fact that a series of assumptions are made. It is considered that people have all the information and are able to identify the risks and express their risk-award preferences.

Another method for measuring the human life refers to *the governmental preference* and this new approach is not based on the values given by each person, but encounters, on the other hand, the existing governmental programs and how much it is spent for saving lives. The fact the government is prepared to spend great sums of money for public safety suggests the public sector values human lives at a very high level.

The Canadian Government uses a *method based on statistics*, which takes into account the numbers and the nature of the accidents, calculates the treatment costs and the income-loss costs, extrapolating afterwards for all the injured population (Treasury Board of Canada Secretariat, 1998). In the economic literature, the empirical estimates for the human lives vary from \$200.000 to \$3.000.000. The Canadian Transport Department uses the following estimations: for fatality: \$2.500.000; for serious injury: \$66.000 and for minor accidents: \$25.000<sup>(1)</sup>.

Even though the majority of people state that there can not be established a price for a human life saved, this being priceless, unfortunately, the world has limited resources and the only question in this situation is if there are being used rational means for setting up the prices.

### 3.2. Discounting costs and benefits and choose the discount rate

Generally, costs and benefits occur in time and in order to be summed up and compared, to obtain a relevant net benefit concerning the financing of the public investment project, all benefit and costs flows have to be discounted at a particulare moment.

The present value of a future sum of money, defined as the maximum sum a person is willing to pay today in order to have the right to receive it in the future, can be obtained using a simple algebra exercise, but the one that meets difficulties is choosing the rate of discount. The discount rate chosen by the private sector needs to reflect an investment rate for alternative investment projects. If there is an investment that has an annual rate of return of 10% and the income tax is 50%, then that investment assures the company a net earning of 5% per year. The opportunity cost of putting the money in a new project is 5%, the rate that should be used as discounting rate for a new investment. From the conceptual point of view, the company's opportunity cost gives an accurate value of the discount rate. The question here is whether this rate can be also used by the public sector. If the government establishes its calculation on the private sector opportunity cost, the best alternative is putting the money in the private sector. Opposed to the private sector, the public sector doesn't guides its decisions only on the earned income, after deducting the income tax, as long as the government is the one collecting the tax. *The social cost of renouncing to invest in the private sector* is 10% for the government: 5% net and 5% income tax, this being the rate used for dicounting.

Another approach is that public expenditures valuation takes into consideration *the social discount rate*, which measures the value society puts on the consumption sacrificed in the present. The social discount rate is lesser, for a few reasons. Firstly, in theory, the government cares about the future generations. The private sector allocates few resources for savings, applying a high discount rate for the future earnings. Secondly, the public authorities should use that discount rate people would use, if they knew what's best for

<sup>(1)</sup> The valuations are in constant prices of 1986.

them. This is the government's paternal role, forcing citizens to consume less in the present and to have more in the future, when it is supposed they will thank the government.

For a more accurate choice of the rate of discount, usually, the sensitivity analysis is used in order to see the way different rates of discount influence the decision. And so forth, in the cost-benefit analysis the risk and uncertainty have been included.

Over time, governments have used a variety of discount rates, depending on the type of the public investment project to implement. In The United States of America, The Office of Management and Budget recently issued new rules, according to which the federal agencies are asked to conduct two separate analysis for project evaluation: one using a discount real rate of 7% and the other one a discount rate of 3%. 7% is the estimated investment rate for the private sector, being an adequate rate for projects that obtain the resources from private investment and 3% is an estimation for the rate that society discounts the future consumption, being the most adequate for projects that obtain resources from private consumption. The Office recommendation to use both rates leads to observing the outcomes and the significant differences. For public investment projects that influence future generations, The Office of Management and Budget also recommends a sensitivity analysis, applying other two discount rates: 1% and 3%.

Moreover, costs and benefits need to be measured in constant prices, their real value being the one taken into consideration in the cost – benefit analysis, because it doesn't reflect the changes induced only by the prices alteration.

### ***3.3. Reflecting the cost-benefit analysis evaluation using outcomes of consumers and producers behavior***

The benefit and cost evaluations should reflect the preferences of past choices. If people can choose between parking their car closer to their destination for a fee of 50 cents and walking five minutes and choose to pay and save time and effort, then they showed that time is more important than 10 cents per minute. If they were indifferent between the two options, then they would have revealed the value of time was exactly 10 cents per minute. A great challenge of the cost-benefit analysis is finding a past choice that would reveal such transactions and equivalences for preferences.

### ***3.4. Avoid the double accounting***

Seldom, the project's impact can be measured in two or more ways. For example, when an improved motorway reduces the travelling time and the injury risk, the houses value in that area may rise. The increase in the houses value as a result of the project is a good approach, at least as a principle, to measure the benefits. But, if the increased value is already counted, there is no need for the value of the time and human lives saved as a result of the improved motorway to be counted. The value of houses has increased because of the time saved and reduced risks. To include both increases, the value of the houses plus the time saved and reduced risks, would result in double accounting.

All this being said, we can conclude that cost-benefit analysis is much more than an algebra exercise, requires heavy study, comparison over time, entailing many fields, not only finance.

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## FINANCIAL EQUILIBRIUM IN EUROPEAN UNION



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***Abstract.** This study is meant to evaluate the financial equilibrium in the states recently adhered to EU, on the years 2000 and 2005 and to mention dynamic factors of the phenomenon. In order to observe the situations of these countries in the European community, as well as in the world, comparisons have been made with the average level of EMU states; also a comparison has been made of the average level of the EMU states with the level of the greatest economic powers of the world.*

**Key words:** macroeconomics; financial equilibrium; budgetary indicators; economic growth; European integration.

**REL classification:** 8E, 8M, 16E, 18B, 18F.

The financial equilibrium in the European Union (UE) is well reflected through Maastricht conditions of acceding to European Monetary Union (EMU). In the analyses concerning the financial equilibrium, indicators as the rate in the internal gross product of the net export, the rate of the recent balance account in the internal gross product, and so on.

In this analyse made by us we have done an evaluation of the economic-financial equilibrium at macro level, in the hypothesis that the financing of the general social needs is made through the gross domestic product (GDP) and through the direct foreign investments. In the field of general social needs we introduced: budget's balance, the gross capital developing, the net export and the duty work, all expressed as ponders in internal gross product: we expressed alike direct foreign investments. The balance of this economic-financial trade represents the financing source of the population's life standard, above the social contribution reflected through the balance of the budget, the net export and the dept.

In the table 1 we evidenced the net balance of the life standard financing, for the countries integrated in EU after 1 January 2004, compared with the average situation of the countries in EMU, in the dynamic on the years 2000 and 2005.

*Table 1*

Country	The net balance of the standard life life financing		Growth indicator (2000=100)
	2000	2005	
Bulgaria	75.8	60.3	79.6
Czech Republic	64.5	71.4	110.7
Cyprus	66.6	62.3	93.5
Estonia	84.8	60.4	71.2

Latvia	64.4	37.9	57.1
Lithuania	65.8	61.3	93.2
Malta	60.1	59.5	99.0
Poland	66.7	70.9	106.3
Romania	70.5	67.0	95.0
Slovenia	64.4	68.9	107.0
Slovakia	52.4	56.1	107.1
Hungary	52.9	52.1	99.5
EMU	88.3	81.7	92.5

**Source:** Our computations.

We can observe a relatively generalised diminution of the net balance indicator (8 states from the 12 analysed), including the EMU average. The diminution is strong for three states (Bulgaria, Estonia and Latvia) and it modifies for the rest of them (in the limit of 6.5 percentage points).

The main causes of this phenomenon can be seen from the dynamic analysis of the indicators above mentioned and they consist in:

a) the accentuation of the budgetary deficit in the case of Cyprus, Slovenia, Slovakia and Hungary; also in the case of EMU; for the rest of the states the budgetary deficit has been improved influencing as a favourable factor;

b) the capitalising effort through gross accumulation of capital in the case of Bulgaria, Estonia, Latvia, Lithuania, Romania; for the rest of the states including EMU this effort is relatively slower. For the 5 named countries we can point out that the relative growth of the capitalising effort appeared because of the unfavourable dynamic of the internal gross product, and also to the low and out of current standards level of the technology. For the other countries, including EMU the real growth of the internal gross product and/or its great volume have lead to the rate's diminution in the internal gross product of the gross capital creation although the capitalising dimension grew;

c) the accentuation of the negative net export in the case of Bulgaria, Estonia, Latvia, Lithuania, Malta and Romania; the accentuation is to cotes of 3:1 in the case of Bulgaria and 2:1 in the case of Estonia, Latvia and Romania, thing which rises the problem of the financing capacity in the case that the problem persists. In the case of the three Baltic countries the phenomenon is associated with the growth of the rate in the internal gross product of the public duty also as the rate in the internal gross product of the public duty service. It is to be evidenced that for the 12 analysed countries it is generalised the negative net export in the year 2000 and also in the year 2005 (year for which Czech Republic is an exception). In the same time the average of EMU for this indicator evolved positively from 0.7% in the year 2000 to 1.5% in the year 2005;

d) the accentuation of the rate in the internal gross product of the public duty service in the case of Bulgaria, Cyprus, Estonia, Latvia, Malta, Poland and Hungary; the accentuation is at cotes of 1.5:1 to 2.5:1 and for some countries it came till 20% (Bulgaria, Latvia, Hungary);

e) the relative diminution of the rate in the internal gross product of the foreign investments in the case of Czech Republic, Cyprus, Estonia, Lithuania, Poland, Romania, Slovakia and Hungary; a tendency alike is to be found on the EMU states average, for which it is registered a massive diminution of volume, phenomenon also seen in the case of some named states.

For a comparison in a larger context we have determined the net balance of the standard life financing for some of the great economic powers of the world, in the dynamics for the year 2000 and 2005.

Table 2

Country	The net balance of the standard life financing		Growth indicator (2000=100)
	2000	2005	
MEU	88.3	81.7	92.5
OECD	82.0	77.8	94.9
USA	78.9	73.5	93.2
Russia	93.4	99.4	106.4
China	64.7	62.3	96.3
Japan	75.7	77.7	102.6
India	69.9	59.6	85.3

Source: our computations.

In the case of the great economic powers of the world can be observed a tendency of diminution alike of the net balance indicator in the limit of 7.5 percentage points. The exceptions are Russia and Japan for which are registered growths of 6.4% and respectively 2.6%, and also India for which an accentuated diminution is registered of 14.7%. The factor determined in the case of India is a lowering for about 10.0 percentage points of the gross capital creation, the similar difference of those of 59.6% from the year 2005 compared with the level of 69.9% from the year 2000 of the net balance of the standard life.

Excepting India for all other six great economic powers of the world the diminution of the net balance is only relative, because the growth of the internal gross product volume led to the growth of the net balance volume.

The high level of capitalising from these countries (excepting China and India) assures a favourable evolution of the capitalising, although its rate in the internal gross product is about 20%. In relative terms the capitalising effort of these countries appears as sensitively smaller than in the others where this rate is frequently seen at levels of over 25%, respectively over 33% in the case of India and over 43% in the case of China.

Concerning Russia, the favourable factors of the growth of the net balance indicators are the budgetary rate balance (positive at the levels of 7% and 10% in the year 2000, respectively 2005) and the rate of the net export (positive at the levels 12.7% and 13.5% in the year 2000, respectively 2005).

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## FISCAL SOVEREIGNTY IN ROMANIA – EUROPEAN UNION MEMBER STATE



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**Abstract.** *The Romania's adhesion to the European Union involves multiple transformations with a direct impact upon many fields, such as law's field, especially economic, fiscal laws. Taxation system should be both efficient and equitable. One of the important problems is sovereignty of state became member of one regional organization, his fiscal sovereignty, state's attributes in this field. Who can decide fiscal policy, direct taxes or taxes upon consumption? Is it attended by this adhesion to the sovereignty? There are some questions appreciated as very important which we try to answer in this paper.*

**Key words:** sovereignty; fiscal sovereignty; adhesion; fiscal policy; European community law.

### ***1. Sovereignty and fiscal sovereignty***

Sovereignty is a feature, an attribute of the state, but also a fundamental truth of relations between states. Cooperation between states is possible only based on the agreement of the sovereign states, their wittingly and engaged participation. Cooperation between states also requires sovereignty deeds, willing demonstration of agreement or disagreement, to appropriate or not new forms of collaboration.

The contemporary international society has known in the last decades multiple evolutions. Under the existing conditions of globalization, various international forces had appeared, and national states hadn't proved to be able to keep up with the new "defiances" that are getting booked on the world wide arena. At the same time, the possibility of people to participate directly to the international life, to address directly to forums or international courts, had grown, which "erodes" the "absolute" nature of sovereignty (Careau, 2001, p. 35). As a general rule, each state's Constitutions (Organic Law) devote the public authority's features. So Romanian's Organic Law (Constitutions) establishes the fact that the Romanian state is a national state, sovereign and free, unitary and indivisible. The sovereignty fundamental truth is established like this: "national sovereignty belongs to Romanian people who exercises it through its authority".

The independence- as side of the sovereignty that express the independency of the state in his relations with others states – gives to the national state that power of decision which allows it to harmonize his legitimate interests with those of other states (Mazilu, 2005, p. 215).

The sovereignty is the principal instrument by which the power of state fulfills its objectives concerning the organization and development of social intern relations and foundation of establishment and unfolding of relations on international level (Geamănu, 1981, p. 137).

By these characteristics, the sovereignty is, from a legal point of view, a central institution in different branches of law.

In the financial internal law and for the international one the *fiscal sovereignty* is accepted and it manifests so.

On intern level, the fiscal sovereignty is an exclusive capacity of state on the fiscal field, capacity that doesn't share with no one and on the manner that applies this capacity doesn't respond in front of the other instance or international organisation (Condor, 1999, p. 23).

Others specialists (Cartou, 1981, p. 14) appreciate that "the fiscal sovereignty can be defined as power to institute a taxes system, either on legislature way, or on statutory way, that owns a technical autonomy in relation with systems susceptible to get in competition with it.

Each state has the full liberty on choosing the fiscal system that intent to introduce, to specify the taxes that compose it, the tax payers, the taxes base, the taxation rates, the payment terms, sanctions and facilities (Văcărel, 1995, p. 33). This manifestation of liberty of the state in the fiscal field is well-known in the fiscal practice and in reference material as fiscal sovereignty. The capacity of a state to institute and perceive taxes on a certain territory is fiscal sovereignty that is an exclusive capacity of it (Văcărel, 1995).

For defining this essential capacity we appreciate that we must consider also the constitutive elements of an upward and downward cadre on "the institution and perception of taxes", respectively the finance and fiscal policy", the financer device with the administrative methods of management in the fiscal field and with specific juridical norms (Roman, 2006, pp. 78-79).

The principal load of each state, borne from the necessity to constitute public funds, that permit the public authority to exercise the intern and extern functions, "the fiscal sovereignty represents the undisputed right of the state to establish in a free and independent way, in first place, the taxes system, taxes, contributions, and in the second place, but not less important, to establish the fiscal policy of the government, as well as the financer-fiscal device, administrative methods of management in the fiscal field, specify juridical norms"(Roman, 2006, p. 75).

## **2. The relation between political sovereignty and the fiscal sovereignty**

In the unitary states usually the fiscal sovereignty is keeping with the political one (governmental). Anyway, with internal settlements of some of these states, administratorial-territorial authorities can receive limited rights to establish taxes for the local level, respectively, they get, with a limit, fiscal sovereignty, but still this does not touch the political sovereignty (governmental).

In the federal states, the two sovereignties (the political and fiscal ones) superpose, usually, only at the federal level, in other cases, the public authorities of the member states, and the local ones too, benefiting of a limited fiscal sovereignty that don't damage the sovereignty of the federal state.

If the fiscal sovereignty doesn't superpose with the state sovereignty there is the possibility that, for example, even though two states make a fiscal agreement with the purpose to avoid the double taxation, although this to happen, against the conventions purpose in the situation of collecting local and governmental taxes set up by public authorities against their limited fiscal sovereignty, if these taxes were not stated in the agreement.

## **3. The fiscal sovereignty in Romania – member state of the European Union**

### **3.1. Sovereignty and the comunitar rights**

In the adhesion Treaty of Romania to the European Union, is reflected, on one side, the decision of the member states to accept Romania's adhesion to the group of the 25, and, on the other side, Romania decision to become a member of this group.

The judicial semification of this treaty is that, starting with January the 1-st 2007, Romania became a full member with rights and obligations of the European Union. So, Romania beneficiates of rights and advantages from the European Union, but she also gets obligations, contributions, and participation to the common efforts to assure the development sustainability of the European building. There must be mentioned the fact that there exists an autonomous, judicial order, integrated in the member states right. The autonomous, judicial order is appreciated like an “organised and structured ensemble of judicial norms having own sources, with organs and procedures capable of emitting, of interpreting and constatating and sanctionating if case of encroches” (Isac, 1999, p. 117). The judicial autonom order is different from the international and internal law, anyway it exists a special relation between the right of communities and that of the member states.

It's important to mention the fact that the communitar treaties instituted a *new way of judicial order in whose advantage the states have limited in more and more expenced fields, the sovverane rights* and the subject are not only the member states but also their residentship. An important feature of this new judicial order is its preemption to the member states (Popescu et al., 2005).

Manifesting its sovereignty, the states aderate to regional, international organisations, based on their free agreement, but at the same time, in some fields they hold back their sovereignty, accepting internal norms, foresights of the communitar right. If there are financial and fiscal problems, then the fiscal (internal) sovereignty is also limited, the state is obliged to include to foresight, and to apply communitary reglementations.

In order to understand the force of the communitary reglementations in its generic meaning, the different categories of the rules regulating of the communitary law must be presented:

- *Original law* – which includes the rules that can be found in the fondation Treaties and in the judiciary instruments which are anexed to them or which modify them (Popescu et al., 2005, p. 96);
- *Derived law* – which includes the documents elaborated by the comunitary organs: regulations, directives, decisions, endorsements and recomandations.
  - *Regulations* have general aplicability, they are compulsory in all component elements and impose to the member states not only the results that must be achieved, but also the application and execution forms; these are directly aplicable in and not only by the member states.
  - *Directives* represent the judiciary act which have double effect: internal and comunitary; they are compulsory as far as the results to be achieved are concerned they are not immediately apliable. They have to be transposed in the internal law and impose a deadline in achieving these results to the ones they are aimed at.
  - *Decisions* are compulsory in all their elements for the ones they're specifically destined. They don't have general aplicability. They established the results to be achieved and the methods to be used. It has to be mentioned that the member states have the right to decide individually judicial form in which these decisions will be transposed in internal law.
  - *Endorsement and recommendation* are comunitary documents of derived law (Isac, 1999) that do not imply limitations from judiciary point of view, but are useful orientative instruments of judicial conductes and legislations (Popescu et al., 2005). Besides the documents mentioned above they are also other documents called atypical documents, the documents of the authorities whose functioning is not regulated by treaties. Those produce judiciary effects over interinstitutional relationships.
- *Conventional law* – which includes the conventional documents, held between the member states or between them, the communities and other states.

- *Jurisprudential law* – which includes the decisions of the European Justice Court.

From the mentioned facts it *results different manifestations of sovereignty*, in general and in particular, in some fields, regarding the obligable or imperative character of the recommended character of the emitted documents of different institutions of the European Union.

### 3.2. *The fiscal sovereignty in Romania*

Through the Romanian Constitution are predicted fundamental concepts regarding the international relationships, international and internal law.

The fundamental law says that the Romanian state obliges him to do as said and in good faith his part of obligations resulted from the treaties he is part of. The ratified treaties by the Parliament, according to the law, are part of the internal law.

Thus the fiscal convention held for evoding the double international judiciary taxation, association agreements, the adhesion to different international regional organisations, from the moment of ratification by the Parliament become components of the internal legislative patrimonium and they apply as so (Roman, 2006).

There are two great aspects:

*a. The coexistence of two special laws*, through one law being recognized the priority of another.

The law principle “*specialia generalibus derogant*”, the priority of a special law toward a general law, is being applied in the fiscal field, too. In this way, through the Fiscal Code is recognized this principle “the Fiscal Code provisions prevail on any stipulation from other normative act, in case of a conflict between those are applied the Fiscal Code provision.

More, through the Fiscal Code is recognized the special law character of a international treaty comparative with the special law which is the Fiscal Code: “if any provision of the Fiscal Code contravenes a provision of a treaty which Romania is part of, the provision of that treaty is applied. The international treaties signed through the manifestation of independence and the state sovereignty can include provisions opposite to the national fiscal aspects adopted through the fiscal sovereignty and with all this, to hold priority in the application, limiting the applicability of the internal fiscal law.

*b. The existence of a special law* (for example the Fiscal Code), which in its content contains the comunitary settlements, became compulsory through the approval of the Romanian Parliament, like:

- the necessary measures for the implementation of the administrative cooperation system and change of information with the states members of EU in the area of the tax on the added value, the excises and the income tax;
- income tax-free foreseed expressly in agreements and memorandums aprooved through normative acts;
- forms of organisation for foreign juridical persons (art. 20, alin. (4) Fiscal Code);
- intracommunitary deliveries of goods;
- intracommunitary acquisitions of goods;
- nontransfers.

In the past few years until the moment of the adhesion, Romania had harmonized the national fiscal legislation with the comunitary one regarding the indirect taxes – the tax on the added value, the excises and the custom taxes had insered in the national legislation of EU districtives in the taxes field like:

- the fusion Directive (90/434/EEC) turned to the postponement of the capital gains tax in the case of certain international transactions of reorganisation of enterprises;
- Directive about the mother-enterprise and its filials from different member states (90/435/EEC);
- the agreement regarding the elimination of the double taxation regarding the correction of the profits of the associated enterprises (90/436/EEC).

The adoption of a common system of taxation on the added value (the sixth Directive/1977) wasn't followed by a Harmonization of the taxation bases and the afferent levels, still willing in the future this thing.

Any harmonizing proposal of the nationals notice in contents of the taxation's base and rate through the communitary legislation must satisfy the subsidiarity's principle. From economical point of view this criterio presents three consecutive aspects (Duculescu, 2007, p. 33):

- the manifestation of the transfrontalier externalities;
- the externalities can't be diminished only through the voluntary coordination of the member states (manifestation of the sovereignty);
- any communitary solution suggested must not create sternel problems than the one's that wishes to solve.
  - ✓ As a conclusion, it can be possible to appreciate that through the international agreements *it has been created a communitary juridical order distinct by the order of the member states*, meaning, after in the first stage on the statal sovereignty base it has been adhered to Communities, in the next stages for some fields it is enter upon commune politics, it is applied communitary issues partial limiting to statal sovereignty, and in certain fields abolishing the fiscal sovereignty.
  - ✓ It has been recognised *the priority of the communitary law on the internal law of states and directly aply* on the territory of the member states mentioned in agreements, in susidiar communitary law (a law created by the communitary organs). Also, it must be mentioned the fact that the competences division namely: to what extent establishes the European Union and the national stat capture directly the stamp on the member state sovereignty.
  - ✓ The increasing of the communitary competences in different fields due to emphasizing and diversifying the integration development *lead to new juridical problems*, for certain interests, in exercising the competences in filed by the communitary institutions in their relations with the member states. Thus, there are situations in which the juridical communitary environment is overtaken by the proportion and volume of the activities from communitary territory.

For purpose the communitary environment configurations for free circulations of goods and services has been impose on the begining period the indirect taxes harmonizing limiting the fiscal sovereignty of the member states in this field, letting to understand that the direct taxes reglementations remain a fiscal attribute of the nationals states. But the more intens manifestation of the free circulations of the persons and capitals, the warning and controlling the unloyal competition, the tax evasion imposed the communitary law intervention also in the direct tax field.

- ✓ There is also a *movement between some competencies from the communitary level to national level and reversed, the propotions being different*, and the connection between the statal and fiscal sovereignty is underlined based on the limitations of legal environment.

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## REGARDS ABOUT FISCAL COMPETITION

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***Abstract.** This paper aims to present the concept of fiscal competition and its impact on the "brain-drain" phenomenon, on one side, and, on the other side, the impact of fiscal competition on the financial privacy, through the measures taken at european and world wide levels to fight against the fiscal competition phenomenon.*

*The paper will present the fact that both the fiscal competition phenomenon and the financial privacy are two important aspects of the freedom of the people and that together they are imperative for an harmonious global economic growth. But, at the same time, the fiscal competition phenomenon can have an impact on the "brain-drain" phenomenon, reckoned as an negativ phenomenon who has an negative impact on the source country and, yet, a positive one on the receiver country.*

**Key words:** fiscal competiton; financial privacy; global economic growth; information sharing; Money-laundering.

REL: 10 – Economy and Globalization (10C – International Economic Organisations, 10F – International mobility of the capital. Foreign investments, 10G – International mobility of work capital. Migration)

Polemic notion – the fiscal dumping or the fiscal competition – can be defined as the non-cooperant competition between two or more parties (public actors) that are looking to improve the attractivity of their territories through profitable fiscal measures, without putting in danger the amount of public revenus used to finance the public policies promoted. The competition between different fiscal systems can lead to the diminishing of some public expenditures or to the rethinking of the fiscal pressure. This way every country will re-examine its one fiscal system and will try by cutting off the fiscal pressure on the mobile factors (labour and capital) to increase the foreign investments or just to sustain the cost and the development of the present ones. Beeing able to move across the European Union territory freely one can establish his/her's residence in that state that will offer the optimal combination between the fiscal pressure to be felt and public goods received.

Often it is thought that the fiscal competition phenomenon has a less good influence on the stat it "attacks", like the Organization for Economic Co-operation and Development (OECD) wrote in the Report of 1998, "it is influencing the financial flows, it is discouraging the submission to the fiscal policies, it is transferring a part of the fiscal expenditures on the less mobile bases".

When it comes to the fiscal competition and the wage revenues we should be taking into account the next aspects:

- How much is the minimum wage per hour;
- How much are the social contributions;
- What rates (quotas) are used to establish the value of the income tax.

One the other side of the problem lies the privacy of the financial informations – every individual has the right at his/her's financial privacy – the datas regarding the value of his/her's revenue, expenditures, investments and wealth must remain secret. If this right is violated, others fundamental rights might be in danger like: the right to own an property, freedom of speech, the right to a free economy (The Romanian Constitution has established these rights in the second chapter – Chapter II – The Fundamental Rights and Liberties).

In the United States of America (USA), where the freedom of people is protected by a wide series of laws, the IV<sup>th</sup> Amendment of the Constitution is forbidding unreasonable searches and seizures, based on a british saying – “every man's house is his castle”, nobody has the right to come in uninvited. (Rahn, Ruggy, 2003, pp. 3-4)

In 1976 the Supreme Court has decided that all the banks customers have no legal right upon the privacy of their financial datas held by financial institutions (banks and others) considering that they had voluntarily given up this right by doing business with a financial institution that has public financial statements. As a response to this the Congress has approved in 1978 the Right to Financial Privacy Act, a law that gives statutory protection to the financial informations – no govermental authority can obtain or access the financial informations of one individual unless it has a reasonably description of these. Furthermore the owner of the financial informations – the bank customer – must authorize the access or there must be a search warrant or an appropriate subpoena from an authorized governmental institution.

Switzerland is one the states with the highest standard when is comes to the privacy of financial informations, since 1934 there have been introduced penal sanctions for the violation of this right. In 1931 Germany has intensified the controls on the foreign financial relations, Adolf Hitler passed a law that punished with death any citizen that had anyother sort of capital than national one. The Gestapo started spying upon the swiss banks being a fact at that time that many german jews had their money placed there. In 1932 was published a list with 2000 names – french citizens, names with a greate impact at that time, senators, former ministers, generals and priests – that had their fortune saved in the swiss bancar system. Taking all this in consideration France announced that it will pressure Switzerland to surrender legal power over these accounts.

In 1990 a new threat to the financial privacy appeared as a result to the combine efforts of the states to fight against the negative effects of the fiscal competition phenomenon. These efforts often suppose that different states should share financial and fiscal informations. The OECD has started promoting policies designed to put pressure on some countries thought to be fiscal paradises – Switzeland, Luxembourg, Liechtenstein, Bermude, Cayman – to lower their financial privacy policies, by introducing the notion of “harmful tax competition”. Otfen such initiatives are bounded with the efforts to fight against terrorism or to prevent money laundering, but the hidden purpose is to gain access to informations about the fiscal systems of your opponents.

In 1998, in Romania was settled the professional secrecy in the bancar system and the exchange of informations between autohorities by the bancar law (Law no. 58/1998, republished Law on bancar activities – Chapter VIII). It was defined that financial informations can be accessed by authorities at their written demand – who owns the accounts and what kind of transanctions where made from these accounts, just to follow if all this was somehow connected with money laundering or terrorism.

In 2006 the Government Ordinance no.131 through article 16 give the right to “access a computer own by anybody without a warrant from a judge” to the Direction of Investigation of Organized Crime and Terrorism. Furthermore this institution making as a purpose ”to collect evidence or to identify the guilty is allowed to take messures, according to the Penal Procedure Code, as fallows:



- a) putting under surveillance the bank accounts and all the assimilated accounts;
- b) putting under surveillance, interception or recording of communications;
- c) access the IT systems".

In 2001 the OECD released a report regarding the fiscal competition blacklisting 41 countries that possessed low-tax fiscal systems like United States of America, Canada, Australia and a series of European countries. In the report were also presented the reasons why it is so impetuous to share informations regarding the financial situations of the citizens, arguing that a series of states is trying to realized a global fiscal system – that is to impose their citizens where ever they are – and to do so they need access to financial and economic informations.

The United Nations Organization report (2001) is suggesting the creation of a global fiscal system that will be applied to all the emigrants, but this proposal is a violation of the civil rights. The United Nation Organization argued that the proposal was based on the "brain-drain" phenomenon and it is justified by the fact that the source country is subject to major economic losses if the majority of its high qualified people are emigrating.

This problem is fragile case the notion brain-drain implies the most sensitive form of transfer that of the human professional capital.

In 1987 the OECD report is defining the notion as a flux of comes and goes between two states – one is the source state and the second is the receiver state. If the flux is realized only in one direction we can talk about the "brain gain" for the receiver state, or "brain drain" for the source country. Also we can talk about "brain waste" when people with high education will migrate but they will never find a work place suite to their qualification.

The brain drain and the fiscal competition are tide up by the mobility of factors and in the European Union where there are no borders the cultural integration is increasing the chances for the emigration phenomenon. The brain drain phenomenon is influenced by both the citizen and central authority according to their choices. If education is a public service and the states are not efficiently administrating their public financial resources and at the same time the public expenditures used to cover the demand of public goods and services it can easily appear the negative externalities. This mean that in the source country the lower public revenues will generate a decrease in expenditures a lower redistribution of revenues and all these will have as consequence a lower economic growth.

Once with the enlargement of the European Union there are two categories of countries – the old ones – the developed ones – and the new ones – in the course of development. To increase their national attractiveness the European Union states are using fiscal facilities for fields like research (Sweden, Danmark), IT (Germany, England) or medicine (England).

In Romania we are facing too the brain drain phenomenon especially among high educated ones. This is due to the low level of the monthly wage and to the better work conditions offer abroad. Another reason is, although since 2004 the revenues are levied according to a flat tax of 16% the level of contribution is still high - 17%. The same tax is used to impose the revenues of the agents. In the short term we will find an increase in foreign investments in Romania, but in the long run we will find that the effects of the fiscal competition will be intense because of the emigration of the qualified "brains". In 2005 the emigrants with the age between 26-40 were representing 58,1% for the total of emigrants considering that in 2000 they were only representing 38,8% for the total.

A close analysis of the impact of fiscal competition on the fiscal pressure felt on the qualified "brains" is shows that the youngs that are choosing to work abroad are in a increasing number and that over 99% of them are deciding to work there after the studies are over. The developed countries are offering to young people the guarantee of success with the

perspective of an high revenue in the conditions of the optimal fiscal pressure. We have to underline here that the receiving country is capitalizing the “brains” and the source country is suffering from a leakage of “brains” and at the same time the added value that can generate development is decreasing.

As for Romania from almost 9.500 exchange students that are studing in our universities only 1.500 of them are coming from the European Union (25) countries the rest are coming from the Republic of Moldavia, Israel, Turkey, Greece or Albany. In comparison, The Czech Republic is “importing” twice as much inteligence then it is annually “exporting” and the Ungarian Republic with 60% more.

Starting form all the things presented in this paper, we can appreciate that the effects of the fiscal competition on the states of the world have different impacts, increasing the already existing differencies between the high develop countries and those in course of development, the later beeing “knocked out” by the “harmful tax competition”.

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# THE REFORM OF THE LIBERAL PROFESSIONS – INITIATED MEASURES, CONTROVERSIES AND RESTRICTIONS

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***Abstract.** The reform of liberal profession is, to a large extent, convoluted due to the difficulty to separate the strictly necessary rules from those unnecessary or even damaging for consumers and for the profession itself. Studies performed at the European Commission's request have highlighted the existence of important differences as regards the level of regulation existing in various Member States and between various liberal professions.*

*The European Union considers that the best way to perform the modernization and the reform in this field should be the voluntary action of the stakeholders; the regulatory authorities and professional authorities with self-regulating role should reassess the existing legal framework and define the sphere of the rules that are strictly necessary for the achievement of a public interest objective.*

*The European Council from March 2005 underlined the importance of competition advocacy in all fields, including in the area of liberal professions; the Member States were requested to review national legislation with a view to ensure its compatibility with the Community rules on removal of barriers and on opening-up the internal market to competition.*

**Key words:** liberal professions; reform; restrictions; competition; regulation.

**REL: 7H.**

The actions undertaken by the European Commission to reform the liberal professions on competitive bases have already registered some results, even if a consensus has not been reached at the European level until now.

The national competition authorities of the EU Member States followed the European Commission's example and involved actively, especially during 2004-2005, in reforming the liberal professions in their countries.

Their activities had different targets in the sense that certain authorities (Denmark, Ireland, Great Britain, Portugal, and Poland) drafted studies concerning certain liberal professions, thereby highlighting the factors impeding the competition development. Other authorities undertook consultations with the regulatory bodies and the professional associations (Greece, the Check Republic, Italy, and Hungary).

At the same time, a number of successful actions were undertaken in order to prevent the introduction of disproportionate legal provisions concerning certain anticompetitive restrictions: in Lithuania the provisions stipulated by the Law on pharmacies concerning the property, publicity and the market access were eliminated. In addition, certain proposals for eliminating the minimum fees in the case of notaries were promoted. In Hungary and Latvia amendments were submitted in order to eliminate the legal provisions on tariff fixing, whilst four other countries (Italy, Latvia, Lithuania and

Slovakia) involved in amending the qualitative restrictions on the access to the profession as regards lawyers, notaries and the technical professions.

Considering the category of restrictions, the process of reform has attained the following results:

### **1. Restrictions on the access to the profession and exclusive rights**

These (qualitative) restrictions as well as the exclusive rights are designed to ensure that practitioners of liberal professions have the necessary qualification and the exclusive right of practice within the respective profession. This is intended to provide an acceptable level of security with regard to the quality of the provided service.

However, there are also quantitative restrictions concerning the access to practice within certain professions. In most cases these restrictions, which are imposed by the professional organizations, limit the number of vacancies without considering the real market demand.

The quantitative limits as regards the notary and pharmacist professions are founded on the geographical and demographical criteria. This is because they are considered services of public interest that are required to be provided for all the citizens of a country. Almost all the Member States have kept these limitations (except for Slovenia and the Great Britain), but the reform plans provide the future amendment of these restrictions by increasing the level of freedom in the field.

The qualitative restrictions are present in almost all liberal professions. Reforming them is easier because in September 2005 Directive 2005/36/EC of the European Parliament and Council concerning the recognition of professional qualifications was adopted. It must be implemented by the EU Member States in their domestic law until 20 October 2007.

In the future, even if certain restrictions necessary for practicing within liberal professions will be kept, they will be harmonized at EU level in order to allow the free movement of services. This will have a direct effect in the case of certain liberal professions, where the access rights reserved only for the inhabitants will be eliminated.

### **2. Restrictions on business structures**

The restrictions on business structures and on forms of organization, which exist in almost all the EU Member States, are less visible. The practitioners are still required to practice the profession individually or in association with other practitioners within the same profession. When associating with other investors the practitioners are required to keep the majority of the registered capital or of the voting rights. This is considered the only way for defending the independence of the profession and for ensuring the quality of the services.

The opportunity to open pharmacies for investors which are not pharmacists was successfully introduced in the Slovakian legislation. This permitted the creation of pharmacy chains.

In other EU Member States (Belgium, Austria, Italy, Portugal, Germany and the Great Britain) the reforms of business structures affecting mainly the accountants, lawyers, architects and engineers are still underway.

Anyhow, after the adoption of the draft Audit Directive all EU Member States will amend the restrictions on business structures for the professions of accountant/auditor.

### **3. Price fixing**

Many European states are still keeping legal provisions concerning the price fixing within liberal professions:

- accountants/auditors – Greece, Italy, Portugal;

- architects – Luxembourg, Cyprus, Germany, Italy;
- fiscal consultants – Germany;
- engineers – Luxembourg, Cyprus, Germany, Greece, Italy;
- lawyers (with a few exclusive activities) – the Czech Republic, Estonia, France, Ireland, Luxembourg, Poland, Slovenia, Spain, Cyprus, Germany, Greece, Italy;
- notaries – Belgium, Estonia, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Slovakia, Slovenia, Spain, the Czech Republic, Portugal.

Even if these countries announced the intention to eliminate from the specific legislation the legal provisions on price fixing, only Germany, Slovenia, Italy and Slovakia have initiated the necessary measures.

Not all announced intentions are successfully implemented by the reform. There are cases when the fixed tariffs are replaced by a predefined interval for tariff negotiation (minimum and maximum limits).

The professions which stirred up major controversies with regard to the elimination of the provisions on fixed prices are the notaries and the lawyers, because the representatives of these professions promote the maintaining of these restrictions. The reason is that they are absolutely necessary for maintaining the prestige and the independence of the profession, as well as for providing qualitative services.

The last motivation is that prestigious and competent practitioners are leaving the profession, and that attracting well trained specialists can not be done if there is no perspective for appropriate financial recompenses.

In this context, the fact that competent specialists can find better paid jobs can not be denied. This is a valid rule for any liberal profession.

In addition, in the case of notaries a certain demand<sup>(1)</sup> is always present on the market. This is generated by the obligation to acquire notary services while concluding many legal documents.

In other liberal professions there is no limitation as concerns the negotiation of tariffs and no certainty in respect to the demand. However, these facts did not impede the development of the market, as well as the financial remunerations considered as reasonable by practitioners.

The Netherlands is the only Community state which had implemented substantial reforms concerning the notary profession starting with 1999. Consequently, the effects were seen in the increased number of notary bureaus, as well as in a bigger number of candidates for the profession – therefore a development of the market. On the other side, the fees concerning family law related documents augmented alongside the decrease in real estate transactions.

The analysis of the effects following the deregulation led to the introduction of maximum fees in respect to family law related documents, which are adjusted annually. In the near future, the notaries not wanting to become independent will be able to get hired within a public notary bureau.

The recommendation of a certain price or its fixing is considered a restrictive practice potentially affecting competition, because on a competitive market having a sufficient

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<sup>(1)</sup> In the notaries' case, we refer to the so-called "Latin notary profession" or "Civil law notaries". It envisages the independent persons with judicial studies which have supplementary counseling attributions in the relation with private law legal entities, the power to elaborate draft contracts and public documents, as well as to perform quasi-judicial tasks. They must not be mistaken with the civil servants: despite the fact that they are appointed and invested with a public function by the State and that their bureaus are public, the notaries are independent from the State's bodies and they obtain autonomously their revenues.

level of transparency any competitor can find out about the prices of the other competitors. Nevertheless, the competitor is not able to have a complete image of the market in its entirety. The result is that the price to be implemented is established autonomously.

When price fixing or recommended prices occur within a professional organization comprising direct competitors, we are dealing with a concerted practice which limits towards elimination the price competition, because the autonomy in making decisions by each competitor disappears. This behavior is similar with the monopoly acting independently from its customers in establishing the price.

#### **4. Recommended prices**

The representatives of the liberal professions consider recommended prices as necessary for offering consumers indirect information on the cost level of the services to be contracted. Additionally, they regard recommended prices as a protection against the “unfair competition between practitioners”.

In other words, even the professional organizations believe that a real competition would function between practitioners if the price fixing is to be eliminated.

#### **5. Advertising restrictions**

This category of restrictions - potentially affecting competition - is stipulated by the ethical and conduct codes, which are adopted by each professional organization according to the specificity of the profession.

Advertising restrictions are grounded on consumer protection reasons as regards the misleading statements, in order to prevent the “unfair competition” and to protect the professional integrity and independence. These practices may take different forms of advertising, which are usually used in other fields of interest.

The reforms started in the EU Member States confronted less opposition as regards the relaxation of the provisions on advertising.

Progresses have already been registered in many states: certain codes adopted by the professional organizations were modified – for example, in Italy in the case of architects and engineers and in Germany, for accountants etc.

Other countries (Denmark, Estonia, France, Germany and the Great Britain) are in the process of modifying the advertising rules specific for all liberal professions (the interdiction to use promotional advertising will continue to be kept in the future).

Hungary and France included in their plans of reform the option to modify the rules and even to allow, in some extent, the promotional advertising in the field of pharmaceuticals. However, most states accepted that advertising plays an important role in educating consumers.

Maintaining certain restriction on advertising impedes consumers to get familiarized with the market basics, such as the location where an expert can be found.

As concerns consumer protection from misleading advertising, a general framework has already been adopted by the European Union through Directive 84/450/EEC concerning the misleading advertising, amended by Directive 97/55/EC – already transposed by all EU Member States.

In many cases, the restrictions limit or eliminate competition between practitioners thus reducing the interest for reducing the expenses, for lower prices, for improving the quality of services or for diversifying the professional services as to respond to the economical evolutions.

Innovation could play an important role in professional services by diversifying the services and by improving their quality. As a result, more jobs could be created in a sector requiring a high level of qualification, and where the labour is well remunerated.

The European Commission proposes to the EU Member States to determine based on the proportionality test<sup>(1)</sup> whether to keep the specific regulation or to eliminate those not necessary for attaining the public objective involved. The main reason for keeping certain restrictions in liberal professions is that on these markets exist an “asymmetry of information”; usually, the market offers sufficient information for the suppliers, as well as for consumers so as the latter could appreciate the quality and the necessity of the services.

In the field of liberal professions consumers can not appreciate the real necessity and quality of the services because these assessments require a high level of qualification.

In my opinion, the delimitation of the necessary restrictions from the ones impeding the development of the profession, and which do not bring benefits for consumers, should be based on the separation of the restrictions influencing the “economic” (and their elimination or “relaxation”) from the other restrictions based on ethics and professional deontology. The latter restrictions are able to provide a sufficient security for consumers as regards the quality of the provided service.

The market failures in liberal professions are caused mainly by the asymmetry of information: the expert distinguishes the level and the quality of the service provided by him, whereas the client is unable to appreciate them, in the most cases because they do not have the necessary knowledge.

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<sup>(1)</sup> According to the proportionality test, each rule must have attached an obtainable objective alongside the reasons demonstrating that the respective measure is less distorting for competition and that it is absolutely necessary for achieving the established objective.

## THE INTEREST RATE – FACTOR THAT DETERMINES INVESTMENT IN SAVING INSTRUMENTS



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***Abstract.** The development level of a country also depends on the saving ratio of the population. In a country with a developed economy the savings placement options available to the population are very wide-ranging. The choice of an instrument is determined by the characteristics of the given economy as well as the financial culture of the population. Savings are low, the savings instruments market is less developed, the choice regarding the placement of savings is mainly determined by the level of the interest rate. However, the situation is different in a country undergoing economical development.*

**Key words:** saving ratio; interest rate; saving instruments.

JEL: G1



The level and the rate of growth of the GDP, calculated globally and per person, the saving ratio determined by the actual net income of the population are some of the indicators of evaluation of a country's level of development.

Transition economies are characterized by a low rate of domestic savings, owing to the very low real net income. However, a segment of population does manage to make savings. Where are these savings placed, and what determines the preference for different saving instruments? As far as "small savings" are concerned, we are also to consider small investors. To reach extended investments, in a first stage, the cash money on the market needs to be collected. Who contributes to this collecting in a "common bag"? On the one hand, it is the State, and on the other, the financial intermediates.

In the first part, our goal is to examine the financial instruments in which the population savings can be placed. Our attention is headed towards the placement of the cash money belonging to physical persons, small investors, without stopping at the financial instruments that address juridical persons, i.e. large investors. In the second part, we will deal with the interest rate, the most important element, on which the expression of the preference of the investors is dependent.

In a market economy with a poorly developed capital market, the possibilities of placing the available supplementary income are extremely reduced. The limits are given on the one hand by the financial culture of the population – a tradition or a culture of the financial markets and of the possibilities offered by these does not exist –, and, on the other hand, by the income level of the population – extremely reduced.

In the present article, we do not intend to direct the attention of the ones concerned on data, numbers or examples, but simply to show the orientation of the population towards certain saving forms and to indicate the factors that determine the individual behavior of the investor.



The preferences of the population in the placement of savings are oriented, in principal, towards the following instruments:

- saving instruments offered by the state: government bonds, treasury certificates etc.
- saving instruments offered by the private financial market: banking deposits, bonds, stocks etc.

The option for a certain type of instrument instead of another is given by the population's vote of confidence in the institution to which the instruments it invests in belong to, by the deadline of payment; however, primarily, individual behavior is influenced by the interest rate. It is important to insist on the fact that the confidence in the public power is considered unlimited, because the state does not represent an entity that could be declared bankrupt. Recent years have shown that this thesis can no longer be totally sustained, the failure of placing certain titles on the Romanian market proving that the main element considered by the investor is the interest rate. The population has the tendency to invest in those titles that offer in a short time interval the maximum potential profits. The preference for cash money obtained in a short time is penalized by a lower outcome. The interest rate is closely related to the falling due. The greater the falling due, the greater the possibility of obtaining higher profits.

In our opinion, there exists a very important factor to be considered by the population in the process of placement of savings. It is the destination given to these financial resources once they are collected. Are they directed towards productive investments or not? Still, it has been proved that, from the point of view of behavior, the individual with a poor financial education is subject to little or no influence of the destination of his /her savings, the main element influencing him /her being the level of the profits, respectively the interest rate.

The preference for choosing certain saving instruments should also be given by their fiscal characteristics, characteristics that may increment or reduce the attraction of the investors. The profit obtained by the investors can be weaved of duties or may be associated to a duty of preferential value. When the development of the financial market and the popularization of certain instruments are wanted, the saving decision may be influenced by tactics of fiscal politics.

In the transition period that characterized the Romanian economy during the last two decades, the placement of the population's savings was mainly oriented towards banking deposits and State bonds. The preference for the banking deposit instead of the state bonds was influenced by the preference for cash.

The economical background in our country, characterized by high interest and inflation rates, has been unfavorable to the use of state bonds on a medium and long-term. This fact has generated the excessive leaning towards short-term state bonds issue. We bring this to discussion, because we must ensure certain conditions of distinction between the characteristics of saving instruments. It is good to know that the falling dues offered along with state titles, in comparison with those of banking deposits, may be very different, thus the different possibilities of profit.

Banking deposits are elaborated with falling dues of one, two, three months, up to one year. However, state titles may reach falling dues of even 30 years. Still, we are to limit at those issued on a medium and long term.

Coming back to the interest rate, depending on its level, the saving instruments become or do not become attractive to the population. As R.A. Musgrave proves, the interest rate has the tendency to vary depending on the characteristics of the economical environment. The economical circumstances are the ones making the indications to the ones who decide the interest rate at which they should offer on the market the saving instruments, depending on their particularities.

The interest rate is also closely related to the tendency of the inflation rate and to the falling due of the instruments. Government bonds, whether they are short term or long-term ones, in order to be attractive, have to offer the interest rates that are superior to the interest rates at the banking deposits and to other saving instruments on the private market. In the contrary case, the investment in these instruments does not have insurance, the person choosing another type of instrument. Moreover, the interest rate must register a positive real level in order to ensure to the investors a benefit that remains untouched by inflation in time.

The state bonds that have long-term falling dues offer a level of the interest rate that is inferior to the medium and long-term of state bonds. The investors' preference for the high liquidity of titles on a short term is penalized by obtaining less substantial benefits. The theory of preference for liquidity states that the aversion to risk gives investors a preference for short-term investment, and lenders a preference for long-term investment.

Renouncing at immediate liquidity and investing money in saving instruments with a longer term is compensated by offering rates of interest that are higher as the falling dues increase. This proves the thesis sustaining that the curve of the interest rates is increasing depending on time.

We must show that there are major differences between placing savings in banking deposits and in state titles. In a first stage, we may make the following judgment: both instruments ensure a primary need to the population, respectively the possibility of placing their savings and obtaining profit. We go further with the analysis in order to see what happens when retracting these savings before the falling due. In the case of banking deposits at term, this leads to the total loss of profit. The continuous development of the banking market has determined the apparition of highly complex definition that no longer determines the interest loss for the entire period, but has reduced these periods. We have not set as a goal though to present the products of the banking products. Still, it is certain that these instruments circulate on the market in parallel with traditional banking products. The option for a certain product in the detriment of another depends strictly on the level of education of the population, and on the promotion of those products by the financial institution selling them. When placing money in banking deposits, the investor should be extremely alert and pay attention to another factor, respectively the level of the allowance corresponding to the banking institution that may thus decrease the actual rate of profit.

In the case of state titles, retracting savings does not imply the total loss of interest. As long as there is a secondary market, on which these instruments can be bought and sold freely, the profit is proportional to the number of days of holding the respective instruments, existing, naturally, a loss because of premature retraction.

As for the interest rate, regardless the chosen type of instrument, another aspect is also important, that of the modality of expression of the rate, to make investors also become interested. Increasing the attractiveness of saving instruments may be realized also by defining an interest rate that is either variable or fixed.

On an unstable market characterized by a high variation of prices or of the interest rates, two arguments for sustaining a variable rate are imposed:

- there is the possibility of obtaining a profit that is higher to the one expected in the moment of the placement, if the interest rate registers an increasing evolution (the assessment is true both for the placement of savings in banking deposits and in state bonds)
- the investors reduce the risk of accountant loss when the rate of the titles registers an increasing evolution (the assessment is true for the placement of savings in state bonds).

Placing savings at a constant interest rate has the disadvantage that, when the interest rate evolves in the sense of falling, the obligation of payment of interest remains at the level established at the time of constituting the deposit or of buying the state titles.

Defining a fixed or a variable interest rate brings both advantages and disadvantages. When these constitute of an advantage for those who place their savings, the counterparty consists of a loss for the institution offering these saving instruments. The higher the falling due is the higher the profit, respectively the loss for both of parts involved. It is recommended that the option for a fixed interest rate is combined with short or very short falling dues, so that in the future, regardless the evolution of the economical environment, the investor is not to be surprised, but able to negotiate more favorable conditions.

In conclusion, the greater the performance of the national economy, the higher the rate of the population's savings will be. Consequently, the financial market will find it necessary to diversify the offer of saving instruments, and the preference of investors will no longer be determined by the interest rate.

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# FISCAL POLICY AND REAL CONVERGENCE. THE CASE OF CENTRAL AND EASTERN EUROPEAN COUNTRIES

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***Abstract.** The European Union integration assumes that countries realized a real convergence process which is influenced by fiscal policy of each country. This study analyzed both absolute convergence (all countries will reach the same steady state level of income) and conditional convergence (countries converge to their own steady state level of income). These hypotheses were tested for Central and Eastern European Countries (1996-2006), focused on the impact that fiscal policy instruments had on economic growth and conditional convergence.*

**Key words:** absolute convergence; conditional convergence; fiscal policy; economic growth; economic integration.

**REL Classification:** 8E, 10C, 10D, 20F

## **1. Absolute convergence and conditional convergence**

Real convergence was defined as a negative relation between productivity growth and its initial level. But, as income disparities between different countries (or regions) were explained by different levels of productivity, we can define real convergence as a negative relation between real GDP growth rate and its initial level. This process consider that, assuming increasing marginal return to capital and capital accumulation, an economy can reach the steady state when the income-labor rate, capital-labor rate and exogenous rate of technological progress are equal. Real convergence can be viewed in two different ways: in terms of income level (if countries or regions has the same preferences and technology access then they will have the same level of income at the steady state and, in time, they will converge to this level); in terms of growth rate (as the steady state growth rate is determined by exogenous rate of technological progress and technology is considered a public good, all countries will reach the same steady state growth rate) – absolute convergence (Solow, 1956, pp. 65-94).

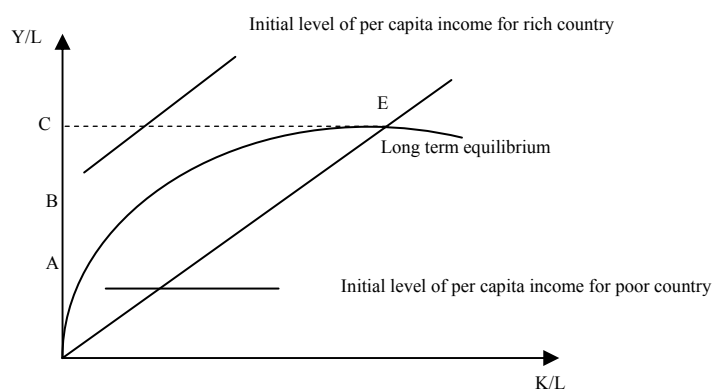


Figure 1. Absolute convergence

But, many studies showed that the negative relation between initial level of income and its growth rate is valid only when controlling for initial conditions. Thus, Barro tested and showed the existence of this relation, but only when controlling for initial level of human capital (Barro, 1990, pp.103-125). A new and more explicit approach was revealed by Mankiw, Romer and Weil who showed that the conclusion of neoclassical model of economic growth should be that countries converge to their own steady state level of income – conditional convergence (Mankiw, Romer, Weil, 1992, pp. 407-37).

Empirical testing of this hypotheses lead to a quantitative definition of two types of real convergence:

- $\beta$  convergence – showing that on the long run, in the context of absolute convergence hypothesis, the poor economies have the tendencies to grow faster than the richer ones and in the context of the conditional convergence hypothesis, the same process depends on different exogenous factors;
- $\sigma$  convergence – showing that a downwards variation of the level of incomes / inhabitant in a group of countries.

## 2. Fiscal policy and economic performance

The development of neoclassical growth model showed the dynamic impact that taxation has on economic growth. In the same context, Diamond introduced in this model an intergenerational factor and growth effects generated by fiscal policy. As in neoclassical growth model the growth path is determined by exogenous factors as population growth and technological progress, fiscal policy has only a level effect and not a growth effect. Thus, existing differences for fiscal policy can influence the level of income, but not the long run growth rate (Diamond, 1956, pp. 1125-1150).

Endogenous growth models tend to transform temporary effects of fiscal policy into permanent effects (Romer, 1986, pp. 1002-1037). Investment and income taxation has a negative impact on economic growth because by affecting it directly through profit decrease. But not all the taxes affects growth, for example, indirect taxation did not disturb the relative price of current consumption and future consumption, leaving unchanged the process of capital accumulation.

The effect of a rise in government expenditures can be null if this instrument of fiscal policy does not affect the productivity of private sector. On the contrary, Aschauer and Barro consider that public investments have a positive impact on private sector and, implicit, on economic growth (Aschauer, pp.177-200, Barro, 1990, pp. 103-125). The effects of a budgetary deficit are more complex. In intergenerational models, government deficit lead to a decrease of savings rate and growth rate (Alogoskoufis și Rodrick, 1991). In other models, the impact of deficit depends on variables which need to be adjusted in the future (for example, an increase in future taxation rate for compensate a large current budgetary deficit)(Chamley, 1986, pp. 607-22).

Fiscal policy can generate different impact on economic performance, especially on short run (Engen și Skinner, 1992). A change in budgetary expenditure determine an increase in public sector, but a change in taxation rate will generate an increase in disposable income, an increase in consumption expenditure which will lead to a development of private sector. Using one or another of these two instruments will be made considering the anticipated social benefits: an increase in consumption or an increase in the number of goods and services oriented to public sector. Another issue is how consumers divide their income increase (generated by a decrease in taxation rate) into consumption and savings. If they choose to save, there will be a small effect on production in the first faze, but will generate an important effect on long run, when savings will be transformed into investments. In the case of budgetary expenditure, the effect is much important in the short run because affects the aggregate demand and the level of production. We can also distinguish between a temporary or permanent change in fiscal policy. For example, a permanent change in taxation rate generate a stronger effect then in the case of a temporary change which can be compensated by economic fluctuation. In the case of budgetary expenditure, a temporary change has a stronger impact on production.

### 3. Empirical testing of real convergence hypothesis

The final part of this study analyze the process of convergence for CEE countries (the new members of European Union from 2004 and 2007) for the period 1996-2006

The basic model of  $\beta$  convergence, as results form neoclassical growth model, is:

$$\frac{1}{T} \ln \left( \frac{Y_{i,t}}{Y_{i,t-T}} \right) = \alpha + \ln Y_{i,t-T} \left( \frac{1 - e^{\beta T}}{T} \right) + \varepsilon_{i,t-T}$$

where  $Y_{i,t}$  represents the real GDP per capita for country or region  $i$ ;  $T$  is time period,  $\beta$  is convergence coefficient, and  $\varepsilon$  is error term. A negative value of  $\beta$  indicates the existence of a real convergence process for analyzed countries and a positive value indicates a divergence process. The hypothesis of absolute convergence is valid for almost all countries in the sample, less Romania and Bulgaria (Figure 2).

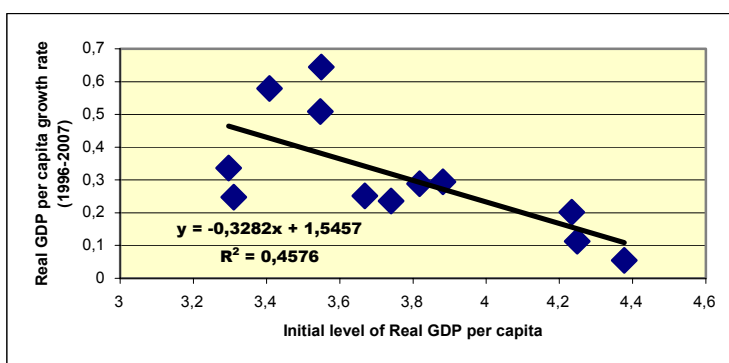


Figure 2. Empirical testing of absolute convergence

Although this model is simple and explain in a simple way the evolution of regional inequality, there are some disadvantages, like ignoring the effects of economic fluctuation. Thus, there is a possibility that in the case of countries with different level of development and economic integration, the convergence or divergence trends to depend on time period (Dickerson, Gibson, Tsakalotos,1998, pp. 51-77). For justifying the use of unconditional convergence for the period 1996-2007, we made a comparison for business cycles for ECE countries and the result reflects that they are synchronized.

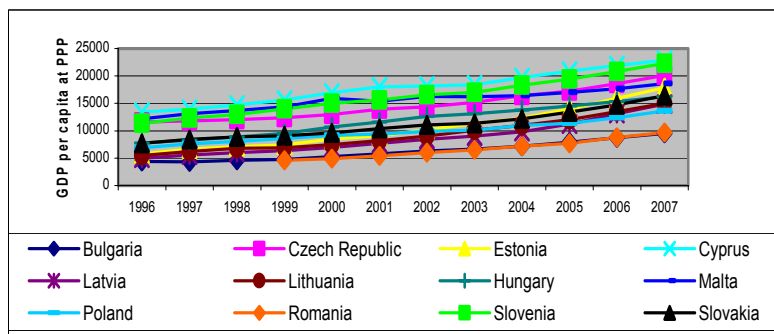


Figure 4. Economic cycles for ECE countries for period 1996-2007

The impact of fiscal policy in conditional convergence process and implicit on economic growth, we used the following variables: budgetary expenditure, budgetary revenue, direct and indirect taxation.

The regression model is:

$$Y_{it} = \alpha_0 + \beta_1 \times PIB_i + \beta_k \times X_{kit} + \beta_j \times X_{jit} + \varepsilon_{it}$$

where  $Y_{it}$  represents real GDP growth rate,  $t = 1 \dots T$  is time period,  $i = 1 \dots N$  is the number of countries,  $\beta_1$  is the parameter for initial level of income,  $\beta_k$  are the parameters for fiscal policy variables,  $\beta_j$  are the parameters for control variables and  $\varepsilon_{it}$  is

the error term. The intercept is considered time and cross country invariant. The exogenous variables are presented in table 1.

### The variables used for testing fiscal policy impact on conditional convergence

Table 1

Symbol	Variable
Y	Real GDP per capita growth rate
GDPi	Initial level of real GDP per capita
BR	Budgetary revenue (% of GDP)
BE	Budgetary expenditure (% of GDP)
IT	Indirect taxation revenue (% of GDP)
DT	Direct taxation revenue (% of GDP)
EXPIMP	Export + Import (% of GDP)
IND	Gross value added in industry (% of GDP)
NGD	Population growth rate (n)+ Technological progress growth rate (g – considered 3%)+depreciation rate ( $\delta$ – considered 2%)
SAV	Domestic savings – the difference between GDP and final consumption (% of GDP)
IR	Inflation rate
INTR	Interest rate
EDU	School expectancy
IEF	Index of Economic Freedom
FCF	Gross fixed capital formation (% of GDP)

The goal of this study is to identify the impact of fiscal policy instruments on real convergence. We estimate a number of regression where this variables were tested separately in order to avoid multicollinearity. Endogenous variables was considered real GDP per capita growth rate.

### Empirical testing of conditional convergence for ECE Countries (1996-2006)

Table 2

	Ec. (1)	Ec. (2)	Ec. (3)	Ec. (4)
GDPi	-0,01 (5,14) <sup>*</sup>	-0,003 (-2,37) <sup>**</sup>	-0,01 (-5,25) <sup>*</sup>	-0,01 (-3,38) <sup>*</sup>
BR	-0,02 (-2,8) <sup>*</sup>			
BE		-0,01 (3,39) <sup>*</sup>		
IT			-0,04 (-2,03) <sup>**</sup>	
DT				-0,04 (-2,41) <sup>**</sup>
EXPIMP		0,004 (4,16) <sup>*</sup>		
IND	-0,006 (-1,8)	-0,001 (-2,92) <sup>*</sup>	-0,001 (-3,40) <sup>*</sup>	
NGD	1,72 (2,41) <sup>**</sup>			1,77 (2,30) <sup>**</sup>
SAV	0,03 (3,12) <sup>*</sup>		0,03 (2,94) <sup>*</sup>	0,03 (3,67) <sup>*</sup>
IR	0,001 (1,61)	0,001 (1,35)	0,002 (1,74) <sup>***</sup>	0,0005 (0,32)



	Ec. (1)	Ec. (2)	Ec. (3)	Ec. (4)
INTR	-0,002 (3,07)*		-0,002 (3,02)*	-0,001 (-1,54)
EDU		0,004 (2,54)*		0,001 (0,47)
IEF	0,014 (2,19)**	0,019 (3,44)*		0,015 (1,85)***
FCF			0,02 (2,44)**	
F-statistic	11,09*	12,37*	11,4*	8,67*
Adjusted R <sup>2</sup>	0,59	0,55	0,58	0,56

t-values are in parenthesis. \*\*\*, \*\* and \* indicate values that are significant at 10%, 5% and, respectively, 1% level.

The results reflects the existence of an conditional convergence process (the coefficient for initial level of real GDP per capita is negative and statistically significant), although the value is smaller toward the case of absolute convergence (Arbia, Piras, 2005). For better results is necessary the use of a longer time period, witch is difficult in the case of ECE countries, so the results shows an adjustment process on short run, in stead of a convergence process on long run.

All four regression reflects the impact that fiscal policy instruments have on economic growth. Thus, an increase in the level of taxation (both direct and indirect taxation) is associated with a lower rate of growth (the estimated coefficients are negative and statistically significant). The impact of budgetary expenditure on GDP is negative, explained by inefficient allocation of this expenditure in ECE countries.

Also, we used a couple of control variables, in order to control for different condition for ECE countries. Thus, international trade has a positive but insignificant influence on growth, but, when the domestic savings are introduced in regression, the coefficient for international trade become statistically significant. This can be explained by the fact that international trade operation influence growth through savings. The positive value of the coefficient for domestic savings shows that a significant amount of investments were financed by internal sources, and foreign direct investments had a smaller impact on growth. We used an indicator for gross value added for industry because new technologies are more evident in this industry. A negative coefficient reflects an increase in gross value added in services and the importance of this increase in formation of GDP.

Economic theory reflects that economic performance of a country depends on physic and human capital accumulation. For reflecting this we used two variables: school expectancy and gross fixed capital formation (both have a positive impact on economic growth). The relation between inflation and economic growth is positive and this can be explained by the fact that inflation was a permanent problem for ECE countries. The interest rate has a negative impact on economic performance because influences the level of investments.

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# ANALYZING THE PUBLIC DEBT SUSTAINABILITY IN EMU

■  
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**Abstract.** *The issues of assuring public debt sustainability were the subject of numerous political and economical debates. The permanent concern regarding this topic is generated by the fact that this is also an important objective of public finance reforms. This conducted to the necessity to impose fiscal restriction in order to assure budget discipline, to avoid the excessive deficits and to ensure the convergence of countries economy to the European Union. The goal of the paper is to analyze the public debt sustainability in EMU.*

**Key words:** budget deficit; primary deficit; public debt; sustainability; intertemporal budget constraint.

**REL Classification:** 13Z, 20H

## 1. Introduction

The issues of assuring public debt sustainability were the subject of numerous studies both at national and international level, with complex approaches in the specific literature. At the international level, the growth of public debt has conducted to the necessity to study the level of public debt sustainability starting with the idea that a prudent budget deficit will ensure the fiscal policy sustainability. The fiscal sustainability, the external debt sustainability and the deflation process are the premises of durable growth of each country.

The debates regarding the public debt sustainability were accelerated by the international institutions (International Monetary Fund, Organization of Economic Co-operation and Development, World Bank) who elaborate the methodology for the determination of the public and external debt sustainability level starting in the '80 when the industrial countries has confronted major budget deficits. At so, the financial crises and the excessive debt had a negative influence over the investments, country risk rate, public budgets and the present and future generations.

The purpose of this paper is to analyze the public debt sustainability in EMU. This paper is structured as follows. Starting with the definitions for the sustainability in section 2 and the study of EMU public debt in section 3, section 4 presents the level of public debt sustainability using different indicators.

## 2. The empirical evidence on the public debt sustainability

The debt sustainability and the fiscal sustainability are difficult to define considering there incidence on the economy and the various values. The debt sustainability is used as: (i) stability; (ii) intertemporal budget constraint; (iii) solvability; (iv) sustainability on short run; (v) sustainability on long run; (vi) sustainability according to the Stability and Growth Pact. At so, sustainability can be identified using different indicators.

*Stability.* Zee (1987) considers sustainability as stability in his study regarding the sustainability and optimal public debt: „A sustainable level of public debt is therefore one which allows the economy, in the absence of unanticipated exogenous shocks, to settle eventually in to a steady-state” (Zee, 1987, p. 8). Also the debt sustainability implies the convergence of public debt to its initial level (Blanchard, Chouraqui, Hagemann and Sartor, 1990).

Blanchard (1990) considered the the sustainability can be assured by a prudent fiscal policy who must not conduct to the growth of public debt and tax rate, the decrease of budget expenditures, the debt repudiation.

*Intertemporal budget constraint.* The debt sustainability derives from the intertemporal budget constraint which means that the current debt must be equal with the discounted value of future budget revenue (Blanchard, 1990, Blanchard, Chouraqui, Hagemann, Sartor, 1990, Gramlich, 1990, Horne, 1991; Buiter, 1995; Commission of the European Communities, 2006). Therefore the government must reach in the future sufficient primary surpluses to finance the debt interests and other expenditures. The budget constraint does not imply the specification of the time for the fiscal adjustment which means that the public debt must not reach a certain level.

*Solvability.* Debt sustainability represents the level that can be reimbursed by the government without fiscal adjustments in the future. In this context, debt sustainability involves state solvability and liquidity (Geithner, 2002). But we must take into consideration that these concepts conduct to the fiscal sustainability: An entity is solvent if the present discounted value (PDV) of its current and future primary expenditure is no greater than the PDV of its current and future path of income, net of any initial indebtedness. ... An entity’s liability position is sustainable if it satisfies the present value budget constraint without a major correction in the balance of income and expenditure given the costs of financing it faces in the market” (Geithner, 2002, p. 5). Vulnerability who means ”the risk that the liquidity or solvency conditions are violated and the borrower enters a crisis”, is other notion related with the sustainability.

Therefore, the study of the country public debt is not enough to determine that debt policy is sustainable over the time. The public debt growth does not always involve the absence of sustainability if the economic growth is bigger than the interest rate on public debt. Al so, the solvability is an imperative but not sufficient condition for debt or fiscal sustainability (Horne, 1991). In this context, the sustainability is connected with the condition that the macroeconomic variables must not be influenced by the option between the growth of tax rate and issuing new debt which is a problem of ricardian equivalence. Al so, the correlation of real interest rate on public debt with the economic growth is a problem of Ponzi game.

*Sustainability on short run* means that the fiscal policy must react momentary in order to avoid the excessive growth of the public debt. This is influenced by the structure of public debt.

*Sustainability on long run* involves the study of the incidence of the public debt on the public budget, financial engagement.

*The convergence criterions.* According to the European Union Treaty and the Stability and Growth Pact, the public debt is sustainable if budget deficits are below 3% of GDP and public debt does not exceed 60% of GDP.

*The sustainability indicators* are useful in the study of the unsustainable risk related with the probability that the public debt reaches the level estimated on the long run. Therefore, these indicators express the current and future budget disequilibrium who can be determined by debt-stabilizing primary balance, initial debt level, and the age-growth expenditures.

### 3. Public debt in EMU

Starting with these methods of defining the debt sustainability, I study the incidence of fiscal convergence criterion on debt sustainability (figure 1).

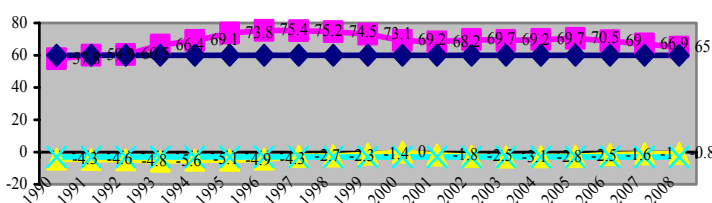


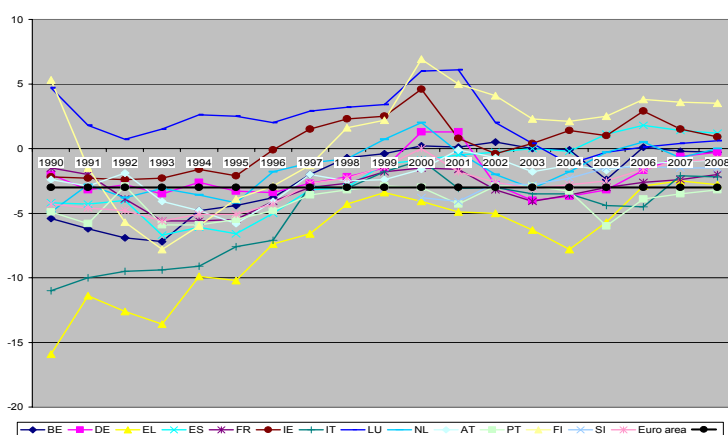
Figure 1. Evolution of public debt and budget deficit in EMU

Source: Public Finances in EMU 2005, 2006, 2007.

In order to achieve the price stability and sustainable growth in different EU countries and to avoid the tensions between them, the Treaty of European Union sets the convergences criteria for EMU. Those five criteria is referring to: (i) the budget deficits must be below 3% of GDP; (ii) the public debt must not exceed 60% of GDP; (iii) the price stability which means that the inflation rate may not exceed 1.5 percentage points of the average inflation rate of the three member states with the lowest inflation; (iv) the long-term interest rates may not exceed by more than 2 percentage points that of the three member states with the lowest interest rates; (v) the exchange rate stability which means that the exchange rates must have been respected without severe tensions for at least the last two years before the examination. The main purpose of those conditions is to ensure that the member states have reached a certain level of economic stability and convergence before to become EMU members in order to avoid the risk of instability.

The convergences criteria were completed with the Stability and Growth Pact (SGP) (1997) which has the main purpose to ensure the budgetary discipline in member states. According to this pact the member states must take all the measures to obtain a balanced or a nearly balanced budget. In order to prevent an excessive deficit the EMU members has elaborated a stability program and the other EU members a convergence program. These stability and convergence programs define a medium term strategy focuses on the sustainability of public finances as an essential determinant of sustainable economic growth. All so, these programs are actualized according to the economic situations of the member states.

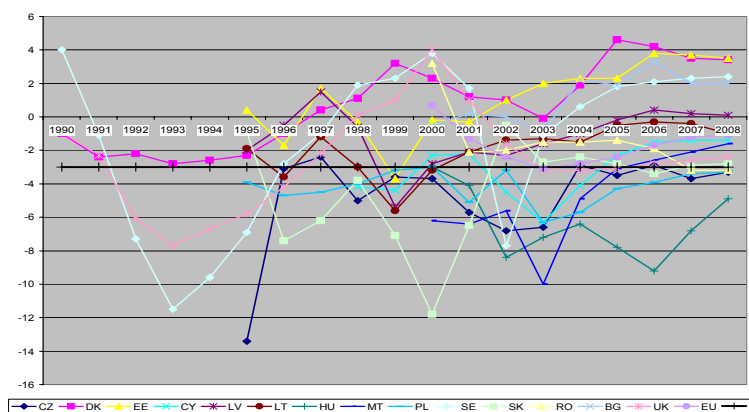
Analyzing the evolution of EMU budget deficit we find that the reference level of 3% of GDP was reached only in 1997-2002 and 2004-2008. For the EMU public debt, the level of 60% of GDP was reached only in 1990-1991. Therefore, we may say that in 1990 and 1991 the public debt had a sustainable level in EMU. The comparative evolution of budget deficit and public debt are presented in figures 2 (a, b) and 3 (a, b).



**Figure 2a.** The evolution of budget deficit in EMU

Source: Public Finances in EMU 2005, 2006, 2007.

Analyzing the degree to accomplish the fiscal criteria in EMU, we find that: (i) Luxembourg, with a budget deficit between 4.7% and 0.6%, and Ireland, with a budget deficit between -2.2% and 0.9%, are below 3%; (ii) Spain has reached a budget deficit according with the this limit in 1999-2008, when it varies at -1.2% to 1.2%; (iii) in Austria, 1997-2008, budget deficit decreased from -2% to -0.9%; (iv) Italy has realized important progress which conduct to the decrease of budget deficit from -11%, in 1990, to -2.2%, in 2008; (v) budget deficit in Greece, also, decreased from -15.9% to -2.5%.



**Figure 2b.** The evolution of budget deficit in non EURO countries

Source: Public Finances in EMU 2005, 2006, 2007.

In Denmark, Estonia, Latvia and Bulgaria, budget deficit is below the limit of 3% of GDP.

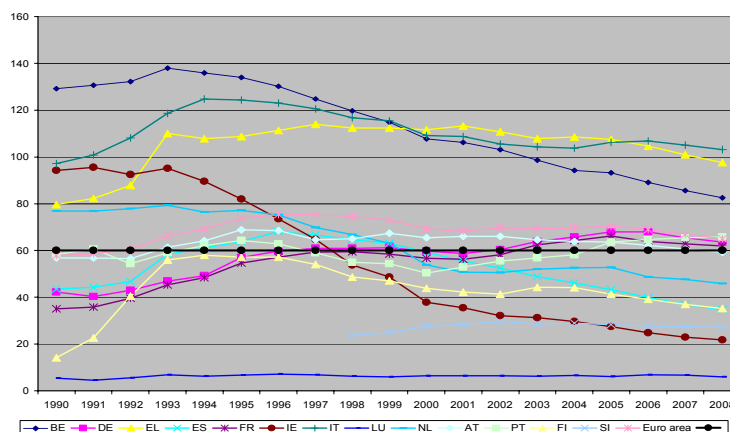


Figure 3a. The evolution of public debt in EMU

Source: Public Finances in EMU 2005, 2006, 2007.

Analyzing the dynamic of public debt in EMU, we find that: (i) the limit of 60%GDP is observed in Luxembourg, Finland and Slovenia; (ii) Germany has reached a sustainable level in1990-2001, when public debt decreased from 58.8% to 42.3%; (iii) France had a sustainable debt in 1990-2002; (iv) Greece and Italy public debt is over 100%.

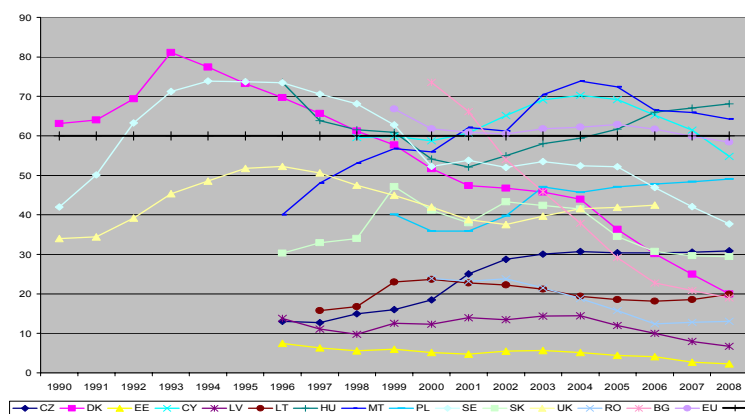


Figure 3b. The evolution of public debt non EURO countries

Source: Public Finances in EMU 2005, 2006, 2007.

In EU countries, the public debt is below 60% of GDP in Czech, Estonia, Latvia, Lithuania, Poland, Slovakia, United Kingdom and Romania.

#### 4. Estimation of the sustainability level of public debt in EMU

Starting with these findings, it is necessary to identify the debt sustainability level in EMU using this equation (Stoian, 2007, p. 69):

$$d_t^* = \frac{1+r_t}{1+g_t} \times d_{t-1} - p_t \quad (1)$$

where:  $d_t$  = public debt at time  $t$ ;  $r_t$  = real interest rate at time  $t$ ;  $g_t$  = real growth rate at time  $t$ ;  $p_t$  = primary sold at time  $t$ .

The results are presented in figure 4.

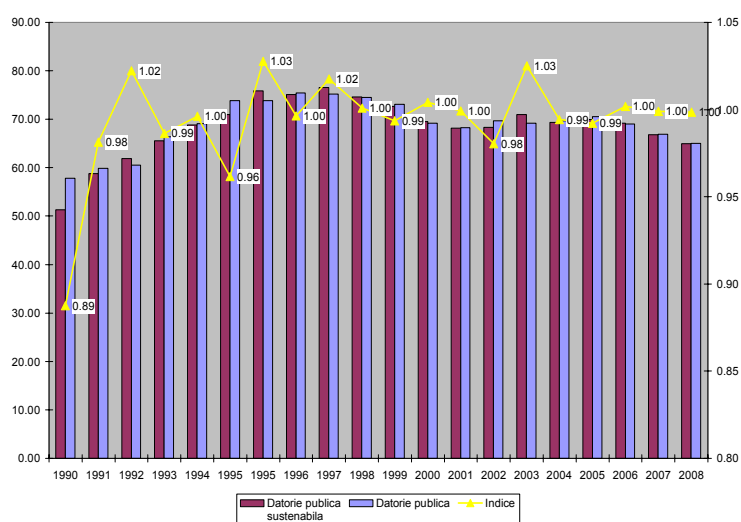


Figure 4. The evolution of public debt sustainability in EMU

Source: own calculation using data from *Public Finances in EMU 2005, 2006, 2007*.

In figure 4 we find that public debt in UEM was sustainable in 1992, 1994, 1995-1998, 2000-2001, 2003, 2006-2008. In 1991, 1993, 1999, 2004-2005, the sustainability index varies between 0.98 and 0.99, which shows that public debt had a weak sustainability in EMU.

Al so, according to the AMECO methodology, public debt dynamic or budget constraint can be expressed:

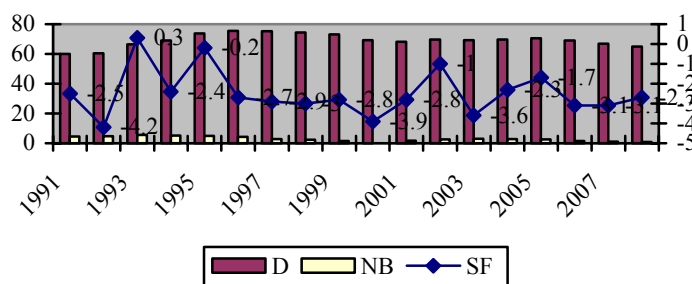
$$D_t = D_{t-1} + NB_t + SF_t \quad (2)$$

$$\frac{D_t}{Y_t} = \frac{D_{t-1}}{Y_{t-1}} \times \frac{1}{1+y_t} + \frac{NB_t}{Y_t} + \frac{SF_t}{Y_t} \quad (3)$$

where:  $D_t$  is public debt at time  $t$ ;  $NB_t$  is budget sold at time  $t$ ;  $Y_t$  is GDP at time  $t$ ;  $y_t$  is nominal growth rate at time  $t$ ;  $SF_t$  = stock-flow adjustment at time  $t$ .

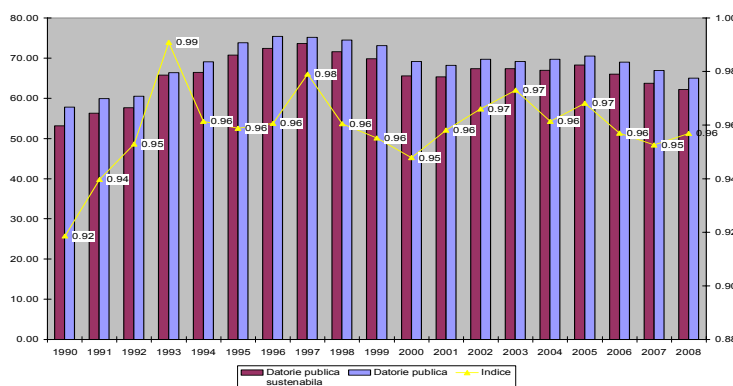


The evolution of the indicators is presented in figure 5 and 6.



**Figure 5.** The evolution of public debt, budget deficit and adjustments in EMU  
**Source:** own calculation using data from *Public Finances in EMU 2005, 2006, 2007*.

Using AMECO methodology, we find that public debt in EMU has a weak sustainable level.



**Figure 6.** Evolution of sustainable public debt in EMU  
**Source:** own calculation using data from *Public Finances in EMU 2005, 2006, 2007*.

### 5. Conclusions

The issues of assuring public debt sustainability were the subject of numerous studies both at national and international level, with complex approaches in the specific literature. Al so, Maastricht Treaty and Stability and Growth Pact had established the nominal convergence criterions. According to these criterions, we find that in EMU, the limit of 3% of GDP was observed only in 1997-2002, 2004-2008, and public debt was below 60% of GDP in 1990-1991. Therefore, using the definition of public debt sustainability by the convergence criterions, we may say that only in 1990 and 1991 EMU had a sustainable level of public debt.

Al so, starting with the sustainability indicators proposed by Stoian (2007) and the AMECO methodology, we find that public debt was sustainable in 1991-2008.

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# CORRELATIONS BETWEEN FISCAL POLICY AND MACROECONOMIC INDICATORS IN ROMANIA

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***Abstract.** This paper analyzes the relationship between fiscal policy and the macroeconomic indicators (economic growth, inflation rate, unemployment rate, public debt) in the case of Romania for the period 1990-2007. The correlations between these variables are tested by applying the regression technique, Granger causality and interval analysis.*

**Key words:** fiscal policy; fiscal revenues; overall tax burden; economic growth; inflation rate; unemployment rate; public debt.

**REL Classification:** 8E, 8F, 8G, 8K, 10B, 10C

## 1. Introduction

The role and the dimension of the state involvement in the economy represent the most important topic to be debated on by all the economic schools. To achieve this target, the state can use as an instrument the fiscal policy.

In order to stimulate the economic growth by means of the fiscal policy, the state has more instruments (Obreja, Brașoveanu, 2007): first of all, the financing or the making up of direct investments, which the private sector would not provide in adequate quantities; secondly, the efficient supply of certain public services which are necessary to ensure the basic conditions to display the economic activity and the long-term investments; thirdly, the financing of one's own activities so as to minimize the distortions to come up with the decisions to spend and invest proper to the private sector.

In the context of analyzing the impact of fiscal policy on economic growth it must be taken into consideration the short-term effect – fiscal policy is an instrument for reducing the short-term fluctuations, taxes and budgetary expenses are being used for influencing the aggregate demand in order to direct the economy to the potential GDP.

*“Fiscal policy represents more a political priority than an economical one”*— this is the conclusion of the econometrical study for 1997-2003 period, using data for Romania, Bulgaria, Lithuania, Latvia, Estonia, Poland, Hungary, Czech Republic, Slovakia and Slovenia (Fabrizio, Mody, 2006, p. 28).

The estimated regression:

$$y_{it} = \alpha + v_i + \beta_i u_t + \delta x_{it} + \varphi w_{it} + \gamma s_{it} + \varepsilon_{it},$$

$y_{it}$  – fiscal revenues on GDP in country  $i$  in year  $t$ ;  
 $v_i$  – a set of specific effects for the country  $i$ , in this model considered exogenous;  
 $u_t$  – common effects for all the countries in the year  $t$ ;  
 $x_{it}$  – economical variables;  
 $w_{it}$  – political variables;  
 $s_{it}$  – fiscal institutions index.

The results of this estimated regression show that not even 50% of the changes in fiscal revenues could be explained through the macroeconomic variables' changes. Fiscal policy was used by political and executive authority as a discretionary instrument for influencing the macroeconomic indicators.

In our paper we investigate the correlations between fiscal policy and macroeconomic variables: economic growth, inflation rate, unemployment rate, public debt.

## 2. Empirical analysis

For testing the impact of fiscal policy, measured by overall tax burden, on the macroeconomic variables we use:

- regression technique
- Granger causality test
- interval analysis

The variables we used are:

- (1) fiscal revenues on GDP, noted VENITURI\_FISCALE, measuring fiscal policy
- (2) rate of real GDP growth, noted CREȘTERE\_ECONOMICĂ, measuring economic growth
- (3) annual rate of inflation, noted INFLAȚIE
- (4) unemployment rate, noted ȘOMAJ
- (5) public debt on GDP, noted DATORIE\_PUBLICĂ

The data base contains annual values of the indicators in the period 1990-2007.

### Descriptive statistics for the variables

Table 1

Descriptive statistics					
Sample: 1990 2007					
	VENITURI_FISCALE	CREȘTERE_ECONOMICĂ	INFLAȚIE	ȘOMAJ	DATORIE_PUBLICĂ
Mean	29.33944	1.072222	70.05000	7.650000	21.76667
Median	28.25500	3.900000	36.65000	8.300000	22.35000
Maximum	35.49000	8.400000	256.1000	11.80000	34.70000
Minimum	26.49000	-12.90000	4.800000	0.200000	0.900000
Std. Dev.	2.491377	6.163918	78.82953	2.976427	7.820937
Skewness	1.191139	-0.883518	1.169800	-0.833721	-1.038734
Kurtosis	3.418103	2.590584	2.989861	3.340562	4.256015
Jarque-Bera	4.387544	2.467531	4.105374	2.172258	4.420088
Probability	0.111495	0.291194	0.128389	0.337521	0.109696
Sum	528.1100	19.30000	1260.900	137.7000	391.8000
Sum Sq. Dev.	105.5183	645.8961	105639.6	150.6050	1039.840

Data source: authors' calculation.

Correlation matrix for the variables

	VENITURI_ FISCALĂ	DATORIE_ PUBLICĂ	ȘOMAJ	INFLAȚIE	CREȘTERE_ ECONOMICĂ
VENITURI_ FISCALĂ	1.000000	-0.679969	-0.448974	0.349385	-0.628041
DATORIE_ PUBLICĂ	-0.679969	1.000000	0.792806	-0.059025	0.302885
ȘOMAJ	-0.448974	0.792806	1.000000	0.279001	0.209225
INFLAȚIE	0.349385	-0.059025	0.279001	1.000000	-0.570991
CREȘTERE_ ECONOMICĂ	-0.628041	0.302885	0.209225	-0.570991	1.000000

Table 2

Data source: authors' calculation.

In order to analyze the correlation between fiscal policy and macroeconomic variables we apply regression technique and interval analysis for each indicator.

**a) Overall tax burden and economic growth**

Using OLS for estimating the regression's coefficients for the period 1990-2007 we obtain the equation:

$$\text{CREȘTERE\_ECONOMICĂ} = -1,5533 \times \text{VENITURI\_FISCALĂ} + 46,645$$

According to this equation, the relation between overall tax burden and economic growth rate is indirect: 1% change of fiscal revenues corresponds to a change of economic growth in the opposite direction by 1,5533%.

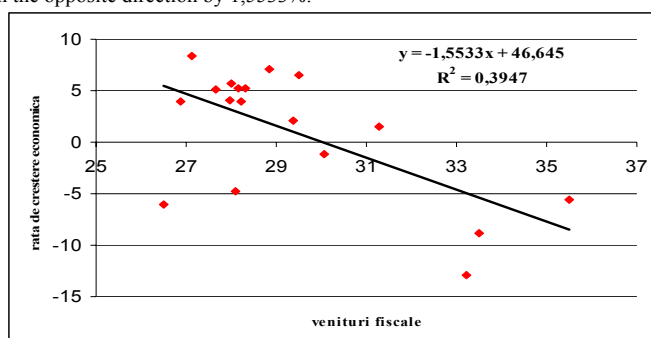
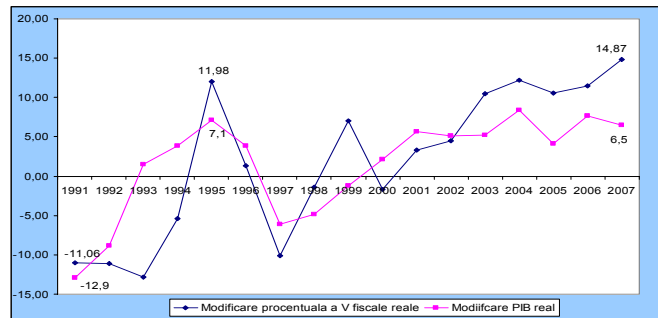


Figure 1. The regression equation between economic growth and overall tax burden

Data source: authors' calculation.

The R-squared measures the success of the regression in predicting the values of the dependent variable within the sample; it may be interpreted as the fraction of the variance of the dependent variable explained by the independent variables. Our regression has  $R^2 = 39,47\%$ , so that 39,47% of the variance of economic growth rate's change is explained by the change of overall tax burden.



**Figure 2.** The correlation between relative changes of real fiscal revenues and changes of GDP

**Data source:** authors' calculation.

Using interval analysis we group into 3 intervals the annual values of both indicators. This technique shows that for the period 1990-1992 and for the year 1999, characterized by high level of tax burden, the economic growth rate was negative. Notice that the highest rate of economic growth was obtained in 2004, a year with low level of tax burden.

#### Interval analysis for economic growth rate and overall tax burden

Table 3

		Economic growth rate		
		1 [-12,9; -1,2]	2 [1,5; 5,1]	3 [5,2; 8,4]
Tax burden	1 [26,49; 27,99]	1997	1996, 2002, 2005	2001, 2004
	2 [28,11; 29,37]	1998	1994, 2000	1995, 2003, 2006
	3 [29,5; 35,49]	1990, 1991, 1992, 1999	1993	2007

**Data source:** authors' calculation.

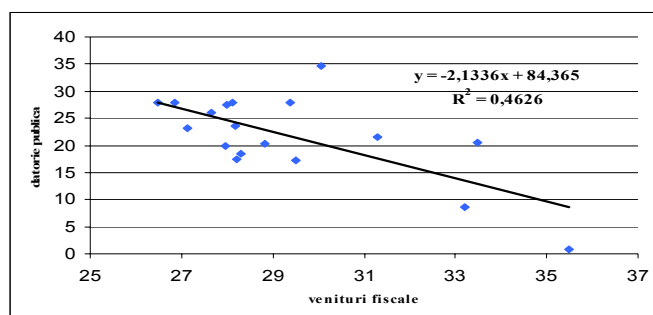
#### b) Overall tax burden and public debt

Using OLS for estimating the regression's coefficients for the period 1990-2007 we obtain the equation:

$$\text{DATORIE\_PUBLICĂ} = -2.1336 \times \text{VENITURI\_FISCALE} + 86.365$$

According to this equation, the relation between overall tax burden and public debt over GDP is indirect: 1% change of fiscal revenues corresponds to a change of economic growth in the opposite direction by 2.1336%.

46.26% of the variation in public debt over GDP is explained by the change of overall tax burden.



**Figure 3.** The regression equation between public debt over GDP and overall tax burden  
**Data source:** authors' calculation.

Using interval analysis we group into 3 intervals the annual values of both indicators. This technique shows that for the period 1990-1991 and for the year 2007, characterized by high level of tax burden, the public debt over GDP had low value. The years 1996, 1997, 2001 were characterized by high level of public debt over GDP and low level of overall tax burden.

It's interesting to notice the year 1999, in which was registered the maximum public debt over GDP, the overall tax burden is also high, explained by the necessity to repayment of the public debt.

**Interval analysis for public debt over GDP and overall tax burden**

Table 4

		Public debt over GDP		
		1 [0,9; 19,9]	2 [20,4; 26]	3 [27,5; 34,7]
Tax burden	1 [26,49; 27,99]	2005	2002, 2004	1996, 1997, 2001
	2 [28,11; 29,37]	1994, 2006	1995, 2003	1998, 2000
	3 [29,5; 35,49]	1990, 1991, 2007	1992, 1993	1999

**Data source:** authors' calculation.

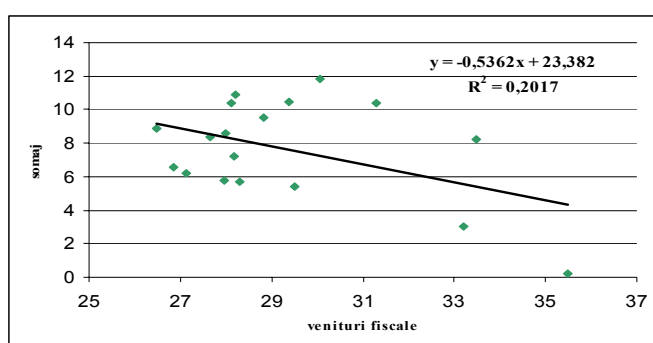
**c) Overall tax burden and unemployment rate**

Using OLS for estimating the regression's coefficients for the period 1990-2007 we obtain the equation:

$$\text{\$OMAJ} = -0.5362 \times \text{VENITURI\_FISCALE} + 23.382$$

According to this equation, the relation between overall tax burden and unemployment rate is indirect: 1% change of fiscal revenues corresponds to a change of unemployment in the opposite direction by 0.5362%.

Our regression has  $R^2=20.17\%$ , so that 20.17% of the variance of the unemployment rate is explained by the change of overall tax burden. But the interpretation of this regression might be done in the reverse way: given a growth/decline of the unemployment rate, the level of fiscal revenues over GDP is low/high.



**Figure 4.** The regression equation between unemployment rate and overall tax burden  
**Data source:** authors' calculation.

Using interval analysis we group into 3 intervals the annual values of both indicators. This technique shows that for the period 1990-1991 and for the year 2007, characterized by high level of tax burden, the unemployment rate is low. From this analysis it could not be taken any evident repartition of the unemployment rate as an indirect correlated with tax burden.

#### Interval analysis for unemployment rate and overall tax burden

Table 5

		Unemployment rate		
		1 [0,2; 6,2]	2 [6,6; 8,9]	3 [9,5; 11,8]
Tax burden	1 [26,49; 27,99]	2004, 2005	1996, 1997, 2001, 2002	
	2 [28,11; 29,37]	2006	2003	1994, 1995, 1998, 2000
	3 [29,5; 35,49]	1990, 1991, 2007	1992	1993, 1999

**Data source:** authors' calculation.

#### d) Overall tax burden and inflation rate

Using OLS for estimating the regression's coefficients for the period 1990-2007 we obtain the equation:

$$\text{INFLAȚIE} = 11.053 \times \text{VENITURI\_FISCALE} - 254.22$$

According to this equation, the relation between overall tax burden and inflation rate is direct: 1% change of fiscal revenues correspond to a change of inflation rate in the same direction by 11.053%.

Our regression has  $R^2 = 12.22\%$ , so that 12.22% of the variance of the inflation rate is explained by the change of overall tax burden.



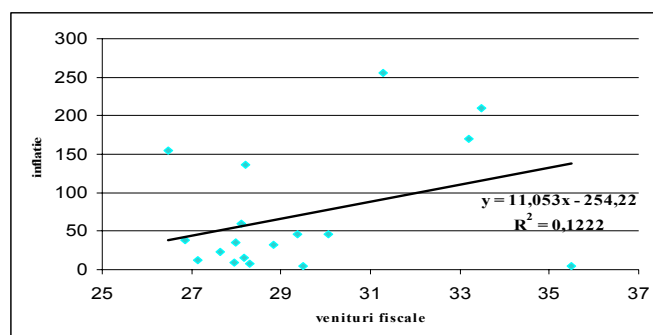


Figure 5. The regression equation between inflation rate and overall tax burden  
Data source: authors' calculation.

Using interval analysis we group into 3 intervals the annual values of both indicators, inflation rate and overall tax burden. This technique shows a positive correlation between the variables for the years 1991, 1992, 1993, both overall tax burden and inflation rate are high, in 1995 and 2000 the variables have mean values and in years 2004, 2005 both indicators have low level.

Interval analysis for inflation rate and overall tax burden

Table 6

		Inflation rate		
		1 [4,8; 15,3]	2 [22,5; 45,8]	3 [59,1; 256,1]
Tax burden	1 [26,49; 27,99]	2004, 2005	1996, 2001, 2002	1997
	2 [28,11; 29,37]	2003, 2006	1995, 2000	1994, 1998
	3 [29,5; 35,49]	1990, 2007	1999	1991, 1992, 1993

Data source: authors' calculation.

But correlation does not necessarily imply causation in any meaningful sense. The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of x and then to see whether adding lagged values of x can improve the explanation.

We perform a Granger causality test for each pairs from the 5 variables set. The hypothesis that x does not Granger cause y is rejected for p-values less than 5%.

The null hypothesis that a specific variable does not Granger causes another specific variable is rejected in the case of bolded row (see Table 7), so that:

- unemployment rate Granger causes the overall tax burden;
- economic growth Granger causes the overall tax burden;
- public debt over GDP Granger causes the inflation rate;
- economic growth Granger causes the unemployment rate.

## Granger Causality Test

Table 7

Pairwise Granger Causality Tests			
Sample: 1990 2007			
Null Hypothesis:	Obs	F-Statistic	Probabilitate
DATORIE_PUBLICA does not Granger Cause VENITURI_FISCALE	16	1.05392	0.38127
VENITURI_FISCALE does not Granger Cause DATORIE_PUBLICA		0.23379	0.79536
<b>SOMAJ does not Granger Cause VENITURI_FISCALE</b>	<b>16</b>	<b>4.93559</b>	<b>0.02952</b>
VENITURI_FISCALE does not Granger Cause SOMAJ		0.83888	0.45806
INFLATIE does not Granger Cause VENITURI_FISCALE	16	0.44963	0.64909
VENITURI_FISCALE does not Granger Cause INFLATIE		2.16172	0.16151
<b>CREȘTERE_ECONOMICA does not Granger Cause VENITURI_FISCALE</b>	<b>16</b>	<b>4.46173</b>	<b>0.03812</b>
VENITURI_FISCALE does not Granger Cause CREȘTERE_ECONOMICA		0.91725	0.42813
SOMAJ does not Granger Cause DATORIE_PUBLICA	16	0.27673	0.76338
DATORIE_PUBLICA does not Granger Cause SOMAJ		1.31533	0.30748
INFLATIE does not Granger Cause DATORIE_PUBLICA	16	0.32821	0.72703
<b>DATORIE_PUBLICA does not Granger Cause INFLATIE</b>		<b>13.2888</b>	<b>0.00116</b>
CREȘTERE_ECONOMICA does not Granger Cause DATORIE_PUBLICA	16	1.25141	0.32384
DATORIE_PUBLICA does not Granger Cause CREȘTERE_ECONOMICA		2.93375	0.09525
INFLATIE does not Granger Cause SOMAJ	16	1.58605	0.24818
SOMAJ does not Granger Cause INFLATIE		0.96257	0.41188
<b>CREȘTERE_ECONOMICA does not Granger Cause SOMAJ</b>	<b>16</b>	<b>7.07843</b>	<b>0.01057</b>
SOMAJ does not Granger Cause CREȘTERE_ECONOMICA		1.77409	0.21489
CREȘTERE_ECONOMICA does not Granger Cause INFLATIE	16	1.17420	0.34499
INFLATIE does not Granger Cause CREȘTERE_ECONOMICA		0.12562	0.88320

Data source: authors' calculation.

### 3. Conclusions

Using OLS for estimating the regression's coefficients for the period 1990-2007, with the overall tax burden as dependent variable and economic growth, public debt over GDP, unemployment rate, inflation rate as independent variable, we obtain: an indirect relationship between economic growth and overall tax burden (1% change of fiscal revenues corresponds to a change of economic growth in the opposite direction by 1.5533%), an indirect relationship between public debt over GDP and overall tax burden (1% change of fiscal revenues corresponds to a change of economic growth in the opposite direction by 2.1336%), an indirect relationship between unemployment rate and overall tax burden (1% change of fiscal revenues corresponds to a change of unemployment in the opposite direction by 0.5362%) and a direct relationship between inflation rate and overall tax burden (1% change of fiscal revenues corresponds to a change of inflation rate in the same direction by 11.053%).

The results of the Granger causality test show that unemployment rate Granger causes the overall tax burden, economic growth Granger causes the overall tax burden, public debt over GDP Granger causes the inflation rate, economic growth Granger causes the unemployment rate.

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## ANALYZING CAUSALITY BETWEEN ROMANIA'S PUBLIC BUDGET EXPENDITURES AND REVENUES

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**Abstract.** *Establishing the relationship between public revenues and expenditures represents a debated issue among economists. The correlation between the two variables is significant for identifying and explaining public budget imbalance and for assessing sustainability of fiscal and budgetary policies. The aim of this study is to analyze the causality between budgetary revenues and expenditures on Romania's case. Applying Granger causality tests reveals the fact that the dynamic of budgetary expenditures is caused by budgetary revenues, which, also, implies the existence of error correction mechanisms for fiscal imbalances.*

**Key words:** fiscal synchronization hypothesis; budgetary revenues; budgetary expenditures; causality test; cointegration.

**JEL Classification:** H6

**REL Classification:** 13A

Analyzing the relationship between budgetary expenditures and revenues represents a debated topic among scholars. The correlation between the two variables has an important significance in order to explain fiscal imbalances, as well as the sustainability of fiscal policy.

The main stream of literature states three hypothesis which give details about the influence that budgetary revenues and expenditures has on each other. For instance,

- When the causality relationship between the two variables is bidirectional it is confirmed *fiscal synchronization hypothesis*, in the sense that, on long term, the decisions regarding the amount of budgetary expenditures are set based on the size and the evolution of budgetary revenues;
- When the causality relationship runs from revenues to expenditures, it is confirmed *revenues-expenditures hypothesis* in the sense that the size of budgetary expenditures is influenced by the size of budgetary revenues;
- When the causality relationship runs from expenditures to revenues, it is confirmed *expenditures-revenues hypothesis*, in the sense that the size of budgetary revenues is influenced by the size of budgetary expenditures<sup>(1)</sup>.

The aim of this study is to investigate the causality relationship between Romanian public budget expenditures and revenues.

Most of the previous studies (Manage, Marlow, 1986, Anderson, Wallace, Myles, Warner, 1986, Ram, 1988 etc.) have investigated the synchronization between public expenditures and revenues using classical causality Granger test. A *causality test* reveals if

<sup>(1)</sup> For further details, see Fasano, U.; Q. Wang (2002), "Testing the Relationship Between Government Spending and Revenue: Evidence from GCC Countries", *IMF Working Paper*, WP/02/201, p. 3.

lagged values of one variable could improve the estimation of other variable. For instance, variable  $X$ , Granger causes variable  $Y$ , if past values of variable  $X$  goes to a better estimation of variable  $Y$ . In fact, Granger causality test represents a weak test for establishing if one variable is exogeneous or not (Enders, 1995, pp. 315-316). Moreover, Miller and Russek (1990) showed that in the case of cointegrated time series Granger causality test is not so relevant and could give some distorted results. Therefore, the two authors suggested an adjusted causality test which takes into consideration the cointegration relationship between two variables. This methodology was successfully applied by Owoye (1995), Fasano and Wang (2002), and could also, be applied on the case of Romania, due to the fact that budgetary expenditures and revenues are cointegrated of order I, as it is further presented.

In order to establish the causality relation between the two variables, it has to be tested the integration order of the two time series based on stationarity tests. Within the mentioned above studies, the tests were applied on real level of the variables, using annual or quarterly data (see in that sense, Miller and Russek, 1990). In Romania's case, the tests will run on quarterly data between 1991-2005. The results of ADF stationarity test are presented in the table below:

**Integration order for budgetary expenditures and revenues <sup>\*)</sup>**

Table 1

Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
CBGC_fx <sup>*)</sup>	-1,77	-3,54	-2,91	-2,59
VBGC_fx <sup>*)</sup>	-1,19	-3,54	-2,91	-2,59
$\Delta$ CBGC_fx <sup>*)</sup>	-7,48	-3,54	-2,91	-2,59
$\Delta$ VBGC_fx <sup>*)</sup>	-7,35	-3,54	-2,91	-2,59

<sup>\*)</sup>Critical values for 1%, 5%, and 10% depends on the option choosed: intercept or trend and intercept.

<sup>\*)</sup>It was considered intercept.

Number of observations: 60

CBGC\_fx: natural logarithm for budgetary expenditures in 1991: 1-st quarter prices

VBGC\_fx: natural logarithm for budgetary revenues in 1991: 1-st quarter prices

$\Delta$ CBGC\_fx: first difference of budgetary expenditures

$\Delta$ VBGC\_fx: first difference of budgetary revenues

The results of ADF stationarity test reveals that budgetary expenditures and revenues are integrated of order I, which allows the existence of a cointegration relation between these two variables. This means that any long term equilibrium relationship between two non-stationary variables implies that the trends are correlated, and the variables could not evolve independently of each other, so there is a correction mechanism which allows a stationary the linear combination between these variables (Enders, 1995, pp. 355-356). When two variables  $X$  and  $Y$  are integrated of order  $d$ , the cointegration relation between  $X$  and  $Y$  is represented by the following equation:

$$Y_t = \beta \times X_t + \varepsilon_t \quad (1)$$

where:

$\beta$  = parameter;

$\varepsilon_t$  = error term which has to be stationary (integrated of order 0).

In Romania's case, the cointegration between budgetary expenditures and revenues will be tested according to (1), but it will be take into account an intercept according to equations (2) and (3):

$$G_t = \alpha_0 + \beta_0 \times R_t + \varepsilon_t \quad (2)$$

$$R_t = \alpha_1 + \beta_1 \times G_t + \mu_t \quad (3)$$

where:

$G_t, R_t$  = budgetary expenditures/revenues expressed as natural logarithm;

$\alpha_0, \alpha_1, \beta_0, \beta_1$  = estimated coefficients;

$\varepsilon_t, \mu_t$  = error terms which has to be stationary (integrated of order 0).

Using Johansen cointegration test, it was revealed the existence of a long run equilibrium relation between budgetary expenditures and revenues, as it follows from the equations below:

$$G_t - 0.77 \times R_t - 1.08 = \varepsilon_t \quad (2a)$$

$$R_t - 1.28 \times R_t + 1.39 = \mu_t \quad (3a)$$

The error term of each of previous equation will be used in the adjusted Granger causality test. A classical causality test investigates if past values of a variable could improve the estimation of other variable, according to the following equations:

$$\Delta Y_t = C_0 + \alpha_0 \times \Delta X_t + \sum_{i=1}^n \alpha_i \times \Delta X_{t-i} + \sum_{j=1}^n \beta_j \times \Delta Y_{t-j} + u_t \quad (4)$$

$$\Delta X_t = C_1 + \delta_0 \times \Delta Y_t + \sum_{i=1}^n \delta_i \times \Delta X_{t-i} + \sum_{j=1}^n \rho_j \times \Delta Y_{t-j} + v_t$$

where:

$\alpha_i, \beta_j$  = capture the influence of current and past values of variable  $X/Y$  on variable  $Y$ ;

$\delta_i, \rho_j$  = capture the influence of current and past values of variable  $X/Y$  on variable  $X$ .

If  $\alpha_i$  and  $\delta_j$  are zero, it means that there is no causality relation between the two variables and, consequently, past values of them could be used to estimate the current value. If  $\alpha_i$  is different from zero, then it could be used past values of  $X$  in order to improve the estimation of  $Y$ , and if  $\delta_j$  is different from zero, then it could be used past values of  $Y$ , in order to improve the estimation of  $X$ . In the case when both  $\alpha_i$  and  $\delta_j$  are different from zero, then, there is a bi-directional causality and both of the variables could be estimated using past values of each other. The last case is consistent with fiscal synchronization hypothesis.

Engle and Granger (1987) suggested that for cointegrated variables, the causality between them should be investigated using a modified standard test based on (4) and on error terms estimated from (2) and (3), as follows:

$$\Delta Y_t = C_0 + \alpha_0 \times \Delta X_t + \sum_{i=1}^n \alpha_i \times \Delta X_{t-i} + \sum_{j=1}^n \beta_j \times \Delta Y_{t-j} + \lambda_0 \times ECT_1 + u_t \quad (4a)$$

$$\Delta X_t = C_1 + \delta_0 \times \Delta Y_t + \sum_{i=1}^n \delta_i \times \Delta X_{t-i} + \sum_{j=1}^n \rho_j \times \Delta Y_{t-j} + \lambda_1 \times ECT_2 + v_t$$

where:

$ECT_1$  represents  $\varepsilon_t$  from equation (2 bis), and  $ECT_2$  represents  $\mu_t$  from equation (3a).

This supplementary term represents the error correction mechanism based on which it is re-established the long term equilibrium relationship between the two variables. According to (4 a), it is tested the null hypothesis,  $H_0: \alpha_i$  and/or  $\lambda_0 = 0$ , against  $H_1: \alpha_i$  and/or  $\lambda_0 \neq 0$ , which could confirm one of the three hypothesis mentioned at the beginning of this study.

In Romania's case, using the methodology presented above, it will be estimated the following regressions:

$$\begin{aligned}\Delta G_t &= C_0 + \alpha_0 \times \Delta G_{t-1} + \beta_0 \times \Delta R_{t-1} + \lambda_0 \times ECT_{1t-1} + u_t \\ \Delta R_t &= C_1 + \alpha_1 \times \Delta G_{t-1} + \beta_1 \times \Delta R_{t-1} + \lambda_1 \times ECT_{2t-1} + v_t\end{aligned}\quad (5)$$

The error correction term (*ECT*) was estimated based on (2) and (3), and the results of estimation of (5) are presented in the table below:

**Causality test between budgetary expenditures and revenues**

*Table 2*

Explanatory variables	Regression 1 Dependent variable $\Delta G_t$	Regression 2 Dependent variable $\Delta R_t$
$C_0$	0.06 [2.41] (0.01)	0.00 [0.53] (0.59)
$G_{t-1}$	-0.05 [-0.22] (0.82)	0.19 [0.95] (0.34)
$R_{t-1}$	-0.33 [-1.28] (0.20)	-0.60 [-2.47] (0.01)
$ECT_{1t-1}$	-1.11 [-3.37] (0.00)	
$ECT_{2t-1}$		0.28 [1.09] (0.27)
<b>Statistics</b>	$R^2$ : 0.41 F-stat: 12.51 (0.00)	$R^2$ : 0.22 F-stat: 5.31 (0.00)

[ ]: t-statistic ( ): probability

As it could be noticed from the estimated results, it is revealed a causality relationship running from budgetary revenues to expenditures which means that the last variable adjusts according to the size and dynamic of previous variable. Based on the second regression, it could be noticed that budgetary revenues could be estimated based on its own past values. Consequently, the results reveal that there is a correction mechanism which forces budgetary expenditures and revenues to be on equilibrium on long term and not to cause large fiscal imbalances.

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# TAX EVASION: AN ANALYSIS OF THE COLLOCATION “PAY WITH MONEY, NOT WITH YEARS”

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**Abstract.** *This paper analyses whether the adoption, in 2005, of a new law with drastic penalties for combating tax fraud had the expected results. I do this by an event study in the period 2003-2005. I computed the expected average sanction for a legal person in case of tax fraud. I found that the expected average sanction was of 43.57% of prejudice in 2003 reaching 5.59% of prejudice in 2005. I conclude that the collocation „Pay with money, not with years” was not connected to the reality, as in 2005 the average prejudice was of 8,000 euro, while the sanction with prison is for prejudices over 100,000 euros. Also, in the same year 2005, the sanction with fine was of 5.56% of the prejudice. Thus, I consider that the right collocation should have been you pay no money and no years”.*

**Key words:** tax policy; the analysis of governmental intervention; others (tax evasion).

**REL Classification:** 8K, 13C, 13Z

## **1. Introduction**

The number of the obligations imposed by the tax laws to the taxpayers and their burden gave, in all ages, incentives to the taxpayers’ imagination for creating different procedures of evading the tax obligations.

Tax evasion is the logical result of the flaws and inadvertences of an imperfect legislation, of defective means of implementing as well as of law-makers’ inability whose excessive taxation is as guilty as the ones who are provoked by this laws to commit tax evasion. Thus, there is a strong correlation between these two facts: an excessive tax rate and tax evasion.

In Romania, the transition to market economy was accompanied by the manifestation, on an increasing scale, of tax evasion. Thus, the law makers were confronted with the necessity of creating and consolidating laws that could master this phenomenon. The lack of experience in this field and, maybe, the insufficient knowledge of the phenomenon made the creation of a legislative framework to be difficult, one rule being modified countless times, which generated a feeling of chaos that fostered the tax evasion. The paper is structured as follows: in section 2 I present the legislative framework in the field of prevention and fight against tax evasion, section 3 reveals an analysis of tax evasion for the years 2003-2005, in section 4 I calculate the indicator average sanction that might be expected by a legal person and the conclusions are presented in section 5.

## **2. Legislative framework**

The first law in this field was the law no. 87 from October 18<sup>th</sup> 1994, published in the Official Journal no. 299 from October 24<sup>th</sup> 1994. The first point that I make is that the Law no. 87/1994 does not have an active function, to modify other laws, being the first law in Romania in this field. The appearance of this law meant, in fact, recognition of the

existence and scope of the tax evasion phenomenon. The tax evasion is defined on art. 1 of this law as “eluding by all means, in whole or in part, from paying the taxes, fees and other amounts due to the state budget, the local budgets, the social security budget and special extra budgetary funds, by individuals and legal persons Romanian or foreign, named, from now on, tax payers”. The law establishes which are the offences and contraventions which represent tax evasion.

It should be noted that this law was modified only once since its approval until its repeal. This modification refers to changing, by the Governmental Ordinance no. 61/2002, the collocation “late payment penalties” with the collocation “interests”. Although, at first sight, this modification seems insignificant, it reflects a change in the law-maker’s vision. Thus, if at the beginning the vision was of punishing the taxpayer for not paying on time its obligations, now the vision is that the taxpayer has to pay a price for using the state’s money; the taxpayer is transformed from an offender to a debtor. I consider that, in the context of the Romanian economy, this change is not a healthy one, as it can induce a feeling of normality for not paying on time the obligations to the state.

Being the first law in the field, it had a lot of drawbacks, thus in 2005 it was repealed by the Law no. 241/2005. The law from 2005 does not include a definition for the tax evasion. The definition is made indirect through identifying the acts and facts that generate tax evasion. The main change refers to harden the punishments, and the law establishes only offences and not contraventions.

For all these offences the punishment is prison, which can go up to 15 years.

Yet, the law leaves the possibility of a penalty, instead of prison, if the prejudice is less than 100,000 euros.

I believe that it was timely to introduce very rough penalties for tax evasion facts, but it is essential that they are implemented so the law will reach its goal. Thus, it needs an analysis of the number of cases when these penalties applied so as to conclude that the law was useful.

Also, the new law was accompanied by a strong media campaign under the title “Pay with money, not with years”.

Following, I will make an analysis of the official data regarding the tax evasion phenomenon, in order to understand the level of the risk of paying with years for a tax evasion fact in Romania.

### 3. Tax evasion valuation during 2003-2005

Rădulescu S.A. (2006) did an exhaustive presentation of the tax evasion phenomenon, based on the information supplied by the Department for Financial and Tax Control from the National Agency of Tax Administration. I will use as period of analysis the years 2003-2005.

#### The evolution of tax evasion in Romania during 2003 – 2005

Table 1

No. crt.	Indicator	2003	2004	2005
1.	Number of inspections	446,882	273,020	286,903
2.	Number of cases of tax evasion found	195,425	120,077	115,158
3.	The frequency of tax evasion (%) (2/3 x 100)	43.7%	44%	40.1%
4.	The total amount of tax evasion (thousand RON)	798,900	982,350	1,746,304
5.	The total amount of penalties (thousand RON)	1,804,700	1,984,522	1,137,326
6.	Total additional amounts for the budget (thousand RON) (4+5)	2,603,600	2,966,872	2,883,630

Source: Rădulescu S.A. (2006, p. 211).

The analysis of the above data is not very obvious. Thus, if we would analyze the indicator the frequency of tax evasion we would conclude that it dropped dramatically during the three years. The problem is that this indicator is computed as number of tax evasion cases found/number of inspections and the number of inspections made during this period decreased constantly. Thus, it should be justified if this drop is due to the increase in tax conformity or to the incapacity of tax apparatus to make inspections.

The performance report of the National Agency of Tax Administration – NATA on 2005 presents the evolution of tax civism for declaration and payment.

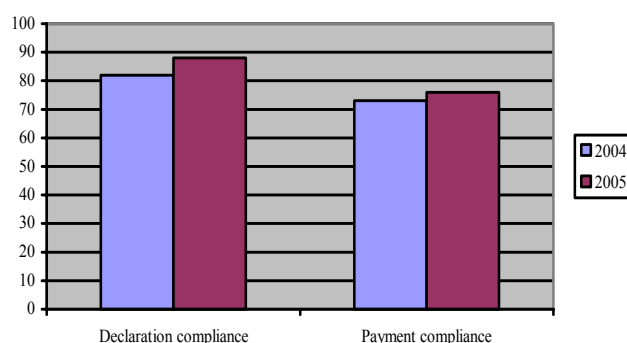


Figure 1. The evolution of tax civism for declaration and payment (%)

Source: Performance report NATA, 2005, p. 15.

Thus, based on the above graphic, it results an increase in the tax civism: both as regards the declaration of tax obligations, and as regards their payment. Unfortunately, the NATA report does not explain how this indicator is computed which makes it very non-transparent and little trustworthy.

I consider that it is essential that the analysis is made separate for individuals and for legal persons. Thus, Rădulescu S.A. (2006) shows that the tax evasion is much less important at the level of individuals than at the level of legal persons.

#### The evolution of tax evasion found in Romania 2003 - 2005 – individuals and family associations

Table 2

No.	Indicator	2003	2004	2005
1.	Number of inspections	176,168	121,070	116,620
2.	The ratio of inspections made at individuals to total inspections	39.4%	44.3%	40.6%
3.	The number of tax evasion cases found.	62,067	58,660	49,516
4.	The ratio of tax evasion cases for individuals to total cases	31.7%	48.9%	42.9%
5.	The frequency of tax evasion (%) (3/1 x 100)	35.2%	48.5%	42.4%
6.	The total value of tax evasion found (thousand RON)	17,580	24,160	52,135
7.	The ratio of tax evasion found at individuals to total tax evasion found	2.2%	2.5	3%
8.	The average amount of tax evasion (RON/case) (6/3)	283.2	411.9	1,052.9

Source: Rădulescu S.A. (2006, p. 223) and own calculus.

**The evolution of tax evasion found in Romania 2003 – 2005 – legal persons**

*Table 3*

No.	Indicator	2003	2004	2005
1.	Number of inspections	270,654	151,950	170,283
2.	The ratio of inspections made at legal persons to total inspections	60.6%	55.7%	59.3%
3.	The number of tax evasion cases found.	133,358	61,417	65,642
4.	The ratio of tax evasion cases for legal persons to total cases	68.3%	51.1%	57.1%
5.	The frequency of tax evasion (%) (3/1 x 100)	48.1%	40.4%	38.5%
6.	The total value of tax evasion found (thousand RON)	781,320	958,190	1,694,169
7.	The ratio of tax evasion found at legal persons to total tax evasion found	97.8%	97.5%	97%
8.	The average amount of tax evasion (RON/case) (6/3)	5,858.8	15,601.4	25,809.2

Source: Rădulescu S.A. (2006, p. 224) and own calculus.

As we can see from the above tables, the most important tax evasion is at the level of legal persons (97% of total). What should worry is that, although the number of cases found decreased, the average amount of tax evasion per case increased very much (5 times in 2005 compared to 2003 for legal persons and 4 times in the same period for individuals)

This might be seen either as an intensification of the control activity which gave greater penalties for the discovered facts or as a relaxation of the taxpayers which felt less menaced by the control, due to the decreased number of inspections.

**4. The average sanction for tax evasion**

Thus, in order to analyze the tax evasion propensity it is essential to determine:

- a) the probability to be inspected;
- b) the penalty rate in case of an inspection.

a) The probability to be inspected will be computed as the ratio between the number of inspections and the number of taxpayers. As it is difficult to determine the number of individual taxpayers, I will identify this indicator for the legal persons only.

Another analysis should be made by dividing the number of inspections to the number of taxpayers, as well as dividing the number of tax evasion cases to the number of taxpayers. For the purpose of this paper I limited the analysis to the legal persons. In order to estimate their number I used the number of companies registered at the Trade Registry on December 31<sup>st</sup> for every year analyzed. It is true that in this way I shall estimate the number of taxpayers-legal persons, but the number of inspections is much more frequent for them than for the individuals.

**The number of taxpayers – legal persons**

*Table 4*

Year	Number of registrations during January 1990 and December 31 <sup>st</sup> of the year	Number of deregistrations during January 1990 and December 31 <sup>st</sup> of the year	Number of persons registered at the Trade Registry on December 31 <sup>st</sup> of the year		
			TOTAL	Individuals and family associations	Legal persons
2005	1,420,783	299,840	1,120,943	357,506	763,467
2004	1,263,408	223,279	1,040,129	293,314	746,815
2003	1,119,124	204,867	914,257	239,876	674,381

Source: Statistical synthesis of the data from the Trade Registry on December 31<sup>st</sup> 2003, 2004, 2005.

Based on the above data we can compute the probability to be inspected, with the formula:

$$\text{the\_probability\_to\_be\_inspected} = \frac{\text{Number\_of\_inspections}}{\text{Number\_of\_taxpayers}} \times 100$$

The results obtained for the taxpayers - legal persons is presented in the following table:

**The probability to be inspected by the NATA – taxpayers legal persons**

Table 5

Year	2003	2004	2005
Number of taxpayers legal persons	674,381	746,815	763,467
Number of inspections	270,654	151,950	170,283
<b>The probability to be inspected</b>	<b>40.1%</b>	<b>20.3%</b>	<b>22.3%</b>

Source: own calculus, based on the data in the tables 3 and 4.

It should be noted that the probability to be inspected dropped dramatically during 2003 - 2005, which could be an incentive for tax evasion.

**b) The penalty rate in case of an inspection**

The penalty rate (Rădulescu, 2006: p. 214) is determined by dividing the value of sanctions applied to the value of the tax evasion found.

$$\text{The\_penalty\_rate} = \frac{\text{The\_value\_of\_sanctions\_applied}}{\text{The\_value\_of\_tax\_evasion\_found}} \times 100$$

Based on the data presented above I shall compute the penalty rate during 2003-2005 and I shall presume that it will be the same for individuals and legal persons.

**The penalty rate**

Table 6

No.	Indicator	2003	2004	2005
1.	The total value of tax evasion found (thousand RON)	798,900	982,350	1,746,304
2.	The total value of sanctions applied (thousand RON)	1,804,700	1,984,522	1,137,326
3.	<b>The penalty rate (%)</b>	<b>225.9%</b>	<b>202%</b>	<b>65.1%</b>

Source: Rădulescu S.A. (2006, p. 215).

Analyzing the penalty rate it can be seen that it decreased dramatically. One explanation could be the change of penalties for tax evasion from fines to prison. Thus, the analysis can not be complete without an oversight of the cases of prison condemnations for tax evasion, which was not available at the moment of writing this paper..

However, as I mentioned in the above section, if the prejudice is under 100,000 euros the penalty is fine, not prison.

**The average amount of tax evasion (EURO/case) for legal persons**

Table 7

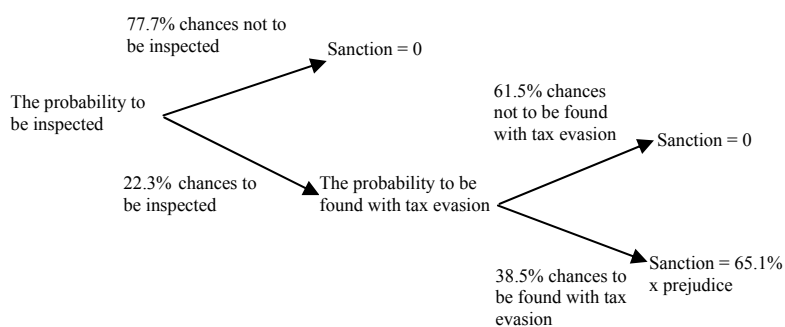
No.	Indicator	2003	2004	2005
1.	The average amount of tax evasion (RON/case) for legal persons	5,858.8	15,601.4	25,809.2
2.	The average exchange rate (RON/euro)	3.7556	4.0532	3.6234
3.	<b>The average amount of tax evasion (EURO/case) for legal persons</b>	<b>1,560</b>	<b>3,849</b>	<b>7,123</b>

Source: own calculus based on table 3 and on monthly bulletin of the National Romanian Bank, December 2006.

As it is shown in table no. 7, the average value of a case of tax evasion of legal persons did not exceed 8,000 euros, which gives good reasons to question the intention of the law maker to apply prison penalties for tax evasion, talking into account that the average value of tax evasion was of 8,000 euro/case, whilst the value beyond which the prison is applied is 100,000 euro.

Thus, based on the computed data it can be concluded that, on 2005 there was a probability of 22.3% for a company to be inspected and, if it was inspected, there was a probability of 38.5% to be found with tax evasion, for which it will be penalized with 65.1% of the prejudice caused.

I will draw a decision tree to determine the average value of the sanction received for tax evasion.



**Figure 2.** The decision tree for calculating the average sanction for tax evasion in 2005

Thus, on 2005, a company could expect an average sanction of:

$$E(\text{sanction}) = (0.651 \times \text{prejudice} \times 0.385 + 0 \times 0.615) \times 0.223 + 0 \times 0.777 = 5.59\% \times \text{prejudice}$$

Thus, on 2005, the average sanction that could be received by a company for tax evasion was of 5.59% of the prejudice caused.

Applying the same calculus for the other two years of the analysis I obtained the following results:

**The average value of the sanction for tax evasion**

Table 8

Year	2003	2004	2005
The probability to be inspected	40.1%	20.3%	22.3%
The frequency of tax evasion	48.1%	40.4%	38.5%
The penalty rate	225.9%	202%	65.1%
<b>The average sanction (% of prejudice)</b>	<b>43.57%</b>	<b>16.57%</b>	<b>5.59%</b>

Source: tables 3, 5, 6 and own calculus based on tables 3, 5, 6.

As it can be noticed, during the period analyzed, the average sanction decreased, which does not encourage the fight against tax evasion, but it gives it incentives.

### 5. Conclusions

The conclusion of the paper is that the collocation “you pay with years, not with money” was not connected to the reality, taking into consideration that, in 2005, the average value of the prejudice caused by evasion was of 8,000 euros /case and the payment “with years” is foreseen for prejudices of more than 100,000 euro/case. Also, in 2005, the payment “with money” was of 5.56% of the prejudice. Thus I consider that the right collocation should have been “you pay no money, and no years”.

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## **REGIONAL DEVELOPMENT PROGRAM. PRESENT STATE OF ISPA PROGRAM AND PERSPECTIVES FOR ROMANIA**

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***Abstract.** The European Union countries have different rates of economic development, therefore, in the European process of policy making for regional development, having as goal the unique convergence at European levels, one must take into account the stages covered by every country, especially the newly accepted into European Union.*

*The work presents the implementation situation of the ISPA Program in the period comprised between 2000 and 2006 and is meant to analyse the way European funds had been attracted and the way the objectives stipulated in the partnership for joining, signed between The European Union and Romania, had been accomplished in order to put into action the national upgrading programs for environment and transport.*

*The analysis shows the important malfunctions in absorbing the ISPA funds in comparison to the allocated funds, though, from the point of view of allocated funds by the European Commission, Romania stands on the second place, after Poland.*

**Key words:** structural funds; regional development; convergence; strategy; European Union; operational program.

**REL Clasification: 16H, 20F**

### **Tool for Structural and Pre-accession Policies Program.**

#### **Objectives**

The „Tool for Structural and Pre-accession Policies” Program is a middle of unreimbursable financing which has as objectives extending the national transport networks with the transeuropean ones, the connections between them, supporting the beneficiary countries toward adjusting national environmental standards with the european ones and adapting beneficiary countries to the policies and procedures applied by the European Structural and Cohesion Funds.

In order to develop the accession objectives which provide fulfilling of the national programs of infrastructural, environmental and transport upgrading according to the Partnerships between European Union and each candidate state, it was adjusted the instrument for structural pre-accession by the Regulation no. 1267/1999 of the European Council. This program has initially financed infrastructural projects for transport and environmental fields, for 10 states and newly admitted member states of the European Union, from Central and Eastern Europe, such as: Romania, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Since 2004 only beneficiate of ISPA assistance Romania and Bulgaria. ISPA is managed by the Direction for Regional Politics of the European Commission.

Building and rehabilitation of the infrastructure in the newly admitted EU states and connecting to the european transport networks must be an important objective of the



economic development strategy in these countries. ISPA finances the development of the railways, highways and navigations ways, giving priority to the development of the transport system in the beneficiary countries and their integrations into the european transport system as for its connection to the trans-european networks.

In the environmental protection field, ISPA offers financial assistance for water supplying, residual water treatment, waste products management and has an objective supporting other beneficiary countries in respecting European standards and applying environmental protection regulations.

Parts of the ISPA budget were used for both projects' technical assistance in order to guarantee their quality level and supporting agencies in projects' implementation and management.

ISPA supports beneficiary countries both in the transport sector and environmental one, towards consolidating the administrative capacity. It also promotes a decentralised project management system.

Implementing this program has strong connections with improving population health and life quality, having a positive impact on economic and social cohesion process in European countries. As mentioned in the Treaty establishing the European Community, Economic and social progress and consolidate cohesion is the European Union general objective to, "reduce differences between different regions development levels and slowing down process in less favoured regions".

#### **Decoiling the "Tool for Structural and Pre-accession Policies" Program in Romania**

During the ISPA (2000-2006) program implementation period, Romania has profitted from a financing of about 240 million euros per year, divided aproximately equally between the environmental projects and the infrastrural ones. Untill 31.12.2005 Romania has signed a number of 64 Memoranda on Financing of implementing projects in environmetal and transport fields. Solely during 2000-2003, Romania has signed 40 ISPA Financing Memoranda, an amount of 1446 milion euros from EU funds, representing over 70% of the total financial assistance offered during the underlined period.

On 20<sup>th</sup> of October 2000, the Memorandum on Utilizing ISPA National Fund was signed in Bucharest, between the Romanian Government and European Community. The Government adopted the Decision No. 1326/2000, which created de institutional basis for developing the program.

The ISPA program beneficiaries are local and central authorities (related ministries, regional councils, municipal councils), self-managed public companies and national companies which have the capacity of developing large infrastructural projects.

The program applies to eight implementing regions, formed by associations of counties, without judicial personality and without being territorial administrative units. Regions are formed according to european system of territorial units classification (NUTS). They belong to NUTS II level, having a population up to 2.8 milion inhabitants.

Spending eligibile amounts for approved projects in the environmental and transport fields was arround 2015033 million euros from European Commission Funds and 716320 euros from the romanian budget.

The National Fund carried out payments for the approved projects as follows:

**Funds required from the European Commission for the period 2001-2005**

Thousands of euros

FIELD/YEAR	2001	2002	2003	2004	2005	TOTAL
Environment	35841	13730	27533	40198	70151	187453
Transport	48131	18145	37458	33443	72862	210039
Technical assistance	369	907	2482	4713	2798	11269
<b>TOTAL</b>	<b>84340</b>	<b>32782</b>	<b>67473</b>	<b>78354</b>	<b>145811</b>	<b>408760</b>

Information source: National Fund of Pre-accession from Public Finance Ministry.

**Fund transferred by the European Commission**

Thousands of euros

FIELD/YEAR	2001	2002	2003	2004	2005	TOTAL
Environment	23979	17250	17188	32991	84384	175791
Transport	41342	20590	13119	47165	65337	187552
Technical assistance	255	660	961	5765	2528	10170
<b>TOTAL</b>	<b>65576</b>	<b>38500</b>	<b>31267</b>	<b>85921</b>	<b>152249</b>	<b>373512</b>

Information source: National Fund of Pre-accession from Public Finance Ministry.

**Actual spendings as declared to the European Commission**

Thousands of euros

FIELD/YEAR	2001	2002	2003	2004	2005	TOTAL
Environment	-	-	6379	15994	35421	57795
Transport	-	-	15844	18482	38315	72641
Technical assistance	1	510	1132	964	1398	4005
<b>TOTAL</b>	<b>1</b>	<b>510</b>	<b>23355</b>	<b>35440</b>	<b>75135</b>	<b>134441</b>

Information source: National Fund of Pre-accession from Public Finance Ministry.

Spendings made during 2001-2005, in amount of 134441 euros represent 32.59% of the funds required to the European Commission (408760 euros). The difference between the required funds and the actual spendings is shown by the earned money transferred from the European Commission to the National Pre-accession Fund.

From the budget assignation for ISPA during 2000-2005, in amount of 2250377 euros, a sum of 635965 euros (28.26%) has been approved for project payments.

**Status of commitments on approved contracts basis**

Thousands of euros

FIELD/YEAR	2001	2002	2003	2004	2005	TOTAL
Environment	8598	88067	107810	89380	196432	490287
Transport	1278	2255	39909	31694	62255	137391
Technical assistance	347	2305	2796	2362	477	8287
<b>TOTAL</b>	<b>10223</b>	<b>92627</b>	<b>150515</b>	<b>123436</b>	<b>259164</b>	<b>635965</b>

Information source: National Fund of Pre-accession from Public Finance Ministry.

**Status of commitments until 12.31.2005**

Thousands of euros

Budget allocations	2250377
Amounts committed	635965

Analysing data shown below, during 2000-2005 for ISPA Program have been allocated funds from EU and national budget in amount of 2250377 euros, from which 262162 euros have been spent for services and works, that is 11.65% from allocations. This situation is an alarm signal regarding the financial absorption of european funds.

**Payments status for services and works delivered until 12.31.2005**

Thousands of euros

FIELD/YEAR	2001	2002	2003	2004	2005	TOTAL
Environment	11131	15320	45187	89380	46695	118833
Transport	3505	39787	29602	31694	64496	137390
Technical assistance	600	1027	3921	2362	891	6439
<b>TOTAL</b>	<b>15236</b>	<b>56134</b>	<b>78710</b>	<b>123436</b>	<b>112082</b>	<b>262162</b>

Information source: National Fund of Pre-accession from Public Finance Ministry.

**Status of ISPA funds absorption until 12.31.2005**

Thousands of euros

Budget allocations from european funds and national budget	2250377
Payments committed	262162

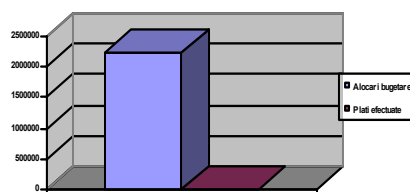


Figure 1. Diagram of ISPA absorption funds in comparison with budget allocations

National ISPA coordinator is the Ministry of Public Finance which monitors the program and, together with the ISPA Monitoring Committee, redacts and assesses each project's evolution.

The incapacity of developing programs, low level of absorbing the european funds and their unefficient use causes development lacks of the infrastructural and environmental protection objective.

ISPA Program data emerge that Romania has dissatisfactory capacity of absorbing fund allocated through financial instruments.

In order to increase the capacity of absorbing European funds, an evaluation on unwinding instrumented programs must be imposed, as a systematic analysis of each program or policy's operations and benefits, in comparison to explicit and implicit standards. The goal is to contribute to improvement that program or policy.

As a member state of European Union, Romania must have as an objective increasing absorption capacity of structural and cohesion funds, given the present state of the infrastructure and the exigency of the European Union. Therefore, it must be taken into account the fact that the deadline for ISPA funds absorption is 2010 and that from 2007 on we will receive three times more money.

**Structural funds absorption at the EU level**

Romania took the second place after Poland in what concerns the "Tool for Structural and Pre-accession Policies" Program funds, assigned by the European Commission. Unfortunately, this opportunity hasn't been used for infrastructural development.

During 2000-2006, Romania has payed through the agency of ISPA Program an amount of 262162 euros, for services and works delivered, representing 11.65% of the

allocation sum. During this period there have only been built 211 km of highway, while Romania has the less kilometers of highway among the European Union's states.

In Romania has a low level development of the infrastructure, in comparison with France, which has 37 times less highway built-in kilometers, or with Bulgaria, which has a deficit of 79 km.

#### Lenght state of the highways network

	No. Km built-in kilometers
France	7800
Hungary	350
Bulgaria	290
Romania	211

Information source: Eurostat 2006.

The data show that in Romania the capacity of absorbing the assigned funds through financial instrument is dissatisfactory. Romania occupied the last place on Europe from absorption European funds level point of view, during the 2000-2006 period. Its absorption capacity was 14 times less than France's and 3% than Bulgaria's. In order to change this situation, the national policy must be improved because it must be taken into account the fact that it has international consequences, as the firms' international activity has national consequences (Nayyar, 2002, p. 11).

#### Level of Absorbing European Funds 2000-2006 (%)

Austria	68
France	56
Hungary	23
Poland	20
Bulgaria	7
Romania	4

Information source: Eurostat 2006.

#### Perspectives for Romania during 2007-2013

In 2007, the financial assistance offered through the „Tool for Structural and Pre-accession Policies” Program has been replaced by the Cohesion Funds and the financial support will increase substantially (3 or 4 times more than the ISPA funds), which implies that the Romanian authorities are to consolidate administrative coordinating structures adjusted as to increase the level of absorbing european funds.

Unlike the pre-accession programs (e.g. ISPA), which had the role to prepare the beneficiary countries for the European rules, the structural and cohesion funds have the role of reducing the economic and social development differences between regions and member states of the EU.

The EU funds will be granted for the 2007-2013 period through operational programs, according to the strategy established by the Romanian National Strategic Reference Framework. On this framework basis seven operational programs will be created through the objective of convergence (increasing economic, environmental, transport, development, regional, technical assistance competitiveness) and will cooperate with other member states of the EU on creating eight operational programs having as an objective European territorial cooperation. From the operational programs which will work during 2007-2013 we pick out:

- the Regional Operational Program, having eight underprograms, which will be financed through the European Fund of Regional Development and the European Social Fund;
- The Sectoral Operational Program for Agriculture, Rural Development and Fisheries, which will be financed through the European Agricultural Guidance and Guarantee Fund and the Financial Instrument for Fisheries Guidance;
- The Sectoral Operational Program for Social and Employment Policy, financed by the European Social Fund;
- The Sectoral Operational Program for Research, Technological Development and Innovation, eligible to be financed through the European Regional Development Fund and the Social European Fund.

For the period 2007-2013, the European Commission has a sum of 28 billion euros to Romania, but in 2007 they estimate an absorption level of only 4% from the total allocations.

In order to develop the infrastructure, during 2007-2013 Romania has received the title of Management Authority for Operational Program on Cross-Border Co-operation between Romania and Bulgaria. This program is meant to stimulate co-operation in the cross-border region on fields such as:

- transport infrastructure
- environmental protection
- communication
- economic and social development.

Stimulating cross-border co-operation is an objective which promotes economic development in order to achieve common interest projects, according to international treaties according to whom Romania is part of. (Moşteanu, 2001, pp. 27-28).

During the seven years period of the Operational Program on Cross-Border Co-operation between Romania and Bulgaria, there will be assigned 256 million euros funds for the 2 countries, from which 218 million euros derived from European Regional Development Fund and 38 million euros national co-financing. For this program, the eligible segment for the Romanian part is formed by the seven border counties: Mehedinţi, Dolj, Olt, Teleorman, Giurgiu, Calarasi and Constanta.

According to European Commission Regulation no. 1959/2003 on establishing a common statistic classification system of the territorial units, the Regional Operational Program in Romania will go on eight development regions:

- North-East Region
- South-East Region
- Southern Region
- Western Region
- South-West Region
- North-West Region
- Central Region
- Bucharest Region as foreseen by the Law no. 315/2004 on regional development in Romania.

During 2007-2013, Regional Operational Program will be financed from governmental budget, local budgets and private resources and will be co-financed from the European Regional Development Fund, which is one of the European structural funds. The financial contribution of the European Union may be up to 85% of the total national expenses.

Through the Regional Operational Program they aim at removing existing territorial differences on economic and social development. Nowadays, the most developed

region in the country is Bucharest. It excels a tendency to grow in the western regions, but less visible in the eastern regions, therefore a well-balanced regional development is foreseen through ensure a minimum development of the business and social environment, in order to obtain economic growth.

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## ROMANIAN BUDGETARY CONSOLIDATION BETWEEN EUROPEAN AND LOCAL

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***Abstract.** The budgetary consolidation has become a current practice in Romania, but the ways in which it is realized and the consolidation rules take on only partially the standard procedure that are used at the European and world level. Furthermore, adapting the budgetary consolidation procedure has to do with components that are not part of the unitary public budgets system, analyzed by the definition given by the Law on public finance.*

**Key words:** budgetary consolidation; public budgets; transfers; budgetary principles; general consolidated budget.

**REL Classification:** 13F – Budgetary systems

The law on public finances no. 72/1996 officially introduced a new concept: budgetary consolidation. This was described as being the cumulative operation, at a national level, of the public financial resources, respectively of the public expenditure, followed by consolidation (realized through the elimination of the transfers). The budgets that were taken into account were: the state budget, the social security budget, special funds budgets, the state treasury budget and the budgets of other public institution with an autonomous character.

It's obvious that the definition given by Law no. 72/1996 presented a series of gaps, since it didn't take into account absolutely all the components of the public sector, the most important lacks being related to the self-financing activities (usually called „extrabudgetary”), external loans, external non-reimbursable funds etc.

The new vision about public finances has taken shape through the adoption of Law no. 500/2002. This legal act takes on the terminology from the previous normative act and also operates an actualization to present as accurately as possible the new economic relations from the public sector. Unfortunately, the definition given by the law is not complete and correct because it establishes the compulsory character of aggregation, along with public national and local budgets, and of the budgets of public institutions, even if these are part of the national and local budgets and are consolidated in the moment of aggregation of the latter. Furthermore, there is no reference to the adjustment that is required as a result of the financial operations included in the public budgets.

### **The budgetary consolidation technique**

The established methodology at an international level regarding the budgetary consolidation is described in the System of National Accounts (1993 version), but every state has to adapt it to its own particularities the implementation of these standards.

The essence of consolidation consists of the elimination of all transactions and debtor-creditor relations that appear between the budgets and are subject of consolidation.

The budgetary consolidation must concern, when talking about incomes, only on those transactions that increase the net value. When talking about expenditure, we consolidate the non-financial expenditures through the summing up of these types of transactions.

The budgetary consolidation, in Romania's case, is done by aggregating all the incomes, respectively the expenditures, that are included in the budgets that form the unitary public budgets system (except the budgets of public institutions), followed by the elimination of the transfers between budgets and adjustments.

Determining the budgets that are the object of consolidation is especially difficult to do, because numerous financial funds exist that refer to public money and that are managed by diverse entities, that, most of the time, are private.

Collecting taxes for a certain fund (the definition of the tax is given by the Law on public finance and represents a mandatory drawing without a direct counter-labor conscription) attracts the inclusion of this fund in the public funds that are being consolidated. If only taxes are collected for a fund, the situation is more delicate, because it is difficult to establish if that fund must be included in the general consolidated budget. Most of the times, the administrator's quality is the main way to establish this. If the administrator is private (even if it is of public utility), usually, these funds are not registered for consolidation.

Transfers that are the object of elimination have been grouped under the title VI „Transfers between units of public administration”, when the new budgetary classification has been introduced through ministry of public finance's order no. 1954/2005 for the approval of the Indicators' classification regarding public finances.

Adjustments are made only to expenditures and they concentrate mainly on the reimbursements of loans (contracted on the internal and external market) and on the differences of exchange rates registered between the date of contracting the loan and the date of reimbursement.

#### **Budgetary consolidation in Romania**

In Romania, the budgetary consolidation focuses on the aggregation of the state budget, local budgets, social security budget, special funds' budgets (the budget of the Single National Fund of Social Health Social Security and the budget of unemployment social security), budgets for the self-financing activities, the budgets of external non-reimbursable funds, and the budgets of internal and external loans.

Furthermore, through a series of normative acts, exceptions regarding the way of constituting, administering and paying some sums have been introduced, as well as including them in diverse funds that are not mentioned in the Law on public finances. Inserting these funds in the general consolidated budget is not unanimously accepted, which is why we often see different tries regarding this.

*The state budget's* incomes and expenditures are established annually through the State budgets law. These take into account all the payments that are included in the budget and all the legal provisions that are included in the competence of the public institutions that are financed from the state budget.

In the income part, there are no subsidies received from other public budgets, so that all the incomes of the state budget are included in the general consolidated budget.

In the expenditure part, we can find, among other things, the transfers between other public budgets. These transfers will make the object of budgetary consolidation, because they must be eliminated in order not to have double entries. Furthermore, reimbursements of loans are included in the state budget expenditure part and are the object of adjustment.



*The local budgets' income and expenditure will be obtained through the summing up of the budgets of the administrative-territorial units.*

As beneficiaries of a significant part of the transfers from the state budget, these budgets benefit from subsidies that constitute approximately one tenth of the total income. The sums and shares separated from some taxes charged by the state budget are not sent to the local budgets though transfers, but by giving from the state budget, representing 70% of the incomes of local budgets. As a consequence, the sums and shares separated from some taxes from the state budget (tax on income, value added tax) are not eliminated through consolidation.

Local budget expenditures incorporate the transfers granted by these budgets to components of the unitary system of public budgets (including consolidated transfers between local budgets of municipalities, cities and communes to local county budgets).

The incomes and expenditures of the *social security budget* are provided by Law no. 19/2000 regarding the public pensions system and other social insurance rights and by Law no. 346/2002 regarding the insurance for accidents at the work place and professional diseases.

In the income of the social security budget are also stated the contributions to social security transferred from other budgets for the categories of beneficiaries that are stated by the law.

In the expenditure part, the social insurances budget also comprises the reimbursements of loans that are eliminated with the adjustment of expenditure.

The incomes of the *unemployment social security budget* comprises the elements provided by Law no. 76/2002 regarding the system for unemployment social security and encouragement of labor force extension and Law no. 200/2006 regarding the setting up and the use of the Fund for guarantees for the payment of salary royalties.

Although this is a smaller budget as far as the sums that it provides are concerned, in the structure of incomes and expenditures we find transfers from other budgets, respectively reimbursements of loans.

The incomes and expenditures of the Single National Fund of Social Health Security are provided by Law no. 95/2006 regarding the reform of health system and by the Government Emergency Ordinance no. 158/2005 regarding medical leaves and social health security.

The income of the budget of the health budget is supplemented by the transfers from other budgets from the unitary system. The expenditures of the health budget concentrate mainly in covering the medical services provided for ensured persons and the payment of indemnifications offered to persons that are on medical leaves.

The incomes and expenditures of the *privatization activities* and the sums that were recovered through the forced execution of the royalties by the AVAS are distinctly found in the general consolidated budget. Most of the expenditures are represented by payments to the state budget or, according to each case, to local budgets, according to the rules stipulated by the Government Emergency Ordinance no. 88/1997 regarding the privatization of commercial societies.

*The budgets of self-financing activities* regard mainly the sums collected through the vice tax set up in 2006 and administered by the Ministry of Public Health.

*The State Treasury budget* is concentrated on the financial activities done by the State Treasury in the specific activity of managing public funds made through the institution's accounts opened at the National Bank of Romania.

*The budget for the National Company for Highways and National Roads from Romania SA* is included in the general consolidated budget because in the year 2002 the vignettes were being introduced for the automobiles that use the national roads and highways infrastructure. The sums charged as a result of applying the utilization tariffs

constitute the income that is at the disposal of CNADN SA and are used exclusively for financing construction, modernisation, maintenance and reparation works of the national roads, as well as guaranteeing and reimbursing the external and internal credits contracted for this purpose, including payments made in the name of the contracting public authority, as a consequence of the obligations that were taken on through public-private partnership contracts in the national roads and highways sectors. Since we are talking about sums with a public character, these have to be found in the general consolidated budget, although the sums that are at the disposal of a commercial society with state capital: CNADN SA.

*The budget of the National Authority for Property Restitution* is part of the general consolidated budget because in the year 2007 it was provided that the financing sources of granting cash compensations by the Direction of Granting Cash Compensations is ensured, until the listing SC Property Fund SA, from the dividends adherent to the shared owned by the state at the „Property” Fund. These sums must be included in the general consolidated budget even though they are not included in one of the budgets that make up the unitary public budget system.

*The external grants* provide the amounts used from European funds (pre-accession funds – PHARE, ISPA, SAPARD – post-accession funds) and other similar resources.

*Internal and external loans*, contracted by the spending ministries in order to finance projects. These loans are regulated by Emergency Ordinance no. 64/2007 on public debt.

In Romania, the consolidation made by the Ministry of Economy and Finance is the following:

**The structure of general consolidated budget (Romania, 2007 m 10)**

Table 1

Budget	Revenues (M lei)	(M lei)
State budget	42.488,3	48.881,1 (including transfers and loan reimbursements)
Local budgets	27.829,0 (including transfers)	22.953,7 (including transfers and loan reimbursements)
Social security budget	19.868,1 (including transfers)	18.168,1 (loan reimbursements*)
Unemployment budget	2.015,6 (including transfers)	1.170,2 (including transfers and loan reimbursements*)
Health budget	10.075,6 (including transfers)	8.985,4
AVAS Budget	707,6	757,1 (including transfers)
Privatization activities' budgets	79,0	78,7 (including transfers)
Self finances activities' budget	4.447,3	3.942,2 (including transfers)
External grants' budget	1.932,1	1.932,1
State Treasury budget	358,3	192,8
CNADN budget	1.845,4 (including transfers)	2.793,3
ANRP budget		775,8
External loans		1.696,0
Internal loans		1.729,9
Transfers between budgets	5.830,9	6.565,5
Adjustments		2.071,5
CONSOLIDATED TOTAL	105.815,4 (27,15% of GDP)	105.365,3 (27,03% of GDP)

Source: Ministry of Economy and Finance.

\* Beginning with year 2008, these amounts are regulated by art. 14 from GEO no. 64/2007.

As shows the table above, the Romanian budgetary system is complex. The large number of budgets requires a large number of transfers between budgets. The most important

flows are from the state budget and there are oriented to most of central and local budgets. The transfers established in the project of state budget in 2008 are in the table below.

#### Transfers between public budgets

Table 2

Current transfers	Capital transfers
– Transfers to public institutions	– Transfers for streets in residential areas
– Academic teaching financing	– Transfers for streets and water facilities in rural area
– Health actions	– Transfers for dwellings and sport infrastructure
– Financial rights allocated to handicapped persons	– Transfers for city plans
– Local airports	– Thermo and electric heating center rehabilitation
– Transfers from intervention fund	– Master plans in rural areas
– Transfers to social security budget	– Health devices
– Transfers to unemployment budget	– Payments for guaranteed loans
– Transfers to health budget for soldiers, prisoners a.s.o	– Capital rehabilitation at hospitals
– Transfers for survey	
– Transfers for daytime centers for children	
– Transfers from social security budget to health budget	
– Transfers from unemployment budget to social security budget	
– Transfers for projects on labor market	
– Transfers from unemployment budget to health budget	
– Transfers from social security budget to health budget	
– Spectrum transfers	
– Health projects	

Source: Ministry of Economy and Finance.

Internal and external governmental loan reimbursements will be centralized beginning with year 2008, being incorporated in the budget of the Ministry of economy and Finance. Local authorities administrate further on the local public debt, and local loan reimbursements are consolidated using the budgetary execution.

#### Conclusions

The Romanian consolidation system is close to the international and European standards, but has many peculiarities that can generate incompatibilities when values are compared.

The large number of legal acts that establish special financial mechanisms for many public funds and the exceptions from the general universally accepted rules make difficult the establishment the exact amounts that should be consolidated.

The Ministry of Economy and Finance clarifies permanently the situation of the funds that should be consolidated. This is why appears periodically changes in the general consolidated budget.

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# **SOME ASPECTS REGARDING THE ADMINISTRATIVE ABSORPTION CAPACITY FOR THE STRUCTURAL FUNDS IN THE CZECH REPUBLIC, ESTONIA, HUNGARY, SLOVAKIA, SLOVENIA AND ROMANIA BEFORE ACCESSION**

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***Abstract.** Based on the review of literature, the paper shows that absorption problems regarding EU Structural Funds may be important. The topic of the paper is the question of how to measure the administrative capacities of some Candidate Countries for Structural Funds. There will be described a suitable methodology for calculating the administrative absorption capacity of Candidate Countries, with accent on Romania's case. By calculating the key indicators, the paper offers some preliminary statements regarding the administrative capacity in a particular new Member State. Thus, the paper is an ex-ante assessment of administrative absorption capacity, very useful for the next period.*

**Key words:** structural funds; administrative capacity; performance; system of assessment; institutional structure.

**REL Classification:** 20Z

## **Introduction**

There are views supported by the European Commission saying EU Structural Funds should speed up the convergence process between the more and less developed countries and regions.

This paper will show that economic theory has not seen much research on the topic of EU Structural Funds. I concentrate my attention to the administrative absorption capacity, with accent on New Member States, from the viewpoint of the processes necessary for improving administrative preparedness. I try to make some conclusion regarding possibilities of Structural Funds implementation in less developed areas of Candidate Countries in the 2004-2006 period.

Here will be pointed out that there was great ongoing pressure for the new Member States to adopt rules and practices in a very short time. The rules and the practices of today's Structural Funds have developed since the end of the 1980s, giving the old Member States over ten years to adjust their systems of structural policies to the EU's gradual reforms. Today, we can speak of almost optimal systems of managing Structural and Cohesion Funds in each Member State.

### 1. Theoretical aspects regarding absorption issues

According to EU regulation, each Member State has to fulfill certain requirements before it can take part in the EU's Structural and Cohesion policy. Each country's government must decide which ministry will take on the leading role in Structural and Cohesion Fund management, who will be responsible for the execution of programmes and financial execution and control, how the national cofinancing of the EU's programmes will be assured etc.

### 2. Literature on absorption capacity

A review of literature in this field indicates the absence of a conceptual framework of absorption capacity. Further, the topic how to manage Structural Funds is quite rarely described in academic literature.

What might explain this low interest in this topic from both European Commission and the academic world? Of course, one can speculate, but one reason may be that the absorption of EU's Structural Funds is a relatively new field for investigation (Bernard, 2003, p.7). We have to take into account that only from the end of 1980 the structural funds exist. The effects of supply become visible on the long run, so it is too early to assess the impact of EU's Structural Funds. After the reform in 1988, the first programming period started in 1989 and lasted up until 1993 and 2000-2006 represents the third programming period.

### 3. Institutional factors of absorption capacity in EU structural funds

The importance of absorption problems depend mostly on institutional factors, both at the EU and national level. Important factors are, for example: transparency of the allocation process of Structural Funds, and coherence in the use of different funds. Also, the administrative factors (Baeur, 2001, p. 14-15) are important: problems of an overburdened administration and a lack of internal vertical communication and horizontal co-ordination which reduce organizational abilities.

Institutional factors at the national level are related to the real structure of the economy, wage-setting institutions, administrative capacity, organization of the political system and economic policies.

The absorption capacity is determined through three main factors (NEI, 2002, pp. 25-28):

A. *Macroeconomic absorption capacity*, which can be defined and measures in terms of GDP levels. At the European Summit in Berlin the upper limit for the Structural and Cohesion Funds was generally set at 4% of the GDP of the respective state.

B. *Administrative absorption capacity*, which can be defined as the ability and skills of central and local authorities to prepare acceptable plans, programmes, and projects in due time, to decide on programmes and projects, to arrange co-ordination among the principal partners, to cope with the vast amount of administrative and reporting work, to finance and supervise implementation properly, avoiding fraud as far as possible.

C. *Financial absorption capacity*, which means the ability to co-finance EU-supported programmes and projects, to plan and guarantee these national contributions in multi-annual budgets, and to collect these contributions from several partners, interested in a programme or project. Financial absorption capacity can only be evaluated ex-post.

### 4. Administrative absorption capacities in new member states

The question of administrative capacity regarding the use of Structural Funds in new Member States emerged when these countries revealed differences in their use of Pre-accession instruments, especially the Phare funds.

In this part of this paper, there will be presented the methodology the European Commission in January/February 2002 that later proved to be appropriate enough for

calculating the absorption capacities of Candidate Countries. One can speculate that the Commission already had a relatively clear picture of the low absorption capacities of Candidate Countries before the negotiations. It is very likely the Commission did not want to present such calculations because this might not have been politically good for the enlargement.

Here, there will be presented the concept how to measure administrative capacities in Candidate Countries. Three variables have to be taken into account regarding the administration capacity:

a. *Performance*, the extent to which the Structural Funds have been managed effectively and efficiently, can be determined at the end of programming period (ex-post).

b. *Functioning* of Structural Funds cannot be measured in new Member States because no effective or efficient management of the Funds in place in these countries.

c. *Design* can be considered to create the conditions for the effective and efficient management of Structural Funds and need to be related to the requirements of the Structural Funds' General Regulations.

The concept demonstrates the importance of proper design (Structure, Human Resources, Systems and Tools) as an input for managing Structural Funds, in relation to the requirements.

The ratio between design and requirements determines the actual functioning of a system, or the supply side of administrative capacity, whereas the actual ability of project applicants to generate projects is seen as the demand side of administrative capacity.

The structure, human resources, systems and tools together provide complementary elements of the structural funds administration.

*Structure* relates to the clear assignment of responsibilities and tasks to national institutions that deal with Structural Funds in fields such as: (1) management, (2) programming, (3) implementation, (4) evaluation and monitoring, (5) financial management and control.

*Human Resources* relate to ability to detail tasks and responsibilities at the levels of preparing job description, the number and qualifications of staff and fulfilling recruiting and retaining such professionals. A key success factor in the management of Structural Funds is experienced and motivated people.

*Systems and tools* relate to the availability of instruments, methods, guidelines, manuals, procedures, forms etc., which enable the organizations managing Structural Funds to transform implicit knowledge stored in the heads of individuals into explicit knowledge that can be shared across organizations.

Combining the dimensions of the management capability grid and the policy life cycle results in the so-called Structural Funds Management Grid.

#### Structural Funds Management Grid

Table 1

INDICATORS	DESIGN		
	Structure	Human Resources	Sistems & Tools
Management	Designation of AM	Staffing of MAs	Existence of a modern civil service
Programming	Partnership present	Capacity to carry out programming	Manuals for programming exist
Implementation	Assignment of IB	Staffing of IB	Existing operational projects development, management process
Evaluation & Monitoring	Designation of monitoring and evaluation responsibilities	Availability of independent evaluation expertise	Existence of computerized monitoring and evaluation system
Financial Management & Control	Designation of PA and functions	Accounting and auditing expertise secured	Existence of accounting system and financial procedures

Source: NEI (2002a).

### 5. Comparative assessment: administrative capacity of five Member States and Romania

The main conclusions of European Commission Report (European Commission, 2003c, p. 3ff) from mid-July 2003 regarding the state of play in Candidate Countries' administrative capacity were as follows:

- institutional arrangements of the implementation system are still not finalized and an issue of particular concern for the Commission is the role of Intermediate Bodies and the missing written agreements between different managing and implementing bodies;
- the recruitment of additional staff has been delayed, in those countries where relevant bodies have been designated they seem to be understaffed in view of their future tasks;
- particular attention needs to be paid to the administrative capacity of regional and local administrations;
- generally, much remains to be done.

The European Commission, through the Comprehensive Monitoring Report on Romania, issued on 25 October 2005, explains the state of the administrative capacity of our country in the field of regional policy and of Structural Instruments coordination (Chapter 21), formulating the following conclusion:

- measures are needed in order to strengthen the administrative capacity across all main ministries and the other relevant bodies;
- the number of employees and the pace of employment should be increased, in order to recover the backwardness;
- the cooperation between the central and local administration should be substantially strengthened;
- the co-financing mechanisms, especially at local level, should be established and clarified;
- for the programming activity, the partnership principle should be effectively implemented;
- the financial management and the control are still characterized by structural weaknesses and should be considerably strengthen in order to avoid the future irregularities.

We will compare the results obtained for Romania with the results obtained for Czech Republic, Hungary, Slovakia, Estonia and Slovenia. The results are comparable from the point of view of the period of time until accession, in the case of the above-mentioned countries it was less than a year and for Romania is a little more than a year (EIR, 2006: pp.24).

#### Results of the horizontal and vertical evaluation by countries

Table 2

	Romania	Hungary	Czech Republic	Slovakia	Estonia	Slovenia
<b>Horizontal evaluation</b>						
Management	C (72%)	B (87%)	B (75%)	C (63%)	B (87%)	C (71%)
Programming	C (52%)	B (80%)	B (80%)	D (40%)	B (87%)	B (80%)
Implementation	C (53%)	C (72%)	C (56%)	C (52%)	C (68%)	C (52%)
<b>Vertical evaluation</b>						
Structure	B (76%)	B (84%)	B (79%)	B (79%)	A 95%	B (74%)
Human Resources	C (51%)	C (74%)	C (71%)	D (41%)	B (82%)	C (59%)
Systems and tools	D (45%)	C (60%)	C (50%)	D (40%)	C (60%)	C (50%)

Source: EIR.



- NB: A: Strong capacity: system ready for the Structural Funds (at least 90%);  
B: Sufficient capacity, but weak points should be addressed (75-90% from the maximum score);  
C: Capacity not sufficient yet, serious weaknesses must be addressed (50-75%);  
D: Insufficient capacity, there is no base for administrating the Structural Funds.

The results obtained suggest that all the analyzed states had weaknesses in the fields as human resources and systems and tools. From all six states, Hungary and Estonia obtained only one A score. These two countries have sufficient capacity in order to access Structural Funds, but there are some weaknesses. Czech Republic and Slovenia obtained almost the same results as Hungary, but Czech Republic is stronger from the point of view of management. With four D scores and one B obtained, Slovenia is not strong enough for management and implementation of Structural Funds.

The results obtained suggest that Romania is still at the beginning of building the absorption capacity. As one may see, for the 9 basic indicators, Romania got only an A, at the institutional structure of the managing authorities, where the points are given for the establishing of such authorities (for Community Support Framework, Sectoral Operational Programme and Regional Operational Programme). The slight downgrading of this indicator is due to a certain delay in assigning the MAs for the Cohesion Fund and for Public Administration. For the other 8 basic indicators, the absorption capacity is not yet sufficient (C for six of them) or there is not a base for managing the Structural Funds (D for two of them). The countries comparison shows that Romania is on one of the last places, although not very last. Nevertheless, it should be mentioned that, in four cases (programming, implementation, structure and human resources), the score is the lowest possible; as the evaluation involves a certain degree of subjectivism. The scores obtained for management stage is close to the upper limit of the category. At the same time, one can observe that, in all countries, the implementation stage and the building of systems and tools have the toughest situation.

In the first year, Hungary had a bad score of absorption capacity (6%), but now is on the third place, before Poland and Czech Republic. After a year and a half, Slovenia is on the first place with 36% and the last Slovenia with 23%.

Romania has the chance, and even the obligation to learn from the mistakes and good things made by the other member states.

#### **6. Conclusions and recommendations**

The results obtained suggest that Romania is still at the beginning of building the absorption capacity. As one may see, for the 9 basic indicators, Romania got only an A, at the institutional structure of the managing authorities, where the points are given for the establishing of such authorities (for Community Support Framework, Sectoral Operational Programme and Regional Operational Programme). The slight downgrading of this indicator is due to a certain delay in assigning the MAs for the Cohesion Fund and for Public Administration. For the other 8 basic indicators, the absorption capacity is not yet sufficient (C for six of them) or there is not a base for managing the Structural Funds (D for two of them).

The administrative absorption capacity of post-accession funds is still insufficient, due to significant and numerous weaknesses which must be tackled in the period of time before accession. However, comparison with absorption capacity evaluation in other candidate states (new member states at present), at similar moments in time (approximately one year before accession) raises additional concerns, given the lackluster performance of Romania.

There is a distinct feeling of lack of authority and coordination in the process of preparation for the administration of EU funds.

By this we do not mean a re-centralization of the administration or implementation process, but rather a re-centralizations of the institution building of an appropriate absorption capacity. The set up of a working group, with real powers (authority regarding information collection, but also decision-making powers), at Government level, which should monitor (with a view to accelerate) all aspects related to enhancing the absorption capacity, might prove a good idea.

As regards institutional structure, it would probably be beneficial to have a better connectivity between the entire structural fund management system at higher levels of the Government. Communication and regular debates, at minister level, on the issues linked to the activation of the structural funds management structures would be highly desirable, in order to better priorities this process.

Overall, less than 40% of staff has practical experience in working with EU funds. By "experience" we mean having been involved in a technical assistance programme or having monitored projects financed with EU funds. It has less to do with conducting economic and social analyses, drafting strategies and quantifying development objectives. At MA level, the percentage of staff with practical experience varied between 20% and 40%, with only one MA (whose planning/programming unit comprises only 3 FTEs) being staffed entirely with FTEs deemed to have relevant experience. At IB level, the most frequent situation is having 1-2 FTEs with experience covering analyses, drafting strategies and quantifying objectives, but there are also two situations where no staff has any relevant experience.

Specific training focused on structural funds is necessary for staff of all institutions involved, especially IBs. Most of these have benefited from general training or training on issues totally different from their own activity.

Besides, for a few years period, pre-accession programmes (PHARE, ISPA, SAPARD) will continue to run in parallel with new post-accession programmes. This means that, in some institutions, staff with certain experience in working with EU funds will continue to work with pre-accession instruments and post-accession funds would be managed by less skilled staff.

Given the novelty and complexity of topics related to the usage of structural and cohesion funds, as well as the lack of experience in this field, technical assistance may be vital. Most of MAs (70%) and most of IBs have been the beneficiaries of such assistance, which would suggest some exposure of their staff to EU standards and requirements.

Many of the ongoing technical assistance programmes are twinning projects. Firstly, in many instances, real involvement by EU institutions is rather formal. Secondly, technical assistance schedule was established, more often than not, by the foreign counterparty, which only seldom had had direct contact with the Romanian environment. Thirdly, quite often, the contents of training courses are determined by the qualification of the foreign experts that can be sent to Romania at certain moments in time. In a nutshell, the efficiency of twinning projects does not match expectations, and both sides are to blame for lack of communication and involvement.

Apparently, a thorough analysis of the twinning projects is needed. Such projects can be expected to make a massive contribution to a better absorption capacity. In other words, we must put technical assistance to good work.

Incentives for staff remains a priority, to avoid high personnel turnover when employed reach a level of expertise better remunerated by the private sector. There are also non-salary incentives which can motivate civil servants, such as career plans, stability, prestige, or EU exposure.

As regards the set up of the partnership framework, it has been noticed that only 50% of MAs use extended partnership networks at present, the others being in a relatively advanced stage of preparations. From a qualitative point of view, most MAs already select their partners from among the representative organizations relevant for the field covered by the operational plan/programme.

The activity should take place in an open environment, at institution level, as well as through an extended partnership. In the first situation, we refer to the collaboration with other units within the same institution, while in the second we consider an extended partnership to be a prerequisite for the programming activity (it is, after all, a compulsory condition for structural and cohesion funds programming).

Coherence, coordination and lack of overlapping between operational programmes, their focus on really important issues, are extremely engrossing imperatives. All these cannot be achieved through desk work or by a top-down coordinating body. They can only be achieved through a bottom-up approach, founded on meaningful and functional partnerships.

Another major challenge for the time ahead is internalizing the evaluation and monitoring capacity, to decrease dependency on external technical assistance, which is very expensive and does not favour institutional memory building. A first step is on-the-job training. A second one would be to gradually outsource from domestic research-evaluation-monitoring institutions. This step should not be seen as a second-best, but as a step towards an independent evaluation and monitoring capacity, managed by the private sector or by the non-profit one.

Regarding the use of instruments, manuals, and procedures, only one MA has put in place a series of procedures, while the other MAs are only now drafting such procedures. Lack of procedures and of detailed methodologies, in connexion with the fragile structure of certain institutions, may represent a serious threat to the absorption process.

Concluding, we have to underline some aspects:

- Romania can absorb many funds, and this with no results, in the same time we can spend less money with notable results;
- absorption of European funds has to be done with an economic policy based on a coherent strategy, on long run;
- it is better to use European Funds for public sector, because at the end the beneficiary is also the public system.

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# RECOVERY RATINGS IN THE EVENT OF SOVEREIGN DEFAULT ISSUERS. AN INVESTIGATION ON THE FACTORS WHICH INFLUENCE THEIR CALCULATION BY STANDARD & POOR'S

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***Abstract.** Recent events have shown that sovereign bonds issuers can be in default. In this situation, the amounts of money are very high and there are few measures that can be taken into account against them. For this reason, the participants on the international financial market have asked the rating agencies to estimate a probability which indicate the debts recovery. This paper focuses on recovery ratings assigned by Standard & Poor's and Fitch to the sovereign speculative issuers. We will use the discriminant analysis to decide whether six quantitative factors are significantly influencing the recovery rating.*

**Key words:** recovery rating, bonds, financial market, informational asymmetry, discriminant analysis.

**REL classification:** 11B.

## **1. Introduction**

The present financial market globalization, in which the investors can have access to a large variety of bonds issued by certain entities they don't have enough information about, and where the issuers can sell bonds on the markets where they aren't well known implies the existence of information intermediaries, which connect the demand and the supply of money. The main information intermediaries on this market are the global rating agencies<sup>(1)</sup> such as Standard & Poor's, Moody's and Fitch.

Lăzărescu (2003, p. 78), considers that *for issuers the ratings represent a real "passport" in obtaining the loan*, and investors have a real trust in the opinions expressed by the most important agencies. For example, in november 2007, the moment when Standard & Poor's lowered the sovereign rating outlook for Romania from stable to negative, the investors reacted immediately: in a few minutes the stock indices collapsed, and the exchange rate of the Romanian national currency lost its value related to the main foreign currencies. We consider that the influence on the Romanian financial market will be greater at a decline of the sovereign rating.

*Rating is a word which can be translated like "evaluation", and represents the analysis of the risk and its final outcome (the mark)*, (Cotică, Lăzărescu, 2004, p. 178). The differentiation between the issuers ratings leads to an additional remuneration for the investors according as the bonds become more risky, corresponding to the principle used by Stancu (2002, p. 44), that *the investments in more risky projects must offer in their exploitation, a higher hope of remuneration*.

Miricescu (2006, p. 437), says that Standard & Poor's and Fitch classifies the bonds according to the risk in:

- investment, having a higher or equal rating with BBB-;
- speculation, having a lower or equal rating with BB+.

In the analysis made by the rating agencies, the sovereign rating is the country ceiling, because as a rule, the public and private entities inside the country present a lower mark than the country itself.

### 2. The necessity of introducing recovery ratings

Recovery ratings represent a new element in the rating agencies approach; Riley, Scher and McCormack (2005, p. 1) consider that *they are intended to enhance the value of sovereign ratings by allowing greater differentiation in the rating of specific sovereign debt securities according to the relative recovery prospects in the event of default.*

Although in the financial theory the sovereign bonds are considered without any risk, some studies (Moșteanu, Cataramă, Câmpeanu, 2005, p. 11) point out that in reality these *are very risky when the public debtor has no possibility or desire<sup>(2)</sup> to pay their duties.*

We can compare a public debtor with a private one. Against the latter we may use certain measures to force him to pay his debts. Against the former we can finish the commercial relations and we can reduce or reschedule the debt service in the terms of Paris Club (of the public creditors) or of London Club (of the private creditors).

The facilities given by the creditors in the terms of the Paris Club will lead to reduction in the recovery rating, because the debtor will seek a comparable treatment from private creditors. So, the debt recovery will be more difficult.

What the two rating agencies compared in our paper have in common is the fact that they assign recovery ratings only for the issuers that are considered very risky, which have a higher probability for default.

Fitch calculates recovery ratings only for the bonds issued by countries having a sovereign rating situated between B+ and D, and Standard & Poor's calculates recovery ratings for the outstanding bonds issued by countries having a speculative sovereign rating (lower than BBB-). In our opinion the rating agencies are efficient as they avoid making evaluation costs for investment issuers having a great reputation because their default probability is very low. Standard & Poor's evaluates more issuers than Fitch as the rating BBB- is higher than B+, and the countries generally ask ratings from each of the three global rating agencies.

Usually a country has only a recovery rating for all the bonds issued, but it might have more in case the principal and interest payments are collateralised by the international financial institutions, which promise to pay these debts if the sovereign debtor is in default. So, Brady bonds issued by sovereigns (Argentina, Ecuador, Uruguay), which had some problems in the payment of public debt service because they are collateralised by the US Treasury, have a higher recovery rating than the usual issues of these countries.

For the bonds denominated in the local currency the rating agencies don't assign recovery ratings, because the country can print money and this way it will reduce the real value of the public debt, as Riley, Scher and McCormack (2005, p. 3) consider.

### 3. Marks given by the rating agencies for the recovery ratings

The two rating agencies use very similar scales for recovery ratings, but these are not the same for the public issuers. This way, examining the working methods in the rating agencies, Raimbourg (1990, p. 180) emphasizes that their rating procedures are identical.

Fitch makes a correlation between the recovery rating and the sovereign rating. Table 1 shows that a country which has a low sovereign rating may not enjoy a high recovery rating.

**Fitch recovery rating scale**

Table 1

Recovery rating	Recovery expectations	Recovery range (%)	Sovereign rating
RR1	Outstanding recovery	91 - 100	B/B-/CCC+
RR2	Superior recovery	71 - 90	CCC+/CCC
RR3	Good recovery	51 - 70	CCC/CCC-
RR4	Average recovery	31 - 50	CCC-/CC
RR5	Below-average recovery	11 - 30	CC/C
RR6	Poor recovery	0 - 10	C

Source: Fitch.

We notice the fact that Standard & Poor's introduced more than Fitch the rating 1+ (see table 2), which indicates a 100% recovery. But neither issuer has received this recovery rating till now.

**Standard & Poor's recovery rating scale**

Table 2

Recovery rating	Recovery expectations	Recovery range (%)
1+	Full recovery	100
1	Very high recovery	90 - 100
2	Substantial recovery	70 - 90
3	Meaningful recovery	50 - 70
4	Average recovery	30 - 50
5	Modest recovery	10 - 30
6	Negligible recovery	0 - 10

Source: Standard & Poor's.

Standard & Poor's gives recovery ratings for 25 speculative issuers (see table 3). In the future they will introduce recovery ratings for others speculative issuers.

**Standard & Poor's recovery ratings**

Table 3

Recovery rating 2	Recovery rating 3	Recovery rating 3	Recovery rating 4
Colombia	Belize	Indonesia	Argentina
Costa Rica	Brazil	Pakistan	Ecuador
Macedonia	Dominican Republic	Panama	Jamaica
Uruguay	Egypt	Peru	Lebanon
	El Salvador	Philippines	Serbia
	Grenada	Turkey	Ukraine
	Guatemala	Viet Nam	Venezuela

Source: Standard & Poor's.

The most frequently given mark is recovery rating 3 – which indicates a meaningful recovery of the debts, followed by recovery rating 4 – which indicates an average recovery, while on the last place is recovery rating 2 – which indicates a substantial recovery. Standard & Poor's is offering for the moment only recovery ratings situated in the middle of the scale. The rating agencies prefer to be careful when they give the marks, because, as Raimbourg (1990, p. 155) says *the credibility is the main asset of each rating agency*.

Countries having higher debts, like Argentina and Russia, have received the biggest reductions of the public debt stock because, as Beers, Esters, Chambers and Chew

(2007, p. 7) remark they have a substantial bargaining power comparing with the countries having smaller bond issues.

Fitch didn't publish sovereign recovery ratings till now, although it has a methodology.

#### 4. Using the discriminant analysis in terms of informational asymmetry to verify of the recovery ratings given by Standard & Poor's

According to the papers of Riley, Scher and McCormack (2005, p. 6), and Beers, Esters, Chambers and Chew (2007, p. 3), when Fitch and Standard & Poor's agencies evaluate the probability of recovery they rely on quantitative and qualitative factors, and their weights differ from one country to another.

In our discriminant analysis we used six quantitative elements:

- a) the population - (POP) living below 1\$ a day (%);
- b) GDP - (PIB) per capita (\$);
- c) imports (IMP) - (% GDP);
- d) exports (EMP) - (% GDP);
- e) foreign direct investment, net inflows (ISD) - (% GDP);
- f) debt public service (SDP) - (% of exports of goods, services and net income from abroad).

The first two elements (POP and PIB) have a negative impact on the recovery rating, because they express the country development. Poor countries may receive an important reduction of public debt when they are in default.

The next three factors (IMP, EXP and ISD), which emphasize the country's openness to international trade and capital, have a positive influence on the recovery rating, as the defaulting issuer has the interest to have access to international markets and foreign investments and to continue the economic activity.

The last parameter (SDP) has a negative influence against the rating, because it expresses the burden of debt public service denominated in foreign currency.

The data used in our analysis are collected from the web page of United Nations Development Programme reports on the economic year 2005. We have analysed only 24<sup>(3)</sup> countries from the total 25 for which Standard & Poor's assigned recovery ratings.

#### 4.1. Descriptive analysis of data series

In our descriptive analysis we used the indicators regarding the general distributions characteristics: minimum, maximum, range, mean, standard deviation, Skewness and Kurtosis, as we can observe in the table 4. To perform the descriptive analysis we worked in the variable space.

#### The descriptive analysis

Table 4

Variable	Minimum	Maximum	Range	Mean	Std. deviation	Skewness	Kurtosis
POP	2	19	17	8.096	6.0587	0.686	-1.094
PIB	631	6135	5504	3240.1	1577.99	-0.089	-1.034
IMP	12	76	64	41.38	19.571	0.364	-1.092
EXP	15	70	55	36	15.604	0.689	-0.132
ISD	0.7	11.7	11	4.554	3.138	1.037	0.243
SDP	2.6	44.8	42.2	18.53	12.6107	0.708	-0.756

Source: United Nations Development Programme and personal processes in SPSS.

The studied countries have a high homogeneity from the point of view of the variables, because we have in all the cases a platikurtotic distribution. This fact emphasised



that Standard & Poor's calculates recovery ratings only for the speculative bonds, issued by countries which have a high probability not to pay the debts according to initial schedule.

#### 4.2. Discriminant analysis

In the data analysis general context, discriminant analysis is included in the shapes recognition techniques supposing the accuracy verification of the measurements performed by two different observers on the same studied phenomenon. This way we can obtain the informational synthesis base on the considered indicators. This situation is possible because in the general context of economic and social phenomena evolution the available information appears in interfered configuration.

In our situation, we want to verify if the rating agency had classified accurately the countries from the point of view of the studied phenomenon – the recovery rating.

To perform the discriminant analysis we used the grouping made by Standard & Poor's, for the three rating groups (recovery rating 2, 3 and 4). The variable list is formed by the six variables that we explained in the descriptive analysis. In our study we have considered that all the rating groups have the same probability of apparition. We have started from this assumption because we will analyse 24 countries which are unequal assigned in the rating groups. If we considered the relative frequencies of the groups as appearance probabilities might affect our study as the recovery rating 3 might have the most highest relative frequency.

It is good that in the pooled within – groups matrices, presented in the table 5, not we should identify strong connections between the studied variables as the discriminant analysis is relevant. When the correlation coefficient is more than 0,7 there is a strong connection.

Pooled within – groups matrices

Table 5

Variable	POP	PIB	IMP	EXP	ISD	SDP
POP	1	-0.106	-0.385	-0.397	-0.341	-0.06
PIB	-0.106	1	0.012	0.08	0.159	0.327
IMP	-0.385	0.012	1	0.812	0.413	0.428
EXP	-0.397	0.08	0.812	1	0.262	0.307
ISD	-0.341	0.159	0.413	0.262	1	0.159
SDP	-0.06	0.327	0.428	0.307	0.159	1

Source: United Nations Development Programme and personal processes in SPSS.

In our situation there is only a strong connection – between IMP and EXP variables. In this case the correlation coefficient is 0.812. Though we can agree this situation knowing that the two variables express the opening degree to international trade.

There are weak connections between other variable groups taken two by two. So, we can conclude that the discriminant analysis hypothesis, according to which the considered variables mustn't have strong connections, is certified. These correlation coefficients may be considered informational superposition indicators between the variables.

To establish the discriminant functions we used the eigenvalues of the covariance matrix between the rating groups. The first discriminant function is corresponding to the eigenvalue 0.553, which explains 76.2% from the total variance. This has a canonical correlation coefficient of 0.597 that means the function has the most highest separation power. The second discriminant function is corresponding to the eigenvalue 0.172, which explains 23.8% from the total variance. This has a canonical correlation coefficient of 0.597 that means the function has a lower separation power.

Taking into consideration that we have three groups we have considered only the first two eigenvalues (see table 6) because these will segregate two of them. After that, the other elements will be assigned to the third group.

#### Testing the discriminant power of the separating plans

Table 6

Function	Wilks' Lambda	Chi - square	Signification level
2 through 3	0.549	11.083	0.522
3 through 4	0.853	2.943	0.709

Source: United Nations Development Programme and personal processes in SPSS.

The first separating plan delimits group 2 through group 3, the Wilks' Lambda value is 0.549. So, this plan has the most highest separation power<sup>(4)</sup> fact demonstrated by Chi – square statistic of 11.083, and the signification level is 0.522<sup>(5)</sup>.

The second separating plan delimits group 3 through group 4, the Wilks' Lambda value is 0.853. So, the separation power of this plan is lower, fact demonstrated by Chi – square statistic of 2.943, and the signification level is 0.709.

The structure matrix presents the correlation coefficients between the initial variables and the discriminant determined variables 1 and 2. These correlation coefficients should be very low as the discriminant function segregates the groups very well.

The separating plans equations are:

$$d_1 = 0.496 \times \text{POP} + 0.001 \times \text{PIB} + 0.112 \times \text{IMP} + 0.157 \times \text{EXP} + 0.035 \times \text{ISD} + 0.228 \times \text{SDP} - 12.107;$$

$$d_2 = 0.654 \times \text{POP} + 0.001 \times \text{PIB} + 0.144 \times \text{IMP} + 0.151 \times \text{EXP} - 0.012 \times \text{ISD} + 0.242 \times \text{SDP} - 13.005;$$

$$d_3 = 0.754 \times \text{POP} + 0.002 \times \text{PIB} + 0.042 \times \text{IMP} + 0.225 \times \text{EXP} + 0.479 \times \text{ISD} + 0.159 \times \text{SDP} - 15.983.$$

In the next classifications we used the results obtained after the discriminant variable 1, because this has the main separation power. We didn't take into consideration the discriminant variable 2, because this one has the lowest separation power.

In conclusion, we accomplished a reduction of the dimensions from the six variables to a single one - discriminant variable 1.

#### Classification results

Table 7

Rating	Group 2 member	Group 3 member	Group 4 member	Total
2	2	1	1	4
3	5	7	2	14
4	2	1	3	6

Source: United Nations Development Programme and personal processes in SPSS.

We can observe in the table 7 that from the total 4 countries which have a recovery rating 2, only two of them (Costa Rica and Uruguay) was confirmed to belong to this group, Macedonia was added to recovery rating 3, and Colombia was added to recovery rating 4.

From the total 14 countries which have a recovery rating 3, only seven of them (Peru, Philippines, El Salvador, Viet Nam, Indonesia, Guatemala and Pakistan), were confirmed to belong to this group, five of them (Brazil, Dominican Republic, Grenada, Egypt and Turkey) were added to recovery rating 2, and two of them (Panama and Belize) were added to recovery rating 4.

From the total 6 countries which have a recovery rating 4, only three of them (Venezuela, Ukraine and Lebanon) was confirmed belong to this group, two of them (Argentina and Jamaica), were added to recovery rating 2, and Ecuador was added to recovery rating 3.

From our discriminant analysis results that only half of the 24 countries were attached correctly, meaning that considered variables are in the Standard & Poor's analysis. Is our study honest?

We used a correct methodology, but the asymmetric information results from the other half of the countries which were wrongly attached. Even the Standard & Poor's ratings are approximate, because the recovery probability is expressed as an interval. In the case of recovery rating 2 the probability starts from a minimum of 70% and arrives at a maximum of 90%.

The rating agency takes into consideration certain qualitative factors as: the willingness to pay of the sovereign issuers, market practices for the debt restructuring, quantitative factors as: the share of public debt owed to official creditors, the importance of financial sector. We didn't use these factors as variables in our study.

### 5. Conclusions

This article has emphasised a new concept in the financial literature – recovery ratings. We underlined the necessity of such indicator, we compared the practicability area, the marks and the scales used by de Fitch and Standard & Poor's.

Using discriminant analysis – part of data analysis – we have demonstrated that these six quantitative factors influence only a half of over rating. Standard & Poor's employs more factors whose influence we want to estimate in a future study.

### Notes

<sup>(1)</sup> This article refers on public informations about bonds issued by the sovereigns given by Standard & Poor's and Fitch.

<sup>(2)</sup> There are certain situations (political regime exchange for example) in witch the debtor has the financial resources for the payment of the public debt service, but he may not want to do this, that is public debt repudiation.

<sup>(3)</sup> We don't include Serbia in our evaluation, because for this country we don't have enough data.

<sup>(4)</sup> A value close to zero indicate a higher separation power.

<sup>(5)</sup> A lower value means that the statement is true.

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# PUBLIC INVESTMENTS, DETERMINANTS OF ECONOMIC DEVELOPMENT

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***Abstract.** Economic growth and its determinants are very important issues for economic practice and literature. This study shows the effect of public investments on economic growth for a sample of European countries and aims at providing solution for improving the allocation of public funds for investments. The effect of corruption on economic growth through public investments is also analysed. The results demonstrate that public investments in infrastructure and in education lead to reducing national disparities, the later representing a potential optimal destination of European public funds.*

**Key words:** economic growth, public investments, regional disparities.

**REL:** 10 I International finance

## **1. Introduction**

The concept of public investment is strongly related to that of public authority. The state had different attributions in different historical periods, his role being a minimal one according to classical financial conception, whereas modern theory regarding welfare state demands it to provide a wide range of public goods. The recent neoclassical theory, demanding goods and services provided efficiently, determined a stronger citizens' control on public decision makers. Hence, in public investments field also, the efficiency becomes a strong demand which means the choice of the destination of the funds that allows maximising the social utility for the beneficiary community. (Văcărel, coord., 2004, pp. 20-30).

Public investments area is very important because of its impact on economic development. Fielding in his paper „The Relative Efficiency of Public and Private Investment Finance: Evidence from a Structural Model of Social and Economic Development” (Fielding, 2003), showed that income inequality and health were determinants of economic growth measured by gross domestic product per capita and they were influenced by public investments.

There are many studies on efficient allocation of public resources in the financial literature, proving the importance of the efficiency condition in modern finance (Alfonso, Schuknecht, Tanzi, 2006, Alfonso, Fernandes, 2005, Esteller, Sole, 2005). Some of them even build efficiency and performance index for public sector (Alfonso, Schuknecht, Tanzi, 2006). Other determine the influence of public investments on economic growth and the impact of corruption in public administration (Mauro, 1995, Sarkar, Hasan, 2001, Ventelou, 2002, Dessus, 2000, Akira, 2004, Chatterjee, Sakoulis, Turnovsky, 2003, Blankenau, Simpson, 2004) or explain the existence of discriminant determinants of economic growth such as the correct description of property rights (Hoff, Stiglitz, 2005).

The competence degree of public administration entitled to realize public investments is also very important in determining the efficiency of the process. Hence, Esteller and Sole (Esteller, Sole, 2005) demonstrate that the efficiency of certain kinds of public investments rose if they were realized by local administrations instead of central

ones, whereas Dall'Ebra (Dall'Ebra, 2003) showed that investments from European funds often did not manage reducing regional disparities because of incomplete information of regional needs.

Among the dysfunctional phenomena related to decisional process and influencing the efficiency of public investments stand electoral manipulation by decisions on the level and structure of public investments (Drazen, Eslava, 2005, Beetsma, Van der Ploeg, 2006), weak management and unrealistic view on costs and benefits of public investments (Boardman, Greenberg, Wimer, Vining, 2001, pp. 5-15), the influence of interest groups (Bowman, Kearney, 1990, pp. 190-250). The response of public authorities to this factor is analysed by Singhal (Singhal, 2006) and Grossman and Helpman (Grossman, Helpman, 2006) who demonstrate how different public authorities influence the decision of public funds allocation in order to respect the interest of their sustaining groups.

But the most important dysfunction of decisional process of public investments due to its effects is corruption (Semenescu, 2007). Mauro (Mauro, 1995) demonstrated that it manifested by an incorrect use of present investments, as well as by inadequate allocation of public funds for investments, determining lower future economic growth. The same conclusion is sustained by Mushfiq-us-Swaleheen basing on an empirical study. Although there are voices affirming that in case of wrong political decisions, corruption may have a positive effect on economic growth (Acemoglu, Verdier, 1996).

Regarding the ways in which corruption affects economic growth, Del Monte A. and Papagni (Del Monte, Pagani, 2000) and Akira (Akira, 2004) consider that in order to integrate corruption in economic growth function it is necessary to consider a direct effect of corruption resulting in the exploitation of existing public investments and an indirect one reflected by the ratio "public investments/corruption" in order to explain the diminishing efficiency of the allocation of public funds for investments due to corruption.

Studies on the effect of public investments on economic growth show that positive impact appears only if some conditions related to fiscal and budgetary policy and to the degree of technical progress incorporated in public goods provided (Blankenau, Simpson, 2004), to the elasticity of the substitution rate between public and private goods (Akira, 2004) or to the quality of the process providing public services (Dessus, 2000).

Moreover, for European Union members, the negative relation between public investments and economic growth is demonstrated empirically by many economists (Casseli, Esquivel Lefort, 1996, Dessus, 2002). Although, there are empirical studies demonstrating the positive effect of public investments on the productivity of the private investments (M del Mar Salinas-Jimenez, 2004, Rivera, Currais, 2004, Pina, St. Aubyn, 2005, Chatterjee, Sakoulis, Turnovsky, 2003).

Endogenous growth models like Lucas, Romer, Barro (Darreau, 2003) show the motor role of public investments for economic growth, except for environment protection investments which according to Hotelling (1931), determine a lower short-run economic growth, but avoid huge long-run opportunity costs. On the other hand, in a study in 2006, Huang and Wang demonstrate the relative inefficiency of public funds use in research and development activities in the main part of the countries (Huang, Wang, 2006).

Hence, although demonstrated in theory, the positive effect of different categories of public investments on economic growth is not always found in empirical studies, especially for samples of countries in European Union.

The aim of this study is to determine the effect of different kinds of public investments on economic development and to explain some decisions on the allocation of public funds for investments, in the meantime providing solutions for a better allocation.

The rest of the paper is structured as follows: in section 2 the database and methodology are presented, section 3 includes the empirical results and their interpretation and section 4 concludes.

## 2. Database and methodology

This study grounds on a model used in the paper „Investments, Corruption and Economic Growth” (Semenescu, Cataramă, Braşoveanu, Dragotă, 2007). It is an extension of Lucas model allowing the researcher to take into consideration the effect of public investments, but also that of corruption in public administration. The study shows that economic growth is influenced by private and public physical capital and by human capital. In this study, we considered that due to the depreciation of capital elements, public investments growth rate and private investments per capita growth rate can be a proxy for capital growth rate. The mentioned study showed that both public investments in physical capital and public investments in human capital have a positive influence on economic growth, but it does not exceed the positive influence of private investments.

The empirical research proposed in this study aims to identify the average periods necessary for different types of public investments to manifest their effects on economic growth and the nature of these effects. The study focuses on European Union members, and it could lead to conclusions regarding the efficiency of the decision of public funds allocation for investments.

In order to take into consideration the quality of national systems for providing public goods identified by Dessus, the research econometrical method was a weighted panel data.

The database includes information referring to European Union members, Iceland and Norway in the period 1996-2006, meaning 11 years.

The variables considered were: gross domestic product per capita, power purchasing parity, supplied according to Eurostat methodology by applying an ordinal scale to enlighten on the differences between countries (y), public investments for infrastructure (i), annual public investments for health (s), education (ed) and culture (c), private investments per capita (k) obtained from Eurostat, the official database of European Commission, corruption perception index (cor) supplied by Transparency International which reflects the degree of corruption perceived in public administration of a country during a given year. This index has high values for low levels of corruption and low values for high levels of corruption.

These variables were transformed in growth rate, and the following relation was tested:

$$gy = \alpha + \beta \times gi + \gamma \times gs + \delta \times ged + \theta \times gc + \mu \times gk + \vartheta \times gcor + \varepsilon \quad (1)$$

where g reflects that indicators are computed as growth rate.

In order to reflect the direct influence of corruption on public investments effect, manifested during their exploitation, but also its indirect influence, acting during the allocation phase, public investment growth rate was multiplied by corruption perception index growth rate, reflecting the effects of corruption manifested in the allocation phase for public funds for investments.

This test was realized using the hypothesis that public investments generate pure public goods characterized by non-exclusive and non-rival consumption.

Hence, the following model was tested:

$$g_t^y = \alpha + \beta \times g_t^i \times gcor + \gamma \times gs \times gcor + \delta \times ged \times gcor + \theta \times gc \times gcor + \mu \times gk + \vartheta \times gcor + \varepsilon \quad (2)$$

The results are presented in the following section.

### 3. Empirical results

By testing the model in the previous section for different lags, the following empirical results were obtained:

#### The results of empirical test for model (2)

Table 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0056	0.00148	3.82963	0.0002
GI(-1)*GCOR(-1)	0.5650	0.09111	6.20163	0.0005
GS(-1)	0.0266	0.00665	4.01229	0.0001
GK	0.1864	0.01276	14.6028	0.0005
GED(-2)*GCOR(-2)	0.5106	0.23037	2.21638	0.0291
<b>Weighted Statistics</b>				
R-squared	0.7331	Mean dependent var		0.020926
Adjusted R-squared	0.7216	S.D. dependent var		0.046422
S.E. of regression	0.0244	Sum squared resid		0.055777
F-statistic	63.884	Durbin-Watson stat		1.667242
Prob(F-statistic)	0.0000			
<b>Unweighted Statistics</b>				
R-squared	0.4981	Mean dependent var		0.013420
Adjusted R-squared	0.4765	S.D. dependent var		0.034398
S.E. of regression	0.0248	Sum squared resid		0.057599
Durbin-Watson stat	1.9439			

The numerical expression of the model is the following:

$$g_{yt} = 0.005682 + 0.565064 \times g_{it}(t-1) \times g_{cor}(t-1) + 0.026695 \times g_{s}(t-1) + 0.510601 \\ \times g_{ed}(t-2) \times g_{cor}(t-2) + 0.186457 \times g_{kt} + \varepsilon$$

Hence, public investments in infrastructure, health and education, as well as private investments are determinants of economic growth.

As for the level of the coefficients, public investments in infrastructure growth rate and education investments growth rate have the major influence in diminishing regional disparities in Europe. This can be the explanation of the high level of European funds for infrastructure investments. The results do not invalidate Dall'Ebra's conclusions. He shows that even if global national indicators demonstrate that regional disparities diminish, inside poorer countries in European Union, the differences between regions increase, infrastructure investments from European funds being in the benefit of richer regions of these countries.

This is why public investments in education could be a better solution for the allocation of European public funds for investments.

Regarding the period necessary for different types of public investments to generate effects on economic development it can be noticed that public investments in health have an immediate effect, whereas public investments for infrastructure determine a significant economic growth in the year following that of public funds allocation.

Public investments in education determine effects on economic growth in two years, fact that can be explained by a lag between providing education services and the moment pupils or students will use them in economic activities. On the other hand, public investments in education are mainly used for paying wages to teachers and are used in the following periods for consumption influencing economic growth in these periods.

It is possible that this lag influences the decision of allocation of European funds for investments mainly for infrastructure investment projects.

Analysing the empirical results obtained about corruption effect on public investments, and by this channel, on economic growth, we can make the following conclusion.

Public investments in infrastructure and in education are influenced by the corruption perceived in that year. Corruption manifests indirectly, in the moment of the allocation of public funds for investments, determining the choice of other destinations than the optimal ones or an inefficient spending of public funds during the realization of the investment project. The direct effect of corruption, manifested during the exploitation of public investments is insignificant.

The indirect effect of corruption on public investment for health services is insignificant. This can be the effect of an efficient allocation system in this domain or of the inspection realized by citizens, or even due to some ways of citizen implying in financing health system that are not considered in this study or cannot be measured.

#### 4. Conclusions

This empirical study realized on a sample of countries including European Union members, Iceland and Norway aims to determine the effect of public investments on economic development and to analyse the efficiency of the allocation of European funds for investments.

The empirical results obtained are reasons for sustaining the idea of public investments being determinants of economic growth. Although the main part of the studies in this domain show that private investments have the major role in influencing economic growth, the results show that in Europe, public investments in infrastructure and in



education allow diminishing national disparities. But, between the region of the same country, the disparities increase, as Dall'Ebra show, if public funds are oriented towards investments in infrastructure. This is the reason for suggesting the solution of public funds allocation in education investments as a better alternative for reducing disparities, even if their effect would be lagged.

Corruption manifests especially in the moment of allocation of public funds for investments and affects mainly public investments in infrastructure and education, but not the private ones, too, which can become the motor of economic growth if public decisions sustain them, and also not the ones in health systems which are more affected by citizens' inspection or are also financed by private funds.

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## STRUCTURAL FUNDS – AN INSTRUMENT OF ECONOMIC GROWTH WITHIN THE POLICIES OF COHESION AND REGIONAL CONVERGENCE

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***Abstract.** Regional development has been defined as a process that has good effects on economic growth. This growth supposes both the expansion of regions' productivity capacities and the increase of demand for these regions.*

*Investment projects in Romania that will be financed from structural funds will be analyzed using a practical method used in the finance field, cost-benefit analysis. It is expected that after the first structural funds received by Romania, the economic growth models, for example Solow's, will be confirmed.*

**Key words:** cost-benefit analysis; economic growth; convergence; cohesion; regional development.

**REL classification:** 13 C, 13 J.

Development programs can be assessed from a regional point of view as aids for increasing the capacity of production in the region and also for stimulating the demand. For promoting these objectives, programs for resources development and their efficient usage should be focused on controlling functions that generate factors for which the demand is sufficiently sensitive at the growth caused by revenue increase at national level.

The valuation of a regional development program supposes a detailed knowledge of a series of activities. Moreover, the programs' individual valuation concerning the impact towards the economic field is much more efficient than the valuation of the whole analysed package. It is possible that projects with national financing to have as goal the national interest more than the regional one. Regional comparisons concerning the relative change of the economic indicators are not sound in this case.

The cost-benefit analysis has the purpose to offer a criterion of investment, more than a criterion of valuation for the development effects in the region the program focuses on. Maybe more than useful would be the analysis of the development process and the way in which programs for regional development can influence this process. This supposes an examination of the program's effects on production parameters and consumption at a regional level, over time, and the direction of the market structure. Although in this case the precise quantitative criterion can be difficult to define, an approach in this directions seems to be more relevant, informative and adequate for the analysis of dynamic inherent aspects regarding problems in economic development.

The strategic constitution of the European economy model concerns grants or more accurately social cohesion, the model actually having a bivalent function, both an economic nature and a social one. Not accidentally, in Lisbon, The European Union aims *two goals*:

1. *turning into the most dynamic economy in the world*, governed by durable development, transition to a knowledge based society and guarantee of the social cohesion;
2. *turning into a successful extension of The European Union*, based on a quick increase of the living standard in the new countries members.

Therefore, to reach this goals, a sustained program of economic growth, a complementary instrument which can assist this effort is recommended, this instrument being described by the structural funds and by cohesion. This funds can successfully be absorbed by our country, if the policies with different implications on economic growth on the one hand, and on a growth of cohesion on the other hand are correctly applied:

- improve the infrastructure, concomitantly aiming to reduce transport and transaction costs;
- provide grants for industrial transformation in the peripheral regions;
- policies with effects on promoting innovation.

Structural funds, originate in The Rome Agreement, are authorized for the next three objectives:

1. Objectiv 1: *poorly development regions*, especially those characterised by a level of GDP / inhabitant under 75% of the European Union average;
2. Objectiv 2: *regions that are in process of economic and social reorganisation*, which depend on sectors that are on the wane, such as agriculture and fishing;
3. Objectiv 3: *regions that are in progress of education development and increase the number of employees in the economy of that country*.

The impuls of economic growth is *the innovation*, as indicated by the Solow model as well as by the model of endogenous growth, otherwise the consequences could be displeasing, such as the cessation of the economic growth in case it doesn't exist a technical progress.

The polities of economic growth are closely correlated with investments in top techniques (it is recommended to be as many as possible), assuring a order within the market economy, including the government intervention in order to maintain "the game's rules" in a operational and improved market economy .

Stories of success in The European Union with regard to the absorption and efficiency in drawing the structural funds have happened in Spain and Ireland.

To support the convergence thesis there is the classic Ricardian theory which notes the fact that the *mobility* factor decisively contributes to creating the equilibrium and acts as a corrective mechanism for the regional inequalities. Concomitantly, this theory states that the qualification factor, the endowment is not so important and the integration will lead to reordering the economic activity, having as goals reduced costs, both for investments and for the innovation process, while for the working factor it takes into account higher costs.

Neoclasical theorys of economic growth describe the convergence concept, based on the market as a allocation mechanism and for that reason, from the point of view of this conception, there is no need for development policies.

The aggregate demand, as an impact of this funds, may be synthesized in the next relation:

$D = \alpha \times (T + NC) - C - A$ , where  $\alpha \in (0;1)$ , where the aggregate demand (D) depends on assignments of European funds (T), depends on national cofinancing (NC), depends on payed contributions (C), but also depends on the level of the received payments. It is uncertain the level of substitution by this European funds of internal consumption, which will take place anyway. The connection between the level of substitution of the European funds and internal consumption is synthesized in the variable " $\alpha$ ".

Concomitantly, it remains to be seen, once these funds will be drawn by our country, how the balance of payment will be affected, because a part of structural funds will be registered in the current account and the other will attend to be recognised within the capital account.

According to the forecasts made by IMF, the higher level of structural funds will be drawn in 2013, precisely 3211 millions euros (discounted in the prices of 2004) for the sustainable growth.

Like any other investment Project, those which are financed using structural funds attend to be analysed using feasibility criterion, such as:

- The revenues generated by the project, noting that the following will not be into consideration in calculating the future revenues:

1. the costs and the benefits should not include VAT. Other indirect taxes must be included only if there are payable by the investor.
2. any other subsidies (grants from other entities, etc.).

- Residual value, that is to taken into consideration only if it corresponds to a real cash flow for the investor and can be compounded in two ways:

1. taking into consideration the residual market value of the fix capital, considering it will be sold at the end of analysed time period.
2. the residual value of all assets and liabilities.

- The accommodation to inflation, because in analysing a project there are used constant prices, that is prices adjusted to inflation and fixed using an annual base. However, it is recommended that in analysing financial fluxes should be used, current prices, this representing nominal prices, observed every year.

- Financial support, which means that the project will not risk to remain without money.

- The discount rate for discounting financial cash-flows generated by the investment project, but also for calculating the net present value (NPV). It has been observed that the discount rate is equal to the capital opportunity cost in the period 2000-2006, the benchmark parameter being the real rate of 6% used to establish the opportunity cost of long term capital.

- The performance indicators, most relevant being NPV and internal rate of profitability

The conclusion is that all the efforts must be corroborated in order to assure the economic growth and there mustn't be an abuse of these structural funds, they shouldn't be seen as the only instruments for aiming objectives such as cohesion and economic and social convergence.

In the future, it is to be seen if there will be taken into consideration the recommendation by the authors of the article "*European Model: economic growth, convergence and cohesion*", that is to encourage the competitive production technologies and the labor force to have a higher educational qualification, in order for Romania not to become the peripheral zone of the European Union. Also, the question of what will be the level of accomplishing the forecasts made by different international organisations is being raised.

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## UNITED EUROPE AND ITS PROBLEMS

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***Abstract.** Romania has joined the European Union in 2007 along with lots of hopes. The question is about the positive effects of the integration. The Union has a complete set of policies concerning agriculture, industry, structural funds, labor force, development and research, micro and medium enterprises. Countries like Romania are very interested in structural funds and in agrarian policies of the European Union. But the behalves imply as well the costs. Every country has its own contribution in the European Union's budget.*

**Key words:** agriculture; EU – budget; industrial policy; research; structural funds.

**Classification REL:** 201, 20J

The European Union has taken form under the motto „unity and diversity”. It represents the largest economic and also political community formed of 27 states, which's interests are: promoting economic and social progress, strengthening the EU identity at an international level, fulfillment of a liberty, security and justice zone, in which it is ensured the free circulation of people, as well as maintaining communitarian equality and consolidation.

The leading trumps of the integration are: fulfilling a space without frontiers, fulfilling a customs and monetary union, consolidation of economic integration, assigning the basis of an external policy and of mutual security and introducing european citizenship. The free circulation of people, goods, services and capital is assured by creating a unique market for the approximately 400 million european citizens.

The first steps of the integration began with the commerce within the EU. Between 1960 and 2000 commerce in the EU has increased with 1200% in real terms, while commerce between member states of the EU and other states increased with 730% in the same period (Gelauff et al., 2005). Badinger (2005) estimates that the income per head in EU-15 would have been with 20% lower without economic integration. But this results of the fact that there is no difference made between economic integration through the EU and economic integration through other international commercial treaties (for ex: GATT - *General Agreement on Tariffs and Trade*), so that the effect would have been lower than 20%.

The are studies (Gelauff et al., 2005) demonstrating that, if there wouldn't have been the EU-15, then the 15 states would have had commercial exchange with 30%-60% lower, and the integration led to the increase of the income up to 10%.

By creating the European Union it has come to such a political coordination, so that there are prevented the losses resulted in overlapping efforts of governments in different directions. The EU's activities coat all political domains, from harboring health and economy, to external affairs and defense.

The European Union is involving, for example, in the agrarian mutual policy which has been developed to offer Europe assurance of the feeding stocks. The leading

principals of the agrarian mutual policy have remained unchanged over the decades: guaranteeing prices for agrarian products, at times located just above the global price level and financial aid based on the amount produced, giving a minor importance to the necessities in production. The agrarian mutual policy has been the best integrated of all the European Union's policies. After a range of reforms, costs in agriculture have dropped with 35% for the period between 2007-2013. The link between financial aid offered to farmers and the production attained is not eliminated in total, but a significant part of the farmers' incomes is made up of the direct aid given according to the size of the farm.

Enlarging the European Union from 15 to 27 states has determined an increase in challenges in the agrarian policy domain, increasing the number of farmers up to 70%. The European leaders will make an analysis of the agrarian domain in 2008, and the year 2009 will represent a general revision of EU's budget, with possible connotations after 2013's horizon.

The European industrial policy is focused on fulfilling a communitarian space that is attractive for potential investors and job makers, giving support to industries based on knowledge and innovation. Disloyal competition must be eradicated, in which the European Committee has a standing role, and control is to be reduced in the interest of economic growth. Enterprises are asked to trend for abiding development, rational usage of natural resources, respect for human rights and reducing poverty.

According to the European Committee, the efforts of introducing structural changes in the economies of the member states have started to take shape. Research, innovation and technological development are gaining terrain, reducing the bureaucratic type of procedures encourages settlement and businesses environment. In this direction, Finland, Sweden, Denmark and Germany have been designated globally as leaders of innovation. The European Union is aiming to bring investments in research and development at a medium level of 3% of the Gross Domestic Product by 2010, as a part of the economic growth and competitiveness strategy.

The European Union implements regional and cohesion policies through a series of European structural and cohesion funds. The Union spends milliards of euros on structural funds which aim at reducing inequality of GDP per head between different regions. Economic growth can be accelerated through projects financed with communitarian money. The European Fund for Regional Development assists programs for regional development, economic growth, competition and territorial cooperation, by financing research, innovation, environmental protection, substructure and risk prevention. Through the European Social Fund is attempted rise up the economic adaptability, the employment rate, equal opportunities and social integration. The Cohesion Fund is used for environmental protection and for trans-european networks, and it is destined for Eastern Europe states, Greece, Portugal, which have a Gross Domestic Product lower than 90% of the Union's average.

Three new policies have been created to offer support for business investments and entrepreneurial services:

- "Joint Assistance to Support Projects in European Regions" (JASPERS), is given along with the European Bank for Reconstruction and Development, the European Bank for Investments, and it offers technical assistance to the member states in preparing the applications of development projects;
- "Joint European Resources for Micro to Medium Enterprises" (JEREMIE), which coordinates the efforts made by the European Committee, the European Bank for Investments and the European Funds for Investments, aiming at developing micro and medium enterprises;
- "Joint European Support Sustainable Investments in City Areas" (JESSICA), is given by European Committee along with the European Bank for Investments for sustained economic growth and creating new jobs in urban regions.



The regional policy represents just a small part of the cohesion policy which aims also cultural, social and environmental problems. Since 1988, the European Union has invested over 480 milliards of euros in regions that are less developed. Through the cohesion policy, in 2007-2013, will be allocated 308 milliards of euros, so said 36% of the Union's total budget. Almost 80% of the sum will go for converging new member states, and 16% will be used for innovation and professional training projects. Only 2% of the sum will be allocated for transnational and regional cooperation. It is expected that these investments stimulate economic growth in poorer regions of the Union and generate 2.5 million new jobs.

Before 2004, the foremost beneficiaries of the cohesion policies were: Greece, Portugal, Ireland, Eastern Germany, Italy and Spain. After the 10+2 members have adhered, a significant amount of funds go to east. The cohesion policy for 2007-2013 is very much different than the one in 2000-2006, because the regulations simplify, the eligibility conditions are more clear, there is used an only source of finance, there is a more flexible financial management, economic growth and decentralization are more important.

It is welcomed a reform in the way structural funds are allocated, because by analyzing actual economic growth in regions that have received these kind of funds, the efficiency is not the one expected. There can be given more power to the European Committee in order to monitor intensely and evaluate better the projects, but this implies an increase of administrative costs. Another path is to give these funds only to the poorer states, distributing them not regionally but nationally. Therefore governments know better than the European Union where to allocate the money.

The European Union aims at technological research and development that leads to creating new jobs and prosperity. The European Union's policy's objectives are organizing cooperation at different levels, encouraging the formation of networks of teams of research and increasing the mobility of research. The Seventh Research Frame Program is developed between 2007-2013 and its elaborated to help economic growth and create new jobs. The Economic Union is a global leader in many technological domains, but it has traditional competitors like the United States of America and Japan, but also new competitors like China and India.

According to Eurostat, financing research and development, in the past years, has been at 1.9% of GDP in the European Union, from 2.7% in the United States of America and 3.2% in Japan. In China, finances have represented 1.3% of GDP in 2005. There are in the Union significant variations between member states. So that Finland and Sweden are investing in research over 3.5% of GDP, while Romania and Cyprus allocate only 0.4% of GDP. The Union's objective is to bring research at an average of 3% of GDP till 2010. Without investments in research is hard to imagine european economic growth, innovative products and services, which can make european business environment more competitive in a globalized economy.

The more recent scientific agency of the Union is The European Council for Research, started up in 2007 in order to finance modern research. It has a budget of 7.5 milliards of euros till 2013, which will be used for financing researchers and scientists established in Europe, for project concerning investigations in science and technology, social and human studies.

From 2005, the European Union has launched a new industrial policy in order to create conditions for productive industries. They make approximately 35 million jobs and they represent three quarters of the Union's exports. They cover approximately 80% of the funds spent for research and development in the private sector. The new industrial policy aims at competitiveness, energy and the environment, the rights of intellectual property, industrial research, innovation and market access.

Approximately 99% of the business environment in the European Union is assured by micro and medium enterprises. They also represent 75 million jobs. The

European Union contours rules for public assistance in order to satisfy the needs of this category of enterprises. The involvement of micro and medium enterprises in research and innovation projects is encouraged, along with developing new micro enterprises. There are available 3 milliards of euros between 2007-2013 for these projects. The European Union encourages also education in schools as to develop entrepreneurial values.

The European Union finances, as demonstrated above, a whole series of domains. The necessary resources are attracted mainly from custom taxes, from the percentage of tax on added value collected by member states and from the percentage applied to the national gross income.

The difference between paid funds and received ones form the net payment position according to accounting definitions. The European Committee is usually using another formula, which doesn't include customs taxes and administrative costs. The two calculus methods differ for Luxemburg (administrative costs), Belgium (customs taxes and administrative costs) and Holland (customs taxes). By using both calculus formulas, Holland has the biggest net contribution at EU's budget, followed by Germany and Sweden.

In conclusion, integration in the European Union means a series of advantages, but also implies costs. They must all be balanced, and the result has to be positive, this being the way that european citizens, among which are Romanians, will feel the benefits of the United Europe.

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# THE GOVERNMENTAL POLICIES THAT ENCOURAGE THE POSITIVE CONTRIBUTIONS OF THE FOREIGN DIRECT INVESTMENTS INFLOWS

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***Abstract.** The maximization of the positive effects and the diminution of the costs associated to foreign direct investments depend mainly on the host country existing conditions and the applied government policies that may encourage the manifestation of some FDI contribution, simultaneously influencing the quality and quantity of the foreign capital inflows. As for the European integration, considering the positive evolutions recorded during the last years, we appreciate that in Romania as well, similar to other Central and Eastern European countries, the massive foreign capital input oriented towards activities incorporating a large number of local resources, mainly technology and knowledge, may encourage the improvement of the existing production factors quality and creation of some specialized production factors. In this respect, the long term development strategy must rely on the improvement of the human and technological capabilities, by making use of intelligent foreign direct investments, applying adequate promotion policies to efficiently instrument the accomplishment of the aimed objectives.*

**Key words:** foreign direct investments; governmental policies; development strategy; positive contributions; and European integration.

**REL Classification:** 7H, 8J, 8K

## **Introduction**

Within the European integration, the new member states are facing a major decision, namely choosing the right path to follow, taking the examples of Ireland (the EU “wonder child”) and more recently Slovenia, the Czech Republic, Hungary and Estonia, countries that significantly reduced the income differential as opposed to the EU-15 mean, as well as Greece, the country inside which the disparity increased. The choice involves not only setting the objective, but also identifying the directions in view of reaching the target and drafting a unitary and coherent strategy. This must proceed from a realistic evaluation and a proper, directing of the existing potential, capitalizing in the same time the opportunities given by the EU integration.

Taking into consideration the insufficiency of the internal resources, the own efforts targeting a competitive production can be intensified and completed by attracting foreign direct investment (FDI) inflows, especially towards the intensive activities within

the capital and technology areas, generating a bigger value added. Although obvious, this scenario is not easy to accomplish. Moreover, practice pointed out that although “desired”, the FDI positive contributions are not always effectively “achieved” due to the lack of a unitary, coherent and realist strategy, based on the objective analysis of the host country definite conditions and the characteristics of foreign capital inflows.

Consequently, a major issue is raised: *What are the characteristic elements of some governmental policies that encourage the manifestation of the FDI positive contributions?* In this paper, we shall try to answer this question, approaching the existing theories and the studies achieved in the area by means of the cause-effect relation.

#### Theoretical aspects

The theories concerning the international investment issue emphasize, in one way or another, the fact that, by means of the achieved foreign direct investments, the companies target obtaining the biggest gain possible by capitalizing the “own” advantages, internationalizing the external markets and generating goods, services, knowledge internal inflows (inside their organizational structures). So, the companies achieve FDI the moment they benefit from advantages that can be capitalized with a higher profitability outside the national borders, the decision to invest in a certain country funding on a thorough analysis of the local factors (location advantages), correlated with the profitability necessities of the economic agents and the force of the risk corresponding to the operation inside a non-familiar environment. The importance of each factor in adopting the decision to invest varies as per the motivation of the foreign investor who, within the present global market economy context, according to which any own advantage can rapidly wear away, gains distinct significance.

The literature distinguishes three sets of FDI investments, as per the reasons the economic agents (especially the transnational companies) achieve investments abroad: market-seeking investment, resource-seeking investment, and efficiency-seeking investment.

*The resource-seeking foreign direct investments*, the oldest FDI type, have in view mainly the capitalization of other countries resources. An FDI particular form of resource-seeking investment is made by *the strategic asset-seeking foreign direct investments* that have in view the access to the research-development capabilities or the competitiveness growth (Miga/World Bank, 2001, p. 74). Thus, some research-development activities or other increased value-added activities are relocated towards the abroad subsidiaries. This type of FDI is generally characteristic to the origin companies from the developing countries that, as compared to transnational corporations (TNC), do not own competitive advantages related to the exploitation of some tangible and intangible assets (UNCTAD, 2006, p. 142). As a consequence, these companies internationalize the production and exploit their limited competitive advantage in order to obtain strategic assets (technologies, brands, distribution networks, research-development facilities and management competences).

The strategy used by these companies, called the “asset augmenting” strategy, does not necessarily include the “asset exploiting” strategy (applied by TNC that dispose of competitive advantages). For example, a transnational corporation that decides upon buying a company in order to gain success on the market shall later on make use of a combination of actives, namely the assets existing before the transaction closing down and the assets obtained following the performance of the transaction. This new strategy of the foreign companies occurs mainly due to the impact that globalization has exercised over the competitiveness and the technological development. In other words, in the context of a world economy characterized by an increased competitive level and a rapid technological development, any own advantage possessed can rapidly wear down, thing that implies the need to obtain new advantages.

*The market-seeking foreign direct investments* knew a rapid growth due to the extension of the USA companies, being initially directed towards the European developed countries. As for now, they represent the most powerful FDI form. They target the magnitude and the growth possibilities of the national markets, the advantages triggered by the customer approach, cutting the transport costs (in case of exports), avoiding the tariff and non-tariff barriers. Despite all these, the market growth is not enough as to attract significant foreign investments, especially given that the market flags or is in decrease, or the country economy is unstable.

*The efficiency-seeking foreign direct investments* comprise those investments made aiming at exploiting certain local advantages given by the labor force or resources low costs (fuel, energy) from the host country. A particular form of this investment type is represented by *the production international integration* (productive units created by FDI provides components to the mother-society). As for now, this strategy (initially used by the USA) developed to the extent that the developing countries manufacture finite products with the mother-company brand. *The horizontal direct investments* represent another kind of investment, in which case are manufactured different products, adapted to the local consumers needs and likes.

In our opinion, this distinction is based on identifying certain primary motivations, namely TNC strategic imperatives, according to which the foreign investor targets certain essential attributes of the host country (table 1).

#### Foreign direct investments typology – synthesis

Table 1

FDI types	Main investment motivations	Main characteristics of host country
Market – seeking	- to establish a strong position in the market of the host country; - to achieve access to a new regional market.	- the national market potential; - economic integration (internationalization).
Resource – seeking	- to achieve access to natural and human resources	- availability of natural resources ; - the skill quality of production labour.
Strategic asset-seeking	- to achieve access to national research and technological expertise/capabilities	- availability of scientific knowledge; - the level of development of innovation and R&D activities.
Efficiency - seeking	- access to low-cost input factors (in order to improve the group's competitiveness)	- availability of low-cost input factors (labour, energy, raw materials)

The here above international investment motivations registered alterations following the changes that affected the world economy: trade liberalization, competitiveness growth, telecommunication and information technology development, increasing globalization. Thus, the TNC motivations migrated away from the access to local resources and the reaction regarding the local markets protection towards competitiveness related-issues (costs and efficiency), the access to strategic actives (research-development capabilities) and to the liberalized markets.

The international studies and researches in the area emphasize the fact that these essential attributes of the host country aren't enough to attract the foreign investors, a series of local complementary advantages being taken into account when deciding to invest into a certain country, namely: the economical and political stability (provides the profit security); the quality of institutions (the administrative efficiency, the lack of corruption); a developed and modern physical infrastructure; the economic agglomeration.

Recent research reveal that, although the market growth (market-seeking) and the cost of the production factors (the efficiency-seeking) are the main motivations of the multinational companies to invest in Central and Eastern Europe, an increased importance

is granted to the economic and political (stable) environment, the quality of the governmental institutions, the legal system (stable and transparent), the access to information and the infrastructure degree of development (transport, telecommunications).

In our opinion, the knowledge and the FDI motivation analysis bear a particular signification for the host countries, as the foreign investment inflows depend on a large extent of their characteristics, namely typology and motivation, age, nationality and volume. Analyzing the FDI potential, positive and negative contribution (table 2) to the receiving economy, Dunning underlined the fact that the relation between the costs and the benefits of every type of contribution vary according to the FDI type, maturity, country of origin, also depending of the characteristics of the host country and mainly the governmental policies (Dunning, 1994, p.20).

### Positive and negative contributions of FDI

Table 2

No.	Positive contributions	Negative contributions
1	By providing additional resources and capabilities (capital, technology, management skills).	May provide too few, or wrong kind resources and assets. Can cut off foreign markets and can fail to adjust to localized capabilities and needs.
2	By injecting new entrepreneurship, management styles, work culture and dynamic competitive practices.	An inability of foreign styles and practices to accommodate could change local business cultures. The pursuance of anti-competitive practices may lead to an acceptable degree of market concentration
3	By a more efficient resource allocation, competitive stimulus and spill-over effects on suppliers and/or customers, FDI can help upgrade domestic resources and capabilities, as well as the productivity of local companies and foster clusters of related activities.	Can limit the upgrading of domestic resources and capabilities by restricting local production to low value-added activities and importing the major proportion of higher value-added intermediate products. May also reduce the opportunities for domestic agglomerative economies.
4	By adding to the host economies' gross domestic product, via 1-3 above, and by providing additional taxes revenue.	By restricting the growth of gross domestic product, via 1-3 above. Can lower the taxes paid to host Governments.
5	By improving the balance of payments, through import substitution, export generating and efficiency-seeking investments.	By worsening the balance of payments, through limiting exports and promoting imports and out-competing local firms that export more and import less.
6	By linking better the host economy with the global market-place and helping to advance economic growth by fostering a more efficient international division of labour.	By promoting a division of labour based on what the investing firm perceives to be in its global interests, but which may be inconsistent with dynamic comparative advantage as perceived by the host country.
7	By more directly exposing the host economy to the political and economic systems of other countries; the values and demand structure of foreign households; attitudes to work practices; incentives; industrial relations and foreign workers; and many different customs of foreign societies.	By causing political, social and cultural unrest or divisiveness; by the introduction of unacceptable values; and by the direct interference of the foreign companies in the political regime or electoral process of the host country.

Source: John Dunning, Re-evaluating the benefits of foreign direct investments, Transnational Corporations, vol.3, no.1, February 1994, pp.18-19.

Every receiving country level can bear both positive and negative contributions, according to the host country existing conditions, mainly by the governmental policies.

John Dunning and Michael Porter, developing the theories concerning the investment development path and the competitive advantages stages, underlined the importance of proper governmental policies in accomplishing the migration from the competitive advantage based on the production factors endowment to the creation of specialized production factors.

John Dunning (1994: pp.18-19), based on the theory and the economic practice, identified certain economic policies, encouraging the FDI positive contributions (table 3).

**The governmental policies that encourage the positive contributions of the FDI inflows**

Table 3

Nr.	Governmental policies
1	Minimal structure distortions and institutional impediments to upgrading of domestic assets. Development strategies that help promote dynamic comparative advantage.
2	The policies that promote local entrepreneurship and a keen and customer-driven work ethic. Appropriate market policies that stimulates the competitive practices.
3	The form and efficiency of macro-organizational policies and administrative regimes. The priority of the policies that help upgrade human and technological capabilities and encouraging regional clusters of related activities.
4	Suitable tax policies in order to minimize transfer pricing abuse.
5	Long-term analyze of importing and exporting behavior of foreign companies and promotion of policies that stimulate export.
6	Policies that encourage the investing firms to upgrade their value-added activities and invest in activities that enhance the dynamic comparative advantage of domestic resources.
7	The strength and quality of Government regulations and norms.

Source: John Dunning, Re-evaluating the benefits of foreign direct investments, Transnational Corporations, vol.3, no.1, February 1994, pp. 18-19.

As a consequence, the success of any development strategy based on attracting foreign direct investments depends mainly of the realism and the objectivity of the analysis made in view of grounding the policies than encourage the manifestation of one or the other FDI contributions (figure 1).

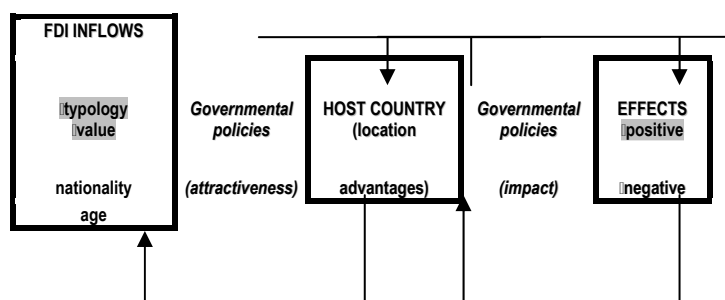


Figure 1. The role of governmental policies promoted by host countries

Within the governmental policies, those concerning the attraction and the promotion of the FDI investments can influence the foreign capital inflows in terms of quality and quantity. In essence, literature distinguishes between two types of FDI

promotion and attraction policies, namely passive and active. *The passive policies* refer to those measures that aim at the quantity-related aspects (the volume of the FDI inflows), in the detriment of the quality-related ones, starting from the idea that massive foreign capital inflows, except for their structure and orientation, can positively influence the quality and quantity of the existing production factors. This category of policies includes those concerning the liberalization of the foreign investment regime, encouraging the FDI by granting incentives and creating an economic climate that encourages investments. Consequently, these policies do not refer to a certain area, but to the economy as a whole (non-differentiated attraction). As opposed to passive policies, *the active ones* target the quality-related aspects, namely the FDI input in certain economic areas (differentiated attraction) in view of improving the quality of the existing production factors and creating specialized factors.

We believe that the potential role of the FDI attracted for sustaining the development of some competitive advantages based on created production factors significantly increases in the case of applying (directed) active policies that target the foreign direct investments attraction towards the sectors that trigger competitive advantages due to the endowment with production factors and towards the upstream and downstream activities.

Of course, governmental policies must comply with the economic and social objectives of every country and in the same time, to have in mind the concrete existing conditions in every country. As there are no a priori positive or negative effects of the received FDI inflows, the intelligent involvement of the host countries, namely the governmental factors, implies the promotion of those policies that considerably increase the probability of manifestation of the positive effects.

As regards the Central and Eastern European countries, this desideratum is even more important, if it is to consider the reduction of the disparities that separate these states from the Western economies (EU-15) and it can not be achieved without attracting massive foreign capital inflows to complete and intensify the internal effort. The quality of this process depends of the applied governmental policies for every country. We consider suggestive the empirical data concerning the development of the Central and Eastern European countries, concerning the development of their competitive advantages by means of attracted FDI contributions.

#### **Empirical data for Central and Eastern European countries**

At the time of the liberalization of the access on the market of the foreign investors, the status of the Central and Eastern European countries is characterized by the lack of internal competence and a diversified demand, the allotment based on non-economic criteria of the material and human resources and the existence of a mentality based on the lack of desire to collect information and the knowledge necessary for the individual and collective development within a competitive environment. Not disposing of the mechanisms that ease the creation of the specialized production factors, the Central and Eastern European (CEE) countries drew benefit from the competitive advantage exclusively based on the production factors, located in certain activity areas. In this context, due to the potential positive effects materialized in the economic restructuring and the development of the mechanisms specific to a competitive market, the foreign direct investments have been thought as "a new Marshall plan" for the Central and Eastern European countries. The extent to which that plan seemed realistic, materialized in positive effects once applied, is given by the success of the CEE countries in strengthening their competitive advantages, namely improving the quality of the existing production factors and the developing several competitive advantages based on specialized factors.



In this respect, empirical data regarding the Global Competitiveness Index (GCI) emphasizes the fact that only few states, new members of European Union, registered notable successes in what concerns their economic competitiveness (table 4).

Thus, in the hierarchy of the 125 countries analyzed in the Global Competitiveness Report (2006), Estonia, which, at the level of year 2005 had already accumulated a significant FDI stock (over 90% of GDP) ranks 25 (the level of GCI is 5.12) before some traditionally developed countries, old EU members (Spain, Portugal and Italy). A quite promising position is also occupied by the Czech Republic (rank 29) that overtaking countries such as Portugal, Italy, Greece and South Africa, this country also receiving considerable FDI inflows (5.504 USD/capita) as well as Hungary (6.015 USD/capita) and Slovakia (2.676 USD/capita) which occupy honorable places, 41<sup>st</sup> and 37<sup>th</sup>, out of the 125 analyzed states. In the same time, Slovenia that attracted FDI inflows comparatively lower (2.469 USD/capita) occupies place 33<sup>rd</sup> (the level of GCI is 4.64) overtaking the majority of CEE countries which demonstrates that, the quality of the foreign direct investments is essential in order to maximize the positive contributions of foreign capital inflows.

#### FDI and GCI for CEE countries

Table 4

Countries	FDI stock/capita (2005)		Global Competitiveness Index (2006)		
	USD/capita	Rank	Score	Rank (global)	Rank (CEE)
ESTONIA	7,059	1	5,12	25	1
HUNGARY	6,015	2	4,52	41	5
CZECH REPUBLIC	5,504	3	4,74	29	2
SLOVAK REPUBLIC	2,676	4	4,55	37	4
SLOVENIA	2,469	5	4,64	33	3
POLAND	1,590	6	4,30	48	6
BULGARIA	982	7	3,96	72	8
ROMANIA	806	8	4,02	68	7

Source: UNCTAD, World Investment Report 2006; World Economic Forum, Report GCI 2006; Eurostat (total population in 2005); own calculations (FDI stock/capita).

The presented empirical data (table 4) emphasize the existence of a strong relationship between the FDI inflows registered by the CEE countries and their level of competitiveness. Thus, the states that have accumulated a significant stock of direct foreign investments (Estonia, Hungary and the Czech Republic) have also registered the highest levels of competitiveness, alongside with Slovenia, while the countries disfavored in what concerns the infusions of capital (Romania and Bulgaria) rank the last regarding their economic competitiveness as well.

We have to underline the cases of Slovenia and Hungary that register big discrepancies between the two variables. Thus, Slovenia occupies place 5<sup>th</sup> in what concerns the level of FDI inflows, registering a much better position with respect at its economic competitiveness (rank 3). Also, Hungary placed on the second position in what concerns the FDI inflows occupies a lower rank (5) in respect with the level of GCI.

Except for the aspects related to the index calculation (for example, Hungary fell 6 positions during 2006 as opposed to 2005, due to the deterioration of the macroeconomic climate) we consider that the disparities recorded in Hungary and Slovenia, as well as the other analyzed countries are mainly due to the applied promotion policies that influenced both the quantity and the quality (structure) of the attracted FDI, determining their impact on the economic and social environment.

Considering the presented theoretical aspects, we appreciate that along the process of turning the Central and East European Economies into functional markets, the quality of the FDI inflows came as a condition for advancing towards the stages in which the investments and the innovative capacity represent the development engine. Consequently, the countries inside which the attracted FDI completed, at a certain point, their quantity, gained leading positions concerning their economic competitiveness. Within these countries, Slovenia marks a particular case, as from the very beginning, has followed the qualitative aspects of the FDI inflows (namely attracting Greenfield investments) targeting their impact on the local competencies. Therefore, although if reported to received foreign capital places behind most of the analyzed countries, as concerns competitiveness, Slovenia surpassed most of them (ranking after Estonia and the Czech Republic) due to the increased quality FDI impact achieved within the economy.

So, the states inside which the act of attracting FDI has been assumed as a priority, namely Estonia, Hungary, the Czech Republic and Slovenia, materialized in promoting realistic and coherent policies based either on attracting massive FDI inflows (Estonia, Hungary and the Czech Republic), or on the qualitative aspects (Slovenia), strengthened the competitive advantages, successfully advancing towards the competitive advantages stage, based on innovation, typical of the developed economies.

#### **Conclusions**

The maximization of the potential positive effects and the diminution of the “costs” associated to the foreign direct investments depend on the real conditions existent within the host economies and mainly by the applied governmental policies. These aspects can encourage the manifestation of some FDI contributions, influencing in the same time, the quality and the quantity of the foreign capital inflows.

In CEE states which, through the promoted policies, have targeted the improvement of the existing production factors quality (investments in technology, infrastructure development, the increase of labour force qualification), the process of economic activities concentration accelerated, sustaining the development of clusters that represents attraction points for domestic and foreign investors. Therefore, the attraction of FDI, by promoting suitable policies, in activities that benefited of competitive advantages given by existing production factors generated the development of clusters, granted the success of foreign capital in upgrading domestic resources and capabilities with positive impact upon economic growth.

Taking into attention the positive evolutions registered in the last years, in European integration context, we consider that, in Romania, as well as the other CEE countries (e.g. Estonia, Hungary, the Czech Republic and Slovenia), the massive penetration of the foreign capital mostly oriented towards the activities that incorporate a higher content of local resources and most of all, technology and knowledge, could encourage the improvement of the existing production factors quality and the creation of specialized production factors.

In this respect, we appreciate that the long-term development strategy has to be oriented toward the improvement of the human and technological capabilities, through application of some measures, such as: the increase of the investments targeting educational and research activities; the stimulation of local initiative; the stimulation of local companies to invest in activities engendered higher value added; the stimulation of clusters development.

In our opinion, notable results can be obtained in this direction provided that it would be produced a more productive application of the EU policy in the State Aids area, including those concerning the (foreign and internal) investments, by directing them mainly towards the objectives that target the long term positive effects. Moreover, we consider as essential the opportunity fructification occurred once with the Romanian EU

integration, by significantly increasing the degree of absorption of the European funds and their proper using, aiming at developing the physical and institutional infrastructure.

Warranting the security of the obtained profits, an essential condition in attracting foreign investors, represents a major aspect, implying the existence of a stable political environment. The evolutions registered this year showed that the political stability materialized, among others, in a postponement of the EU parliamentary elections, negatively influenced the foreign capital inputs. As per empirical data, the level of the FDI inflows, attracted early 2007 represents less than half the recorded the previous year.

Moreover, the strict and non-discriminatory application of the European norms and regulations in the competition, labor ethics and environmental protection areas, shall create, in our opinion, the necessary conditions to minimize the FDI negative effects on the economic, social and natural environment.

Consequently, considering the here above presented aspects, we appreciate that the maximization of the report between the FDI positive and negative contributions implies the promotion of adequate governmental policies, oriented towards an intelligent use of the foreign capital inflows as a development strategy instrument.

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## ANALYSIS REGARDING THE ISRAELI PENSION FUNDS SYSTEM

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***Abstract.** In this work, we made a presentation regarding to the Israeli pension system which was deeply reformed by passing it from a system based on Defined Benefits with huge actuarial deficits to a system based on Defined Contribution actuarial balanced. One of the major by products of this reform is the concentration of the pension market in the hands of three pension funds which together control more than 85% of the market. The reform established new high standards of transparency, company governance and risk management. This presentation is an historical overview of the Israeli pension system reform from their establishment until the end of year 2005, of factors who launched the Israeli pension system reform, of reform involvement, of way of regulation and supervision of the system.*

*This presentation include also an overview of the Israeli pension fund market at the end of year 2005 about: types of the Israeli pension funds, the differences between old pension funds and new pension funds, pension fund's portfolio, investment, actuarial surplus and actuarial deficit.*

**Key words:** pension funds; other private financial institutions; retirement; retirement policies; personal income; consumption, saving; portfolio choice, investment decisions.

The Israeli pension system passed successfully through a major reform, being transformed from an definite benefits (DB) system type, which registered high actuarial deficits, into a definite contributions system (DC) type, equilibrated from the actuarial point of view.

The first pensions fund in Israel has been created in the 1940 year by the Histadrut union confederation. The purpose of the constitutions of these funds of pensions was that to insure economies for the age of retirement for the employees. The collective labour contracts, concluded between the representatives of the union confederation and the representatives of the national organizations obliged the workers in certain domains of activity (industry, constructions, agriculture) to adhere to the pension funds, administered by Histadrut. After that, some of these contracts (agreements) extended also to employees in other domains of activity. During the half of '80 year, it was created the first pensions fund for the freelancer employees, and starting with 1990, there have been created more complementary pension funds to those administered by Histadrut, but which also accepted as members (participants) the persons who were freelancers. The main features of the old pension funds are:

- a) The pension fund was constituted under the form of a joint stock company. The shares were the property of Histadrut, but they did not offer the right to cash dividends. The administration expenses were supported from the pension fund

assets and represented around 10% of the annual contributions of the members (participants).

- b) The pension funds were of DB type, these offered integral pension plans (they cover old age, invalidity, death risks), also named “comprehensive”:
- life old age pension, starting from the age of retirement (65 years old to men and 60 years old to women) and the possibility of anticipated retirement with up to 5 years before (the accumulated pension decreased with 5% for each anticipated year);
  - invalidity (disability) pension in case of labour incapacity. The invalidity pension is equal to the old age pension, which the member of the fund could obtain if he continue the contribution until the age of retirement;
  - Survivors pension. The wife and each child who was less than 21 years old had the right to pension. Wife received 60% from the old age pension of her husband deceased, and children received 15% under the condition that, cumulated, the pension received by wife and children to represent maximum 100% from the old age pension of the deceased.

All the above mentioned pension categories were 100% indexed to the inflation rate.

- c) The contributions of members (participants) represented 17.5% from the monthly wage/ income.
- d) The pension funds were obliged to invest at least 92% from the total actives of the fund in state debentures (earmarked bonds) specially issued by the government for the investments of pension funds. These types of debentures offered a fix yield of 5.5 %. The invested amount and the yield were indexed to the inflation rate. The law in fiscal domain sustained the adhesion to these funds because of contributions tax deductibility from the imposable income (up to certain ceilings) and non-tollage of pensions up to a certain ceiling. The revenues obtained from investments were not taxed.

The level of pension (old age, invalidity, survivors), that a member receive to a pensions fund depends of 5 main factors: The level of contribution; The administration expenses of the fund, The yield of investments, The mortality and invalidity tables concluded for each member depending on age, sex, and others actuarial criteria and the Annual Percentage of increasing of the medium wage on economy.

The actuarial deficits of the pension funds administered by Histadrut accumulated due to the following:

- a) Non-conformity with the mortality and invalidity tables depending on the life expectancy of members, invalidity rate, number of new members. The life expectancy of the population has been rising as the society evolves due to the improvement of life conditions. Up to present, the rise was around one year in every decade. For this reason, the pension funds had and will have to pay old age pensions on longer periods. Parallel (simultaneously) to the rising of life expectancy, it also increased the invalidity rate, as well as the number of persons who benefit of invalidity pension.
- b) Decrease in time of the interest paid for the special debentures “earmarked bonds” from 6.4% up to year 1977, to 5.5%, starting from the year 1977. This interest is warranted on the entire duration of life of the member who contributed to the fund;
- c) Increase of benefits (pensions) paid to the members of fund with over 3% yearly than the inflation rate, more that it was estimated at the establishment of the fund, 2% respective over than the inflation rate;

d) The expenses for administration have been maintained under control in the sense that they did not exceed (surpass) 10% from the contributions cashed by the pension funds.

The optimum and professional solution which must be adopted was to modify the pensions plans and to decrease the benefits packets offered (the levels of old age, invalidity and survivor pensions). The "political" pressures of the labour union members on the leaders of Histadrut realized to restrain these necessary modifications. The administration councils of the funds were composed by labour union leaders. Histadrut also negotiated the collective labour contracts, at national level, at branch level and at the enterprise level. In quality of negotiator of labour contracts, Histadrut had an influence upon the Government (which had the quality of employer for 10% from the total labour force in the country). The influence on the labour market also extended upon the decisions of the Finances Ministry, in connection with the pensions funds regarding the continuance of issuance of special debentures.

On 1995 year, based on certain common interests, the Government and Histadrut reached to an agreement which put the bases of the reform of Israeli pensions system and which was finished in 2003 year. The evolution of this reform proceeded as follows:

- a) Since 1st of January 1995 the existing pensions funds on the market have been transformed in "closed" pensions funds. It was banned to these funds to accept new members. The pensions plans of the pension funds have not been modified, so it was kept the benefits packet. The Government continued to issue special debentures "earmarked bonds" for these funds. In the present, the name of these pension funds is "old pension funds".
- b) Since 1st of January 1995, the employees and freelancers have been adhered to "new pensions funds". The old pension funds have been given the possibility to create new pensions funds.

Currently, the pension funds market in Israel is composed of more types of funds. After 1995, there have been created two types of new private pension funds, new pension funds and general pension funds, respective. The new pension funds are comprehensive pension funds, these insure to the participant, an old age pension and an invalidity pension and/or survivors pension, in case that it produces the invalidity risk or death.

In 2000 year, there were created the general pension funds, which offer to the participant only an old age pension, without covering the death risk and/ or the invalidity risk.

In 2000 year, the actuarial deficits of the old pension funds represented around 25% of the accumulated assets of these funds. It was also a "political" consent it must be done something to prevent the bankruptcy of these funds and the same time with these, the loss of pension of 260,000 of pensioners and of the accumulated rights of other 400,000 members. Histadrut had no more "political" power to introduce substantial changes in the pension plans for decrease the benefits with around 25%. This way, in 2003 year interceded the Ministry of Finances, which, according to the Hebrew law is responsible for the supervision (surveillance) of pension funds. The pension funds have been given 3 months to modify the pension plans in the sense of realizing the actuarial balance (equilibrium) between actives and obligations. No pension fund realized to reduce the benefits packet to make this actuarial equilibrium. Due to the actuarial deficit, that the old pension funds registered, these could not anymore pay pensions for the eligible participants, and the Government paid the rights of participants, and the administration of pensions funds passed from labour unions to the special administrator. The special administrator was a person named by the Government to lead and survey all the operations of the fund. Consequently, the Administration Councils have been dismissed from the post, and in their place, the special administration installed, respective the appointment by the

Ministry of Finances of a single administrator. This administrator issued the unique pension plan (scheme) for all the old pension funds.

The pension plan makes no difference between the rights to accumulated benefits until to the entry of this plan into functioning and the rights to benefits which will be accumulated in the future, after 2003 year. The benefits conferred by the unique pensions plan (for old age, invalidity or survivor pension) are smaller with around 20% up to 30% (depending on the age of the member in 2003 year), compared to the promised benefits by the pension plans, previous to the old funds. The retirement age for the old age pension was increased with 2 years for men (67 years old than 65 years old) and four years for women (64 years old than 60 years old).

The government assumed the obligation that in the future to continue the issuance of special debentures (earmarked bonds) for the placements of old pension funds, with a fix annual interest warranted of 5.56% in real terms (over the inflation rate). In the 2004 year, the government paid 750 millions NIS to cover the updated value of payment of the insured members to these pension funds, and all these measures brought the old pension funds to the actuarial balance (equilibrium). In the future, if appear actuarial deficits (due especially to the increase of the life expectancy), these will be immediately eliminated, by decreasing of the benefits or the adjustment of contributions or by both measures united.

The special administrator took capitalization measures of different goods held by the old pension funds (lands, collective housing units, etc.). For others, in the 2003 year there were sold by auction all shares held by the old pension funds to the companies of administration of the newly created funds by these old pension funds. These shares have been bought by the insurances companies. The transaction of shares led to the concentration of pension funds market. Mivtahim is a new pension fund and holds a market quote (share) of 48% of the total of members and actives of new funds, followed by Makefet with a market quote of 27% and Harel with a market quote of 10%.

The 2004-2007 period was characterized by an intense effort of stabilization of the Israeli pensions system. There have been issued norms by the Ministry of Finances and the Commission of Surveillance to rise the professional level of those who administer these funds, as well as norms that insure the transparency of the system (investments, transactions with parts, etc.) mobility (transfer from a fund to another one, with no expenses) and norms regarding the administration of risks. These norms put the bases of implementation of new laws of mandatory adhesion to a pensions fund by each employee.

The main features of the new pension funds "comprehensive fund" are:

- a) The funds are based on the DC system (Defined contribution) and not DB (Defined benefits). Anytime exists an actuarial balance (equilibrium) between the accumulated amounts of money and the assumed obligations by the pensions plan;
- b) The choose of the pensions fund is the individual option of the member. One member may transfer his money from a pensions fund to another one without penalties and restrictions;
- c) The pensions fund is created in the form of a contract of civil company with a partnership role between its members. The contract comprises the pension plan. The risks of pension funds (mortality, invalidity, investment risks) are distributed between the members and the pensioners of the pensions funds, depending on the accumulated assets in the personal accounts.
- d) The pensions fund is administered by an administration company of the new pension funds, this is a joint stock company with a minimum share capital of around 1.8 millions Euro. A company may administer only one new pensions fund with a comprehensive pensions plan, which insures only an old age

pension and survivor pension. For the administration activity, the company collects (perceives) a commission for administration, the maximum ceiling of the commission being established by law. The administration companies register and deposit separately its actives from the actives of the funds that he administers.

- e) A new “comprehensive” pensions fund (it insures old age, invalidity and survivors risks) may receive monthly contributions from a member of up to maximum two medium gross wages on economy (in July 2007 the limit was of around 1500 Euro). The contribution to a new pensions fund is 17.5 % of the wage. If the member is employee, one third of the wage is paid by the member and two thirds by the employer. The freelancers pay integrally 17.5%.
- f) The new pension funds are obliged to invest 30% from assets in special debentures “earmarked bonds”, which insure an annual interest of 4.8% over the inflation rate. This condition represents a facility for the new pension funds. The general pension funds are not allowed to invest in special debentures “earmarked bonds”. But the general pension funds may receive monthly contributions without limitations. The accumulated amount in the account of a participant is updated depending on the yield of the investments and the demographic capacity.

The fiscal legislation regarding the tollage of contributions, of benefits, of the capacity of pension funds has not been changed, it remained the same, also for the old pension funds, so that the contributions are deductible up to a certain ceiling, the earnings from investments are not taxed (tollage), and the benefits are monthly updated to the inflation rate and they are non-tollage until a certain ceiling. The supervisor of the pensions market surveys the observance by the companies of the principles of corporative governance.

At the end of 2005 year, due to more pension funds fusions, which took place on the private pensions market in Israel, there have been 40 active pension funds. The old pension funds are divided in two categories, as follows:

- a) In the first categories, are comprised 10 old pension funds, equilibrated;
- b) The secondary category is formed by the old pension funds, which are under the special administration and which are administered by a special administrator named by the Government. At the end of the 2005 year, there were 8 pension funds of this kind.

In 2005 there was a decrease of the number of pension funds on the market, due to the fusions between more funds, as a result of the take overs and changes in the shareholder structures. The mergers between the new pension funds reduced their number from 20 to 13, and in case of the general pension funds, their number reduced from 12 to 9.

The main feature of the Israeli private pension market is given by the separation between the old pension funds, which had been created and functioned up to 2005, and the “comprehensive” pension funds, which started to function after 2005. According to the table 1, at December 31 2005, the assets of old pension funds totaled 145 milliards NIS and the net total assets of the new pension funds were around 30 milliards NIS. Moreover, these funds registered an increase of the net actives of 24% yearly. The main reason was that these new pension funds functioned on a relative short period of time and concentrated on the attracting of new participants, the big majority being composed of young persons, who have just started the saving for the retirement age, so that the invested contributions in these funds increased, and the payment of pensions reaches minimum levels. The contributions to the new comprehensive pension funds could not exceed (surpass) the value of two gross medium wages on economy.



## Financial data regarding Israeli pension fund (NIS thousands "NIS")

Table 1

	Old pension fund			New pension fund			General pension fund			Total		
	2004	2005	%	2004	2005	%	2004	2005	%	2004	2005	%
Net assets at the end of the year	124,084	145,377	17.16	24,199	30,049	24.18	157	264	67.77	148,440	175,688	18.36
Revenues /Net yield per year	53.29	10,456	96.23	3,572	3,830	7.22	51	49	-4.19	8,952	14,336	60.13
Pension payments	8,790	9,063	3.10	35.7	49.2	37.75	1	1	18	8,826	9,113	3.25

Source: Financial statements of pension funds processed by Capital Markets, Insurance and Savings Division.

The actives of the new "comprehensive" pension funds held at the end of the 2005 year a market quote of 28%. This high rate of increase is a continuance of the tendency in 2004 and 2003 years, which was characterized by a significant increase of the actives of these pension funds. This increase of the new pensions funds was due to money in the deposit accounts (existent contributions), to the new participants who adhered to the funds and not least to the obtained earnings from the placements of funds in the 2005 year.

At the end of 2005, the actives of general pension funds registered a small level and represented only 375 millions NIS. This fact was due firstly to the imposed restrictions regarding the placements of these pension funds, because these funds are not able to invest in the earmarked bond (special debentures issued by the Government, excluding for the pension comprehensive funds), moreover, they represent the complementary choice for the pension funds, because they offer only an old age pension, and they not cover invalidity and/or death risks, generally the persons who contribute to these types of pension funds are the same with those who contributed to the new "comprehensive" pension funds, with a maximum percentage of contribution allowed by law and which is currently 20.5 of the medium wage/ income on economy. Another reason is that these funds act on a short period of time. These funds receive contributions with no restrictions and represent a solution for the persons who did nothing for saving to the pension. For this reason, it is foreseen an increase in the future of the assets of these types of pension funds.

According to the table 2, the new pension funds have in total around one million members, and only 54% of them are active members (contributors), the rest are non-active members. The number of active members to the new pension funds increased in 2005 to 23% and the number of the non-active ones represented around 10%. The number of pensioners to the new pension funds is diminished and represents less than a half from the total number of members of the fund, especially due to the fact that the new pension funds have been functioning on the market since 1995, and the members of the funds are relative young persons.

## Net assets and the number of the new pension funds

Table 2

Pension funds	Active members (contributors)	Non-active members	Pensioners	Total number of members	Active members/ Total number of members (%)	Active members share market (%)	Assets (million euro)	Share market (%)
Mivtachim Yoter	221,669	252,568	2,427	476,664	46.50	38.94	1754.6	51.0
Makefet Ishit	88,765	81,049	456	170,270	52.13	15.59	531.5	15.4
Meitavit	83,286	15,451	377	99,114	84.03	14.63	291.6	8.5
Atudot HaHadashah	37,204	22,456	34	59,694	62.32	6.54	159.6	4.6
Te'utzah	15,967	15,704	111	31,782	50.24	2.80	148.1	4.3
Gilad Rivchit	37,611	4,288	58	41,957	89.64	6.61	134.4	3.9
Netivot	20,288	8,120	174	28,582	70.98	3.56	86.0	2.5
Yozma HaHadashah	14,704	6,759	26	41,957	89.64	2.58	61.4	1.8
Amit Rivchit	21,417	8,012	12	29,441	72.75	3.76	54.6	1.6
Yuvolim	N/A	N/A	N/A	N/A	N/A	N/A	51.5	1.5
Tenufa	9,649	5,402	80	15,131	63.77	1.69	23.4	0.7
Adi	2,215	9,311	16	11,542	19.19	0.39	34.8	1.0
Pisgah	4,090	5,244	38	9,372	43.64	0.72	27.3	0.8
Aldit Ishit	N/A	N/A	N/A	N/A	N/A	N/A	21.8	0.6
Manof	3,854	2,433	51	6,338	60.81	0.68	23.9	0.7
Magen Zahav	4,446	1,343	3	5,792	76.76	0.78	9.9	0.3
Shiluv	N/A	N/A	N/A	N/A	N/A	N/A	10.6	0.3
Helman Aldobi	294	9	0	303	97.03	0.05	0	0
Achdut	3,825	14,006	12	17,843	21.44	0.67	15.5	0.5
TOTAL	569,284	452,155	3,875	1,045,782	54.44	100.00	3440.5	100.0

Source: Financial statements of pension funds processed by Capital Markets, Insurance and Savings Division.

The old pension funds and the new pension funds (table 3) and the general funds are obliged to invest the contributions of the members, according to the Israeli legislation, regarding the (tax) tollage of incomes. But there are differences regarding the rules of realization of the imposed investments for each type of fund: old funds, new funds and general funds. The major difference regarding the investment rules between the 3 categories of funds consists in the permission to invest the pension fund assets in special debentures "earmarked bonds".

The old and new pension funds are obliged to invest in earmarked debentures up to 30% from their actives. According to the new rules regarding the investment of actives, the investment managers of the pension funds must be specialized in the administration of investments and risks dispersion. They compete with other investment managers on the pensions market, to obtain a maximum capacity of the investments, and this kind of competition was less relevant in the past in the case of old pension funds, which were administered by labour unions, because these funds were obliged to invest at least 92% from their actives in special debentures.

The general pension funds can not invest the assets in special debentures "earmarked bonds", they invest the fund's assets in similar financial instruments to those in which they invest provident funds and the life insurance companies that offer life insurances with a pension component. The component of the assets portfolio in which invests a fund and the capacity of investments are very important and have a major impact on the rights

(benefits) of members. In 2005, the old pension funds invested their contributions in earmarked bond in a proportion of 78%, and in 2004, in a proportion of 84%.

**Investment portfolio of old and new pension funds  
(NIS thousands "NIS")**

Table 3

	December 2004 Old pension fund	December 2005 Old pension fund	December 2004 New pension fund	December 2005 New pension fund
<b>Non-negotiable assets</b>	<b>NIS thousands</b>	<b>%</b>	<b>NIS thousands</b>	<b>%</b>
Earmarked bonds	12,680,817	53.66	13,059,935	42.98
Deposits	831,027	3.52	1,342,444	4.42
Loans and mortgage portfolios	243,007	1.03	522,403	1.72
Land	4,763	0.02	5,276	0.02
Corporate bonds	1,707,899	7.23	3,563,850	11.73
Non-negotiable stocks	34,691	0.15	13,744	0.05
Other non-negotiable assets	70,547	0.30	228,639	0.75
<b>Total non-negotiable assets</b>	<b>15,572,751</b>	<b>65.90</b>	<b>18,736,291</b>	<b>61.66</b>
<b>Negotiable and liquid assets</b>				
Cash and cash equivalent	605,909	2.56	530,388	1.75
Negotiable government bonds	4,697,340	19.88	4,788,346	15.76
Negotiable corporate bonds	1,048,240	4.44	2,734,915	9.00
Convertible bonds	112,130	0.47	186,200	0.61
Negotiable stocks	1,527,333	6.46	2,676,862	8.81
Foreign stocks	32,888	0.14	681,360	2.24
Options and negotiable derivatives	6,487	0.03	5,922	0.02
Mutual funds	28,649	0.12	45,870	0.15
<b>Total negotiable and liquid assets</b>	<b>8,058,976</b>	<b>34.10</b>	<b>11,649,863</b>	<b>38.34</b>
<b>Total</b>	<b>23,631,727</b>	<b>100</b>	<b>30,386,154</b>	<b>100</b>

Source: Financial statements of pension funds processed by Capital Markets, Insurance and Savings Division.

The contributions of participants to the new pension funds have been invested at the end of 2005, in earmarked bonds in a proportion of 53.66% and around 20% of the actives have been invested in governmental debentures, transactional.

The actives of the general pension funds have been invested in a proportion of 68% in governmental debentures, transactional, transactional shares and corporate debentures, the rest being invested in shares.

The quality of administration of a pensions fund is reflected in two key proportions, these have a significant impact regarding the level of the pension paid to the participant and the establishment of fund. For this reason, the new pension funds make a separate evaluation of the two indicators:

- Investments management, this is reflected in the fund yield;
- Insurance risk management, this is reflected by the demographic yield.

The financial yield of the new pension funds was bigger in 2005 in comparison to 2004 and with the average of the last 6 years. The percentage of the actives of pension funds, which is invested in shares, justifies the increase of earning (the capacity obtained at the end of 2005). This fact was due especially to the increase and development of the stock market. This positive trend of increase of the earnings was also registered due to the development of the market of debentures.

The capacity of the pensions fund has a direct impact with respect to the amount accumulated for the pension. This is a very important criteria for the choice of a pensions fund, and the risk degree of the pensions fund must be the same with the preferences of the participants for risk, because the investments in pension funds are long term investments. On the 2000-2005 period of time, the medium yield of the pension funds was 6.32%. When it is made the evaluation of the performances of a pension funds, it must not be made an analysis only on the yield of investments, but also the way that the respective administration company of the pension funds administer the insured risks, to which the participants are exposed.

The surplus or the actuarial deficit is the consequence of the variety of the pensioners number. For example, if the current number of invalid persons is bigger than the estimated number by actuarial computations, this fact produces an actuarial deficit and diminishes the level of the accumulated money for old age pension. According to the regulations of the Israeli surveyor of the pensions market, a pension fund is obliged to conclude and transmit an annual similar actuarial balance that comprises the actives and debts of the pensions fund. The part of debts from the actuarial balance comprises the obligations of the fund, towards the members and the life expectancy of the participants, based on the foresees, regarding the capitalization of interests and the life expectancy of participants, pensioners and survivors. If the assets of an pension fund are bigger than the debts (assumed obligations), the fund registers an actuarial surplus, and if the debts are bigger than the assets, the fund registers an actuarial deficit. The main purpose is to realize an actuarial equilibrium of equalization of the assets with liabilities, by increasing and decreasing the debts..

The most part of the companies which administer pension funds must have a considerable influence in the establishment of the ceiling regarding the surplus and actuarial deficit. This is responsible for administration of the risks, answers especially by the attraction procedures of the new members (verification of the health condition of each member who adheres to the fund), of the examination procedures in case of the invalid contributor's claim and of the identification and testing procedures in case of invalidity or decease.

The surplus or actuarial deficit may differ from a pensions fund to another, not just due to the quality of management of the fund, but also due to the differences between the contributors (age, sex, incomes, domain of activity).

For example, if the average age of the contributions is high, it is foreseen that the number of invalids to be higher for this fund. The actuarial surplus may be an index regarding the quality of management, but also for the features of participants to the fund (age, domain of activity).

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## **RISK TRANSFER THROUGH INSURANCE CONTRACT – PART OF BUSINESS RISK MANAGEMENT**

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***Abstract.** The paper presents the importance of risk transfer through insurance contract for all organizations. The paper explains risk adjustment rules who offer key points for decision making when dealing with risk, but each of them also have limitations. Also, the paper presents risk managerial policies.*

**Key words:** pure risk(insurance risk); speculative risk; risk managerial policies; success in business; behaviour towards risk

A major element, with deep implications, which characterizes the particularities of the business environment, is business risk. We can explain risk as situation in which managers are aware of all the possible solutions as well as of the fact that those can change from good to bad in every moment, thus the final results being unknown. It is very hard for the managers to know all possibilities and probabilities. Most of the times the managers estimate the probability with which a certain possible solution will work or not, in order to build optimistic and pessimistic scenarios. After this estimation, the risk of an action can be determined with the use of statistic coefficients, namely dispersion and variation coefficient (risk coefficient).

In order for the risk to be completely taken into consideration when making decisions, projects which have different levels of risk are evaluated according to the manager's personal attitude towards risk assessing. These attitudes are divided into three categories: risk-adverse managers, neutral managers and managers who prefer risk. Once the risk levels and manager's attitude have been established, the managers are confronted with real decisions which imply a certain level of risk. Thus, they use specific indicators, such as risk adjustment rates, decision making tree and the concept of normal standard.

When the level of risk is extremely high, the managers apply strategies based on the theory of games.

Considering the risk exposure of one company there are two kinds of risk: speculative risk and pure risk (insured).

The speculative risk is generated by the wish to attain a higher profit through activities which have a result increased expenses, and thus higher possible losses. The factors which imply such a risk are: public authorities' decisions (fiscal regulations, companies' rights etc), output techniques (informatics, patents), financial factors (investments, profitableness), human factors, structural factors (organization, mergers etc).

The pure risk is the consequence of incidental events, which represent an unpredictable threat for the business, the delimitation of losses being very hard. Besides of the risks occurred due to external factors (hurricanes, storms, natural calamities, wars, frauds, vandalism), pure risks can be generated also by a series of shortcomings in the activity of some companies (conception or fabrication mistakes, deficient maintenance of the productive equipment, unfulfilling of security and labour protection regulations etc

Orio Giarini, outlines that “one of the effects of industrial society’s complexity in expanding and one of the main characteristics was that... pure risks and entrepreneurs’ risks are conditioned and are dependent one with the other”. This is the reason for which, in present days, we assist to an implementation of the management concerning these two risks not only vertically but also horizontally speaking. Generally, the two kind of risks are generated not only by the internal operating of the firm but also by the business’ environment.

Pure risks have the following characteristics:

- pure risk is not accepted in counterparty with a possibility of gain; its occurrence results in a loss for the company; its absence does not represent a gain; the company can be unaware of a loss caused by this risk.
- the pure risk is an incidental event, independent of the parties’ will; these two characteristics have assimilated by the lawgiver in order to define the insurance contract. In fact, in the day-to-day language, the expression “insured risk” usually replaces the “pure risk”.
- the pure risk is difficult to control, especially taking into consideration the fact that its occurrence and spread are independent of the company’s will. This is the reason for which the risk insurance activity is handled by insurance companies.

Classic economy has often opposed these risks, dissociating theme. In reality these risks are very often interdependent. The occurrence or aggravation of a pure risk can have as root a strategic managerial decision. The increase of company’s vulnerability is the result of extended interdependency between the two risks. This is a reason for integrating the management of the two risks in a unique process.

Risk management implies besides its importance and financial consequences also costs associated with its administration.

These costs are:

- risk transfer costs (especially insurance);
- losses assumed by the company in case the risk occurs.

Even when a risk is identified, this implies a cost for having taken it into consideration and the potential cost of insurance.

On the basis of interdependent approach of risk’s financial consequences and administration associated costs, we can define various managerial policies for the risk starting with a typical situation of a risk situated outside the area accepted by the company: preventive management allows the decrease of costs, limiting the possibility of its occurrence and repeating; preventive management aims to reduce the financial consequences of risk by minimizing the effects and risk management through transfer aims to transfer the increase of risk costs (insurance costs), through the passing on of the consequences to another commercial agent (insurer).

Thus, the objective of the company- through the adequate association of the three managerial policies – is to stay within an area in which the risk is bearable, namely the variability (consequences) is lower than a certain maximum accepted level, and the cost is inferior to a limit imposed by the company’s profitability.

The knowledge of the risk in the decision-making process is one of the major concerns of a company’s management. Assuring security and ameliorating the company’s vulnerability imply a careful and harsh selection of the employees which have precise responsibilities in risk’s management

The main features in decision-making process in risk condition are:

### I. Risk in economic analysis

Taking into consideration the fact that decisions are rarely taken in certainty conditions, the risk must be measured and inserted in the decisional process.

#### A. Probability of occurrence

Being known a probability of occurrence for every decision which must be taken, the amount of these combinations of probabilities estimates the probability of occurrence.

1. The expected value represents a probabilistic distribution. This is calculated as a weighted mean of the potential final results. For example, when the weight is the probability of occurrence,  $p_i$ , the expected value is calculated with the formula:

$$\text{Expected value} = E(\pi) = \sum_{i=1}^n \pi_i \times p_i$$

#### B. Risk measurement

In the theory of decision-making, the risk depends on the variability of potential results.

1. Standard deviation – is the most common method for measuring the spread of an expected value for a probability distribution. Standard deviation is calculated as a weighted mean of potential deviation for possible results from the expected value,  $(E(\pi))$ , where the weight is the occurrence probability.

$$\text{Standard deviation } (\sigma) = \sqrt{\sum_{i=1}^n (\pi_i - E(\pi))^2 \times p_i}$$

2. Variation coefficient is a variable which indicates relative risk, often used to compare the risk for multiple variants in a decision-making issue.

$$\text{Variation coefficient} = V = \frac{\sigma}{E(\pi)}$$

### II. The theory of satisfaction and risk

#### A. The attitude of managers in decision-making process is determined by the satisfaction or profit implied.

1. A cautious manager has a marginal utility or a profit in reduction. This is a common behavior, but not a universal one.

2. A manager neutral to risk has the utility or profit constant.

3. A manager who prefers risk has the utility or profit growing.

**B. Conclusion:** Managers' decisions must not be entirely based on expected results, but must also incorporate a risk analysis.

### III. The adjustment of risk evaluation pattern

#### A. Adjustment using certainty equivalent

A first method for measuring risk in the evaluation model is to convert profits from individual projects in risk certainty equivalents. For this are used adjustment factors which fluctuate for every project. The V value of a given investment becomes:

$$V = \sum_{i=1}^n \frac{\alpha \cdot \pi_i}{(1+i)^i}$$

Where:

$i$  – is a rate for reducing risk

$\alpha$  – is an adjustment factor, calculated as:

$$\alpha = \frac{\text{suma\_sigura\_echivalenta}}{\text{suma\_de\_risc\_asteptata}}$$

1. Adjustment factors. It is important to know that both sides of the fraction are constant in utility.

2. Calculating adjustment factors. Taking into consideration the value of  $\alpha$  we can determine the level of risk:

a)  $\alpha < 1$  implies risk aversion (the most common)



- b)  $\alpha = 1$  implies indifference towards risk  
 c)  $\alpha > 1$  implies the preference of risk.

#### **B. Discount rates when adjusting risk**

The second method for calculating risk in the evaluation model is to adjust the capitalization rate,  $i$ , by adding a risk variable which is different for every project. The  $V$  value of an investment becomes:

$$V = \sum_{t=1}^n \frac{\pi_t}{(1+k)^t}$$

Where  $k$  – is a risk adjustment rate, representing a risk reduction rate,  $i$ , plus a risk variable,  $r_p$ :  $k = i + r_p$

#### *IV. Other techniques for decision-making in uncertain and stressful conditions*

##### **A. Decisional trees**

A decisional tree map offers all the possibilities for solving a situation and the associated probabilities, offering in this way efficient means for analysing alternatives. When different alternatives have both the expected value and the risk characteristics at an inferior level, these alternatives can be removed because they are considered to be dominated.

##### **B. Simulations**

PC simulating models can be used in the analysis of decisional issues with a complexity which eliminates the decisional tree technique.

##### **C. Standard normal curve**

Standard normal curve can be efficiently used in decision-making issues, when incomes, cost and profits are normally distributed.

1. Standardization variable: is a method used to characterise the location of a spot  $x$ , in a regular distribution.  $z = \frac{x - \mu}{\sigma}$ ,

Where:

$z$  – standardization variable

$x$  – interest spot

$\sigma$  – standard deviation

$\mu$  – the middle.

##### **D. Game theory**

This is a method widely used for situations which imply a high level of risk and disastrous consequences.

1. the maxi-mini decision rule: choosing the decision alternative with the most critical moment
2. the mini-max regret decision rule: choosing the alternative with the lowest possibility of loss
3. An alternative of the opportunity-loss concept: the expected loss is the uncertainty cost.

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## PROTECTION AGAINST NATURAL CATASTROPHES IN ROMANIA

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***Abstract.** An actual problem worldwide, and also in each country is represented by natural catastrophes and active measures taken by population, insurance companies and Govern in order to prevent them, or to decrease theirs' effects in case of occurrence. The existing situation worldwide of natural catastrophes is very delicate, because the number of losses and their financial aspect is very high. In Romania natural catastrophes appear every year and the population is very affected. Also, the imminence of a great magnitude earthquake in Vrancea, made Romanian Govern to decide the introduction of a compulsory insurance for homeowners from the 1<sup>st</sup> of January 2008. During this paper we will present evolutions and different aspects of natural catastrophes, the requirements of the new law and o comparing between this new insurance and the existing facultative one.*

**Key words:** catastrophe; insurance; global warming; pool, reinsurance.

**REL Clasification:** 11C

An actual problem worldwide, and also in each country is represented by natural catastrophes and active measures taken by population, insurance companies and Govern in order to prevent them, or to decrease theirs' effects in case of occurrence.

According to the second article from the Law no. 32/2000 in the category of Hazard Risk are included all the risks associated to an event or a series of events which can cause substantial damages in a short period of time. Natural disaster is a consequence of the following calamities, earthquakes, with a magnitude higher than 6derges on the Richter scale, floods and storms.

In a report presented by the World Bank the natural calamities had a grooving tendency for the last 35 years. Over 85% of the events that happened sins 1980 we were caused by extreme weather conditions. These events were categorized as consequences of the global worming, because the events caused by geographical element had a constant frequency in the last 50 years. The damages caused by this worming phenomenon could reach 20% of the global NGP.

If we follow the statistics of Insurance Information Institute ([www.iii.org](http://www.iii.org)) the worldwide insured losses caused by natural catastrophes is at a high level every year. This mention is demonstrated by next table:

**Worldwide insured losses caused by natural catastrophes**

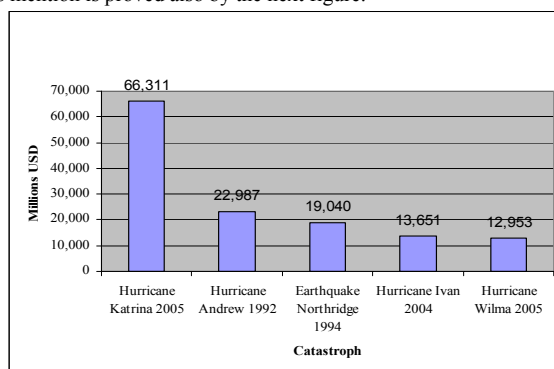
*Table 1*

Year	USD Millions	Year	USD Millions
1997	10.745	2002	16.241
1998	23.971	2003	20.964
1999	41.857	2004	51.175
2000	14.582	2005	110.369
2001	40.635	2006	15.881

We also can notice from the above table, that the worst year was 2005 – the highest level of insured losses. This things were caused y Hurrucane Katrina in SUA. The big amount from 2004 was generated by Hurrucane Ivan and its' effects.

The last years' hurrucanes had a stronger power than ever, are followed by huge winds that blow with more than 200 km/h (record is about 274 km/h), they have a long and strong intensity. The specialists appreciate that these evolutions are caused by worldwide climacteric changes.

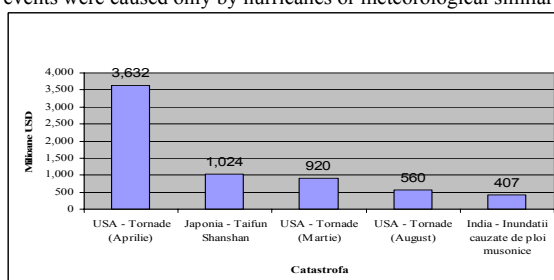
This mention is proved also by the next figure:



**Figure 1.** Huge losses caused by natural catastrophes (1970-2006)

We observe from this graphic that the hurrucanes are the main cause that generates natural catastrophes worldwide, so the insurance companies pay huge amounts to cover theirs effects.

The negative effect of the hurrucanes against insurance/reinsurance market is mentioned also in the 2006 statistics for natural catastrophes. So, the most severe catastrophic events were caused only by hurrucanes or meteorological similar phenomenon.



**Figure 2.** Severe losses caused in 2006 by natural catastrophes (2006)

If we use the data of Sigma 2/2007 (Swiss Re Bulletin - Sigma nr. 2/2007) elaborated by SwissRe – worldwide distribution of natural catastrophes is almost the same every year. The leader is unfortunately, North and Central America that are frequently hit by hurricanes and other similar meteorological extreme phenomenon (especially Carraibe Region). On the 2<sup>nd</sup> and 3<sup>rd</sup> place are changing places Europe and Asia every year.

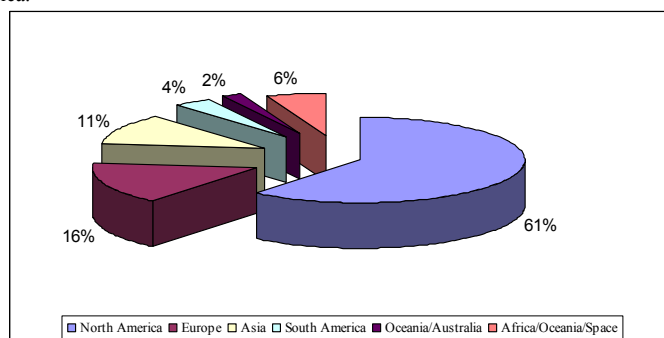
At the end of 2006 it was recorded the next situation:

**Worldwide situation of natural catastrophes in 2006**

Table 2

Region	Events	Victims	Insured Losses (mil. USD)
North and Central America	43	517	9,658
Europe	45	4,166	2,569
Asia	169	19,789	1,814
South America	11	485	587
Oceania/Australia	2	14	335
Africa/Oceane/Space	79	6,100	918
<b>TOTAL</b>	<b>349</b>	<b>31,071</b>	<b>15,881</b>

If we analyse the worldwide situation of natural catastrophes in 2006, from 15.881 millions USD insured losses; a huge percentage of 61% belongs to North and Central America.



**Figure 3.** Worldwide percentual repartition of natural catastrophes

To avoid and reduce these damages countries from Europe like Italy, Spain, France, created an insurance pool and through this they implemented an *Hazard Risk Mitigation & Emergency Preparedness*, which helped to satter the hazard risk and leed to the an effience growth of the insurance of hasards. After a long period of time Romania started to develop a pool by introducing compulsory property insurance.

Before this, we will present the hazards which affect Romania.

According to a report presented at the ICAR Forum from 2007 by Diana Ghetu, general manager of the PRIMM magazine, the main hazard risk are the earthquakes. Over 50% from the territories of Romania is affected by earthquake. In this region we can find over 66% of the urban population, concentrated in approximately 40 cities, which produce 60-70% of the PIB. Also more then 45% of the critical infrastructure is situated in a region with a seismic activity higher the 7 MSK.

The second risk is represented by floods. Over 30% of Romanian is highly exposed to this risk. Since 1999 floods happened with an annual frequency. Every year over 1.3 million ha of land and 500,000 people are exposed to floods. Other property risks are land slides, fires, drought, but these are not so frequent.

These hazards can cause severe social tensions, and thanks to the growth of the frequency and severity of the events the old system of risk management become cost inefficient, ineffective, as the recourses take to long to deliver, insufficient, because the government never has sufficient recourses, and they are inequitable, as the poorest segment of the population which needs the most assistance only receives a small fraction of it.

The idea of creating an insurance pool appeared in 1997, but it was taken in consideration only at the end of 2005. At the ICAR forum from 2006 the foundation of an insurance pool called PAID – pool of insurance for natural hazards, was highly discussed.

A pool is an association between several insurance companies, founded to offer a better coverage for hazards, which individual insurance companies could not offer.

The most efficient pool are the once created as a private – public partnership, as showed by HORA – The basis of insurability of natural risks in Austria. The efficiency is sustained by the combining of the experience of insurance companies in the risk management with the requirements introduced by the public institutions the construction industry and the investments preventing plan.

The role of the Government in this partnership includes initial capital support, regulatory support, public education, auditing and supervision. The private sector in responsible for pricing, distribution, claim adjustment, indemnity payment, and program management.

Through this pool the pressure on the budget will be reduced, the responsibility of the Government in the situation of hazards will decrease in time, the damage coverage capacity will grow, and with this the social tension will almost disappear and the trust of foreign investors in the capacity of the economy to recover after hazard will increase.

The damage coverage will grow because it will be financed from three resources. The first financing will come from the pool, which will retain a part of the risk. The financing resource will come from funds gathered from the premium.

A second financing will come from the reinsurance companies, to which the pool has transferred the risk. The last resources will come from the government, depending on the severity of the damage. In the disaster risk financing the government can offer ex post or ex ante financing.

The PAID<sup>(1)</sup> pool was founded by the introduction of the compulsory property insurance. The inhabitants of Romania will be obliged to pay this insurance from January 1<sup>st</sup> 2008 and the insurance will cover three hazard risks: floods, earthquakes and land slides. We have to notice that the landslide risk is not included by the law in the category of natural catastrophes. All property owners will have to pay the insurance, independent of the region in which they live. This will scatter the risk and will offer the possibility to ensure these risks all over Romania, because no insurance company will insure only the risk of an earthquake, for example, in an area where it will happen for sure.

The insurance concerns two types of buildings: type A<sup>(2)</sup> and Type B<sup>(3)</sup>. For type A the premium will be 20 Euros/year and the coverage will reach maximum 20,000 Euros. For type B the premium will be 10 Euros/year and the coverage will reach maximum 10,000 Euros. Whoever will want to insure the property for a higher value will have to pay an additional optional insurance. Those whom will refuse to pay the compulsory insurance will receive a fine of 100-500 Rumanian currency.

The Romanian authorities estimate that if a cataclysm will happen it will cause 3 billion Euros worth of damage. To transfer this risk Romania will have to pay a reinsurance

premium of 100 million Euros, in the situation in which the premium fund gathered from the population will reach 145 million Euros. This premium is flexible, and there is a chance it will grow if Romania transfers this risk later. This increase is caused by the reduction of the reinsurance capacity, as a consequence of the high frequency of the hazards.

Certain aspects of the compulsory property insurance, like the pricing, the perception of the public, and the case of buildings that have no construction authorization or can not be insured, from different reasons, need more explaining. But the response to this came from the Radu Mircea Popescu, the counselor of Ministry of interior and Administration Reform, whom said at the ICAR Forum from 2007: "I am not in a position to say that this law is good or bad. The important thing is that the law exists and it will be perfected after it will carry into effect".

As alternative for homeowners compulsory insurance in the Romanian insurance market in the Romanian Insurance Companies Portfolios exist the facultative homeowners' insurance. So, the persons that want can do this facultative insurance without waiting for the mandatory aspect of the law.

Moreover, at this moment the effective number of insured buildings is continuously increasing because of the credits taken by the owners. The buildings are put as guarantee for the loans, and the banks require the insurance, as a protection and prudential measure. So, because the credit market is evolving exponentially, the facultative homeowners' insurance is situated on an ascendant trend.

We must do a very important mention about this new compulsory insurance policy. By its definition it will cover only the catastrophic risks despite the fact that a facultative insurance will cover also the other existing risks. In order to avoid the subscribing problems of the new compulsory insurance, at this moment the facultative insurance policies for homeowners split the risks into:

- catastrophic risks;
- general risks;
- extended risks.

This splitting is made in the benefit of the actual insured persons, because in the moment the insurance will be compulsory they will make easily the proof if such insurance for the required risks.

We made a study into three great insurance companies from Romania (Allianz, Tiriac Asigurări, Unita Wienerstadische and OmniaSig), and generate an average of the quotations for catastrophic risks, presented in the next table:

#### Medium quotation for catastrophic risks

Table 3

Crt. No.	Type of the building	"Catastrophic Risk Quotation"				
		The age of the building				
		< 1945	1945-1977	1978-1990	>1990	
<b>Houses from A districts:</b> Alba, Bihor, Bistrița Năsăud, Brașov, Cluj, Covasna, , Harghita, Maramureș, Mureș, Satu Mare, Sălaj, Sibiu						
		Deductible	(%)			
1	Block of flats – concrete structure	Zero	0.10	0.08	0.07	0.06
		EUR 50	0.09	0.07	0.06	0.05
		EUR 100	0.08	0.06	0.05	0.04
		EUR 200	0.07	0.05	0.04	0.03

2	Houses – concrete structure/bricks	Zero	0.12	0.10	0.09	0.08
		EUR 50	0.11	0.09	0.08	0.07
		EUR 100	0.10	0.08	0.07	0.06
		EUR 200	0.08	0.07	0.06	0.05
		EUR 50	0.16	0.14	0.13	0.09
		EUR 100	0.15	0.13	0.12	0.08
		EUR 200	0.14	0.12	0.11	0.07
3	Houses – wooden/combustible structure	Zero	0.06	0.05	0.04	0.03

Analyzing these medium values, we appreciate that there is a classification of all buildings taking into account the structure, the age, the geographical regions. The geographical splitting was made using the existing flooding map and earthquakes' exposure areas.

Beside A zone, there is B zone that include districts Arad, Botoșani, Caraș-Severin, Hunedoara, Neamț, Suceava, Timiș and C zone with districts: București, Argeș, Bacău, Brăila, Buzău, Călărași, Constanța, Dâmbovița, Dolj, Galați, Giurgiu, Gorj, Ialomița, Iași, Ilfov, Mehedinți, Olt, Prahova, Teleorman, Tulcea, Vaslui, Vâlcea, Vrancea.

In case of a block of flats in A zone, built in 1980, the percentage quotation for catastrophic risks is at a very low level of 0.07%.

Also, using our analysis the catastrophic quotation for B and C zones are increasing in some cases with maximum of 0.02%, so we reach a final quotation of 0.09%.

Using the Govern' proposal, in case of the compulsory insurance for an insured sum of 20,000 Euro the insurance premium is 20 Euro that may be translated as a percentage quotation of 0.1%. This quotation is higher than the existing one in the insurance market for the facultative homeowners' insurance. This aspect could influence the insurance companies to sell more facultative similar products only for catastrophic risks but the low level of insurance premium and also the lack of peoples' interest will block this advantage. The people will not pay this amount for catastrophic risks because the insurance is not compulsory.

We must mention also, the sum insured aspect. The law will require a sum of maximum 20,000 Euro, and this sum is quite insufficient in case of huge or total losses (because the prices in the actual real estate market are very high and the building materials are very expensive).

In conclusion, the introducing of such a homeowners' compulsory insurance, may resolve just partially the devastating effects of natural catastrophes. This is because in the case of occurrence, huge losses will not be covered entirely, and the affected persons will not have the financial strength to cover the uninsured part.

The greatest benefit it will be for the Romanian State, because the exceptional budget will not be affected as much as it is in this moment, and the responsibility of the natural catastrophic effects is ceded to insurance/reinsurance companies.

The benefic effect of the compulsory character is imminent, because but is about solidarity principle – much more persons will contribute to the system and just very few will beneficiate of this product. So this is because the most exposed people are the poor one, and in case of natural catastrophes they may lose their entire properties.

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**Notes**

- <sup>(1)</sup> PAID is formed by 17 insurance companies, plus the Romanian State by its' 4 Departments that developed some risk managements programs: MIRA- *Strengthening of Emergency Management and Risk Financing Capacity*, Ministry of Transportation and Public Development - *Earthquake Risk Reduction*, Ministry of medium and Durable Development - *Flood and Landslide Risk Reduction*, National Agency for Mineral Resources - *Risk Reduction of Mining Accidents in Tisza Basin*, that were presented in ICAR 2007 Forum.
- <sup>(2)</sup> Type A - buildings made of concrete, bricks and other chemically and thermally treated materials
- <sup>(3)</sup> Type B - buildings made out of wood or chemically or thermally untreated materials

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## THE MANDATORY PRIVATE PENSIONS. A EUROPEAN CHALLENGE FOR ROMANIA

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***Abstract.** The problem of national pension fund systems is a global one, due to the feeble performances of the PAYG system. The paper will focus on the main aspects of multi-pillar system. The aim of this article is to underline the similarities and differences between the several states that are already experienced in the field of the multi-pillar pension system in order to identify both the weak points that Romania might deal with, and the strong points that provide a carefree life to all social categories.*

**Key words:** private pension; multi-pillar system; retirement age; pay-as-you-go; disease retirement.

**REL Classification:** 20F, 11C

There cannot be a general rule but Romania's economic tendency follows a modern European trend. Even if there is a delay in the adoption of some measures, as compared to the rest of the European countries, the importance of their applying must be acknowledged.

The implementation of the multi-pillar pension system follows this direction, too. It is true that other member states have successfully applied this system for over a decade, but there are countries where the success of this reforms, has not shown yet and there has even been a failure.

Over all, Romania's accession to the EU at the beginning of this year has been perceived by all Romanians as a gigantic step forward towards an immediate and significant welfare. After all, the hope always rises when there are important events in Romania's life and this, particularly, could not be left "unexploited". Many of us expected major changes over a short period of time. Very often, the first who expect such positive evolutions are especially those with a modest living standard.

Pensioners also fall into this category, with a few exceptions, who welcome every increase of pension point, every rumor on correlation, indexing etc. The way they are treated by the Romanian state is not the object of this article, although there are many things to correct, but people must be made aware of the risk of reforms failure: it could be a burden for both the present beneficiaries (present pensioners), and the present subscribers, the future pensioners (Șerbănescu, 2007a, p. 24). The current problem of the pensioners should not be superficially dealt with because in a few decades' time we will all be in this position that some people consider ingrate.

The reasons in view for pensions' reform are: population aging, continuous decrease of employees' number necessary for a pensioner financial support, possible occurrence, in long term, of insolvency status for the pensions system.

Since the state is not fully capable to perform its tasks, the international experience has made its point. The multi-pillar pension system has been implemented in other

countries for almost a decade and produced the expected results. Thus, Hungary has experienced the first phase of a mixed system (the first and the second pillar) since 1998.

The decreased interest for public pension system (there have not been such indicators yet but the continuous growth of interest for the second pillar, preceding the legislative promulgation, is a proof) has determined the reforms accelerations in this field. As a result, a new pension system has been designed based on a relatively simple structure:

- public pension;
- mandatory private pensions;
- voluntary private pensions.

Since the public pension system is not as “transparent” as the other two, meaning that the private retirement fund account is perfectly visible from the financial information point of view, while the public pension system is the result of a complex and long mechanism from the point of view of the basic computation element, renders these two last pillars an interesting alternative.

The premises for this vast system formation started from the Europe’s demographic features, a continent aging slowly but surely - the decrease of birth rate, the improvement of life expectancy are the main reasons for this cruel but true diagnosis. Every member state should reconfigure its own plan of action; the multitude of population’s opinions and creeds represents a proof in this regard. Further more, we should not omit that every country was confronted in time with several economic or politic crises, was involved in conflicts or affected by its level of economy development. As a simple example I would like to draw your attention upon the case of the Former Yugoslavian Federation state, Croatia. In almost a decade, 1991-2001, the country population decreased with 3% (approximately 150,000 inhabitants) counting 4,300,000 citizens at the end of the period mentioned above. The demographic structure underwent significant changes following the consequences the war implied in the region. The pensioners’ number increased because of the inclusion in this social category of war invalids and those entitled to benefit from these social rights as surviving war victims’ relatives (e.g. war widows). And this is not the only negative influence element. Those who perished because of this armed conflict were actually the ensured people (subscribers), their number decreasing by over 30% (from 525,000 to 360,000 individuals). Although, this is a singular example, it proves the necessity to apply methods specific to the socio-economic aspect of every area considered.

Under this condition, present generations are to improve the pensions system as this population categories are some of the first beneficiaries of the reforms.

The first pillar of the tripartite pensions system is the objective of several controversies. There are critics who predict a rapid bankruptcy of this system “pay as you go”, starting with the future increase of aged persons’ number.

Even if a rebalance (counterbalance) of this system is being experienced due to the increasing retirement age limits, the problem still exists. The population’s aging rhythm is fast, Eurostat statistics approximated to over 30% the number of people over 65 for the year 2050, a concerning element if we consider the active population simultaneous decrease. In my opinion, it is pointless to talk about the preference for illegal work since it additionally determines the continuous decrease of the contributions paid by employers and employees (Șerbănescu, 2007b, p. 28). The question is whether pillar two should be exclusively perceived as a “lifebuoy” for the public pension system or as a supplementary possibility for saved money investment. In Romania’s case it is obvious: the social retirement fund fails to provide a satisfying living standard.

As I have already mentioned, the first measure the states decided to implement was the increase of retirement ages. This should be very well correlated with the type of “penalty” of those who solicit their retirement before the age limit, since the application of some insignificant coefficients, as comparison terms for opportunity costs, will determine

an increase in anticipatory retirement requests, with the possibility of using the resulted free time for more profitable pecuniary activities. At the same time, the possibility of a "reward" for those willing to continue their activity after the retirement date should be considered. In Romania, the anticipated partial pensions are established from the total pension amount for the age limit and its decrease based on the subscription stage and the number of months that reduced the standard age retirement. The maximum ratio of decrease per anticipated month is of 0.5%, in the case of the persons with a subscription stage over the standard subscription stage of up to a year. In this case, we can say that our country discourages anticipated retirement; a person in the situation mentioned above will suffer a penalty of 6% per year and 30% per five years. As a comparison, the annual penalty in Croatia is of only 1.33%.

The gradual increase of the retirement age was also often insisted upon. What is curious about Romania is the keeping of the significant distance between women and men's retirement ages, although in our case, the differences in life expectation between the two categories are similar to those in the Western Europe. Especially, if we have in mind that many European states adopted the equalizing criterion. Thus, Estonia has as age limits, 63 for men and 59 for women and the retirement age will have an equal value of 63, until 2016. In Bulgaria, they also expect an increase of the retirement age, the age difference decreasing with three years until 2009 (60 years for women, 63 years for men).

In my opinion, the disease retirement requires a greater responsibility, as well as, an efficient correlation with the age limit retirement. If there are minor differences, there could be an unfavorable tendency towards the first category, with repercussion on the state.

All these reforms that had in view the first pillar, in case of a "failure", had to be counterbalanced through adequate means to eliminate the pension system collapse. Thus, the first and the second pillars were designed as a viable alternative to confer a solid feature and confidence in the economic entities' possibility to provide an adequate living standard for everybody.

The aim of the retirement funds system with a private management is to provide a distinct private pension that will supplement the social retirement fund based on collecting and investment, in the subscribers' interest, of a part of the social insurance individual contribution.

How difficult could it be to choose a private retirement fund? (Șerbănescu, 2007c, p. 26)

In statistics, the employees orient themselves especially towards the information given by the press and marketing agents and pay the least attention to the employers' recommendation.

Honestly, the stress should be laid upon the information on the CSSPP site, as they provide objective opinions and beyond any doubt. The information thus acquired should be correlated with the company's financial data.

Marketing agents present what they consider appropriate and they give a "commercial" or a marketing techniques tailored answer to very technical questions.

Friends matter only if they have been previously informed; otherwise, it is the "wave" policy.

The employer should be severely punished if he forces his clients, in a way or another, to adhere to a certain fund since their commission is current (it is not the problem of the commission, it is an illegal aspect of the second pillar).

The press could be objective but it could also be interest driven. I refer to economic information since advertisement does nothing else but to puzzle the public. Both the TV channels and the press provide abundant information about the firms authorized to operate within the second pillar, but most of them are mere advertisements, and the Romanians knew from previous experiences how appeasing advertisements could be.

Romania's situation is atypical as compared to other markets, though, the current number of marketing agents authorized for the second pillar (at 27 October 2007) could seem rather high. The population of the country aged between 16 (the minimum hiring age) and 60 (the approximate retiring age calculated as an average between the retirement age for men and women) is of almost 14 millions. Out of all these, maximum 3,500,000 individuals could be subscribers to this pillar, the rest are students, unemployed or other systems' subscribers (lawyers, army or police personnel), or are over 45. In other words, supposing the majority of agents consist in persons under 45, we get a ratio of 14 clients to one marketing agent. Is the level of the technical knowledge in the field so high or the possibility of a good payment changed us all into specialists? If we are all good at insurances, then why is the insurance market still undeveloped as compared to those in the EU? The cavilers will answer that we are poor and we cannot afford it, but the luxury cars inflation, the incredible increased rhythm of sales in this field seem to say something totally different.

As it appears on several insurance sites ([www.lasig.ro](http://www.lasig.ro)), people consider that the most correct information is that provided by the press, although the best agents should be the marketing agents, if not CSSPP, since this committee cannot advertise a particular society. Is the very high number of agents to blame for the decrease of population's confidence in these sources of information? Many will say that since so much is known about this pillar, there is no need for a thorough explanation (from a marketing agent) but maybe some of the individuals did not get all the necessary information. Where do they get these data from? Maybe they do not have the time to surf the internet, although it is true that people should be well informed before subscribing, even if after two years, there is the possibility of transfer without penalties.

Due to the numerous problems that could intervene, I will insist upon this second pillar. The eligible persons are those under 35 and they are insured according to the following:

- the persons perform activities based on an individual labor contract or are public servants;
- the persons perform their activities in elective positions or are appointed within an executive, legal or judicial authority during their mandate, or are cooperation members in an organization of domestic industry;
- the unemployed persons;
- the unique partner, partners, secret partners or share holders;
- the managers who concluded an administration or a management contract;
- the family association members;
- the persons authorized to perform independent activities;
- the persons employed in international institutions if they are not their insured;
- other persons who obtain income from professional activities;
- the persons who obtain accrued income per year equivalent to at least three gross medium salaries and are at least in two of the positions of unique partner, partner, secret partner etc.

Supplementary, the persons over 45 who are already insured and contribute to the social retirement fund can subscribe to a retirement fund, in this case, without any obligation.

These specifications are mandatory, since those who did not subscribe to a pension fund within the four months from the legal mandatory date (17 September was the first day) will be distributed randomly to a pension fund by the evidence institution. The random distribution of the persons is performed in a direct ratio with the number of participants to a pension fund at the date the distribution is being performed.

This is very important to know since non-subscription within these limits of four months could lead to your distribution to a fund you do not want. There is the situation where, unsatisfied with the profitableness of the manager you chose, you decide to re-distribute your

investment to another. This is correct, but an earlier subscription, before two years, is punishable and then comes the rightful question if this current indifference is worth.

To what extent the actions performed by Romania will lead to the expected effect, is still to be seen, but a comparative analysis should be made between other countries' experience in this field and the frame designed in Romania.

In this direction, the position adopted by Romania is surprising as it considers the eligible conditions based on age criterion. As I have mentioned, the persons over 45 cannot choose this system even if they want to.

Under the same criterion of age distribution, the younger population of Romania (under 35) is unsatisfied that they were not consulted upon their subscription to a private retirement fund or to the first pillar. In this regard, it is important to know that the state is entitled to intervene whenever necessary due to major implications. For instance, the civil liability for vehicles (RCA) is mandatory, no individual can own a car without insuring it since there are high risks of accidents with important "pecuniary" consequences. I will underline, as an everyday occurrence that in Bulgaria, the age of the subscribers to the second pillar is 48.

There are many tendencies and it is difficult to find the ideal solution. Slovakia allows its employees under 21 to decide whether they subscribe to the second pillar or not, but there is a debate if this will become mandatory in the middle of the next year. In Lithuania, although the private managed pillar is four years old, it is still optional. In Switzerland, the second pillar is mandatory for all the employees.

The quotas and income formation for the second pillar should not be omitted from the analysis. The contribution quotas in Romania are part of a generally accepted trend, with a few changes. For instance, Lithuania started with a quota of 3% which soon became 3.5%, and 5.5% in 2007. In the case of this country, they got to the point where the opposition suggested the deduction of an 8% quota for the second pillar. Estonia also started with a quota of 2% directly supported by the employee out of his gross salary and the state would add 4% of the contribution to the social insurances supported by the employee and paid by the employer.

As a conclusion, the multitude of decisions adopted by several member states and candidates cannot design a clear and concise pattern that we could define as the most successful to ensure a high profitableness. The most important issue remains the way the retirement funds managers will invest their clients' money, so that, in a few years' time, the decision of moving from the first pillar to the second could be considered a wise choice.

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# THE DEVELOPMENT OF THE FINANCIAL RISKS REINSURANCE ACTIVITY FROM THE SINGLE EUROPEAN MARKET PERSPECTIVE

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***Abstract.** The development of the activity of reinsuring the financial risks growth of the reinsurance efficiency needs first of all, an intensification of prospecting the International Insurance and Reinsurance Market, good knowledge and understanding, especially on the European one. This is how Reinsurance creates the necessary environment to stabilize the financial results of the insurance companies.*

*The main characteristic of the reinsurance activity is the internationalisation.*

*The chosen subject came out and turned our attention to the issues faced by the Insurance Market while trying to find a proper reinsurance for different risks, but especially the financial ones, as well as the necessity to find both explanations and solutions in this respect.*

**Key words:** reinsurance; financial risks; European reinsurance market; efficiency of reinsurance; reinsurance broker.

**REL 11C**

The main role of the insurance is to bring the peace of mind to the policies buyers for their protection. Unfortunately, insurers themselves miss often this peace of mind.

The insurance companies must have a proper visibility on each and every aspect of their activity. This is why they need an all-embracing picture, on the underwriting, claims handling and settlement, marketing, clients support and reinsurance, as well as on the sales force and to take the best decisions in due time.

In the last years there was a rising of the financial risks underwriting activity, which came as an outcome of the development of the crediting activity. However, we need to figure out a contagious relaxation status since no major losses occurred so far and consequently the insurance companies wrote financial risks without reinsurance or with no proper reinsurance program and coverage, meaning no real protection.

The truth is that external reinsurance companies were not very eager for this kind of risks, except in the case of an old and strong relationship with few Romanian insurers when financial risks were accepted together with Property treaties. The acceptance in those cases was restrictive and the treaties (usually quota-share) had small underwriting limits: up to 10,000 USD/debtor for commercial credits and up to 50,000 USD/debtor for leasing contracts.

The need to develop their insurance portfolio made the insurers to accept some risks not covered by reinsurance treaties (as bank credits) or to underwrite over the treaties limits.

Consequently, now the protection through reinsurance contracts is the main condition that the financial risks underwriting activity to be authorized.

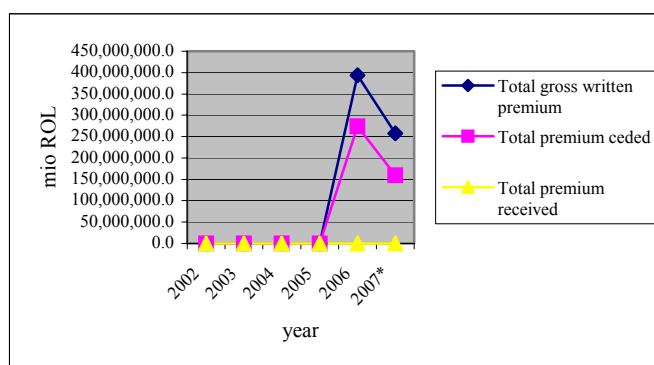
The insurance and activity of those companies, which are members of National Union of Romanian Insurance, and Reinsurance Companies (UNSAR) in the period 2002-2007 can be illustrated as in the Picture no.1 below built on Table 1 data.

**The evolution of the financial risks insurance and reinsurance activity in the period 2002-2007**

Table 1  
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Indicators/years	2002	2003	2004	2005	2006	2007*
Total gross written premium	358,070,708	889,593,126	1,453,291,536	198,492,2	394,009,057,1	257,568,709,2
Total premium ceded	149,263,185	197,291,292	850,755,244	151,765,9	274,006,494,6	159,461,850,5
Total premium received	381,120	57,026	0,0	0,0	0,0	0,0

\*Results YTD 2007-06-30



**Figure 1.** The Evolution of the gross written and ceded premiums in the period 2002-2007  
Source: UNSAR –2002-2007 Statistics.

By analysing the above statistic data provided by the National Union of Romanian Insurance and Reinsurance Companies a general view of the Financial Risks Insurance and Reinsurance Market evolution in the last six years.

We don't mind saying that the development of the Financial Risks Insurance and Reinsurance Market was even higher than the above presented, because the number of the Romanian insurance companies which wrote these risks is not equal to the number of the companies which are members of the National Union of Romanian Insurance and Reinsurance Companies.

The available data are showing a high and almost unprecedented dynamic of this market, as a result of the close relationship between insurance companies and banks or other financial and credit institutions.

In order to prevent disastrous consequences of a quick and uncontrolled growth of the loss ratio that could appear, the Supervisory Authorities put in place some rules, regulations to the environment, terms, conditions and limits for financial risks underwriting.

In 2004, in Romania, the Insurances Supervisory Commission issued the *Credit Insurance Standards* that applied under the provisions of the Order no.113109/2006.

The settlement of this activity allows us to be optimistic concerning the future aligning to the Single Insurance European Market that will facilitate the access to collaborations with reinsurance companies with high reputation under equal and advantageous conditions.

An increasing efficiency of the reinsurance activity obviously requires a growth of the financial risks insurance; a bigger involvement of the insurance companies in claims handling activity or risks assessment, as well as a decrease of administrative and unjustifiable acquisition expenses.

From the Single Insurance European Market perspective, the development of the financial risks reinsurance activity requires from the insurers another approach by taking into account some aspects that were neglected so far. One of these aspects is connected to the importance of the credit risk assessment, which wasn't first priority in the insurance activity, but currently insurance companies become more and more aware of its importance<sup>1</sup>.

It becomes necessary also that insurance companies define their own concept of associating the commercial transactions with the credit risk and to find best underwriting practices. This is why it is very important to correctly assess the risk and to quantify this one on all the "links" of the protection chain, from underwriting to reinsurance.

The transfer of the financial risks ensures a mechanism of stability by splitting the risks between two or more "players". However, the number of involved "players" has to be limited to the professionals in the field, including reinsurance brokers. Their role has to be seriously taken into account by those insurance companies wanting to develop the financial risks underwriting activity. Brokers are able to obtain sure and clear information from the market about the best reinsurance companies and to find the most appropriate reinsurance programs to cover the protection needs.

In order to develop efficiently the reinsurance activity, it is necessary to consider the fact that the probability to obtain positive results is higher in case of received business than in case of ceding (Văcărel, Bercea, 1999, p. 521).

While receiving risks, the reinsurance companies are imposing the limits, terms and conditions of the reinsurance contracts. They will accept only those risks written with best and correct insurance premiums (from their point of view) according to the amount of responsibility taken. They will easily accept that business with a low loss ratio (e.g. leasing contracts).

From the assigners' point of view, the best reinsurance programs are those offering best prices, higher coverage and commissions, as well as participation to the reinsurers profit. The reinsurance offer being lower than the request, the reinsured companies have to often accept those conditions imposed by reinsurers.

From the volume of ceded reinsurance business perspective, the information has an important role. In the protection chain, the insurers are the first responsible link to obtain correct and clear information before taking decisions concerning the underwriting activity and the choice of the reinsurance program. Before accepting business the reinsurance companies must have information concerning: the partners involved in the commercial transaction, their activity, financial situation, the history of the commercial activities they were involved in, the experience, the banks and financial institutions they are collaborating with. For trading companies, additional information as the situation and perspectives of their specific activity, legislation, economic circumstances and any other aspects of the assessed entity.

In order to find the best formula to cede a part of the assumed risk it is necessary to deeply go into the info concerning the experience, the activity, and the financial results of the reinsurance companies that accept to reinsure that specific part of the risk. If the reinsurers have financial stability and write profitable business, the reinsured companies will obtain later a part of the reinsurers profit, according to the volume of ceded business and reinsurance premium paid.

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<sup>1</sup> *Regulatory Issues Surrounding Reinsurance*, Report of the Office of the Superintendent of Financial Institutions, London, May 2006.



The information regarding insurance and reinsurance market evolution, market “players” and their activity domains are very important for a reinsurance company to close good transactions bearing to profit.

Taking into account all the above-mentioned aspects as well as the actual needs of the Romanian Market we consider that a higher attention has to be paid to the activity of receiving risks in reinsurance. This is why, a Romanian reinsurance company specialized in financial risks reinsurance, could be, in our opinion, the answer to the coverage needs of Romanian insurers, especially now when import-export trade activity is developing. As a result, the financial and currency effects of the financial risks reinsurance have not to be neglected.

The reinsurance, as an international activity, involves many currencies. The variations in the exchange rates that could modify from a day to another, bringing advantages or disadvantages for the involved parties.

The insurance companies will stabilize and consolidate their financial status while ceding risks, if proper insurance premiums will be paid and proper commissions will be received, but also because if an insured event appears, the payment of claims is shared.

The reinsurance programs including “packages” of insurance products have a positive influence on the policyholders. As they become aware of the double protection, they will trust more and more the insurance industry.

The reinsurance activity exercises one’s influence not only on the reinsurer and reinsured but also on credit capital (assets) and the State Balance of External Payments. The reinsurance activity developed in the Central and East European countries together with the insurance activity and thus, a financial market supported by both insurers and reinsurers was built in this area.

The reinsurance activity has currency influence in the following situations:

- If the reinsurance contracts are concluded in a different currency from that specific of the insurance company’s home country;
- The reinsurer accepts the underwriting of risks in a non-convertible currency with further settlement in convertible currency;
- Investments in hard currency made by both the insurance and the reinsurance companies;
- Most part of the reinsurance programs is developed through companies that are not resident in the reinsurer’s home country.

In the insurance literature, the reinsurances are considered as non-commercial transactions (Bistriceanu, 2006, pp. 418-421) since the payments made for ceding risks to reinsurance companies abroad are similar to the export activity and the encasements for receiving risks from foreign ceding companies are similar to the import activity.

The influence of the reinsurance activity on the external payments balance is a positive one when there are encasements in hard currency and negative if there are debts in hard currency.

Big insurance companies are ceding financial risks to famous reinsurance companies paying in hard currency for. The insurance policies are usually concluded in the currency of the credit contract, which in most cases is the national non-convertible currency. In these cases an exchange is necessary and is done at a variable rate, which can be disadvantageous for one of the parties. This is why both insurance and reinsurance companies are facing the *currency risk*.

The risk of currency is more striking when credit operations are done in different currencies but the payments due to reinsurers have to be done in one single currency only – those of the reinsurer home country and the exchange rates change in the reference period.

Being aware of the effects on the whole credit and credit insurance activities, both parties, insurers and reinsurers looked for different ways to avoid as much as possible that those risks arise or to minimize the results.

One of the most important aspects to be considered while a reinsurance program develops is to associate the credit risks with the type of reinsurance treaty selected for that specific program.

Financial transactions have the risk that one of the partners has solvency problems, to delay payments or to become bankrupt. Thus it becomes very important to keep a viable business register, so that the reinsurance of a specific business to be able to face the insured events as soon as they appear.

The consequences of losing a reinsurance support for a financial risks insurance program are many and can bear to serious financial losses for the reinsured as well as for the original insured.

The target of each insurance company is to select a reinsurer to promptly answer to all needs and to wish to stay in that specific reinsurance program.

All insurance and reinsurance companies are audited and quoted by different rating companies that establish their financial stability. State owned reinsurance companies and those where the state has shares are more rigorously assessed. This it is obvious that the reinsurance company's rating must be analysed before starting a reinsurance program.

There are many rating companies, part of them being specialized in insurance activities, as A.M.BEST, the others being strictly focused on financial rating, as STANDARD&POOR'S. Each rating company is collecting information both on US and non-US Markets and meets many times the management of the audited company before deciding the rating.

A high rating given by such a company to a certain reinsurance company guarantees the fact that the reinsurer will not have a financial loss in the future. In the last 30 years, there were some "A" rated companies, which quickly became bankrupt. Consequently, rating companies were criticized for not being able to foresee this. As an answer, rating companies became more conservative and rigorous. The result was that presently only few reinsurance companies have a high rating<sup>(1)</sup>.

The strictness in audit and analysis and the quality system makes reinsurers to give up to some reinsurance programs if they are not sure these will lead to profit. The consequences are felt especially with those reinsurance programs that have no "history" or on those that have to be renewed. This is why the insurance companies hardly find reinsurance with big reinsurance companies for new, uncertain business or if there are no long-term relationships with the reinsurers.

Besides the rating, the reinsurer's reputation in claims handling and payments has to be taken into account, which are very important.

Reinsurance brokers role does not be neglected in this business. In the brokers market there are lists made by their security committees with the risky reinsurance companies<sup>(2)</sup>. The reinsurance brokers duty is to find reinsurance coverage with those companies that do not have credit or solvency risks. In some countries, brokers are obliged by law to check the reinsurance companies' financial status and to report to the reinsured companies. This is why reinsurance brokers are the best source of information and know-how to chose the reinsurance companies by the ability and the way claims handling and payment are done.

By all means, the best way to avoid credit risk and any other solvency issue with a reinsurer is to ask guarantees for those amounts representing the ceded risks. This is very difficult to put into practice, even if theoretically looks very simple.

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<sup>(1)</sup> According to Guy Carpenter Re, *Reinsurance and the Impact on A.M. Best's Capital Adequacy*, Financial Integration Team Briefing, November 2003.

<sup>(2)</sup> See Larry P. Shiffer, Lamb Le Boeuf, Greene & MacRae LLP, *Avoiding the Reinsurance Credit Risk*, Expert Articles, Shiffer09, 2005.

In the usual reinsurance treaties, there is no such an obligation stipulated if the reinsurer's home country's legislation does not require.

If a certain reinsurer has no authorisation in the home country, it has to prove to the reinsured its financial soundness. This fact allows the insurance company to have the control of the present and future reinsurance programs.

In the last years, some changes appeared in this respect. Thus, highly rated reinsurance companies accepted to include in the contracts a clause stating their obligation to regularly show the financial status and also to put some warranties if the reinsurance program is a viable one.

Another very popular clause in the reinsurance contracts in the last 3-4 years is the "rating decreasing clause"<sup>(1)</sup>. This clause allows the reinsured to cancel the contract on one-side (and to find another reinsurer) if the specialized rating companies decrease the rating for the reinsurance company.

There are some clauses stating reinsurer's obligation to put warranties in case of rating decrease. The level of accepted warranties is stated by regulations and is variable for one step decrease till a minimum accepted level (e.g. rating "B").

If the reinsurance contracts state the obligation to guarantee the financial stability, there are statements also concerning the type of those warranties – cash, state bonds, treasury bonds (certificates), letters of guarantee from banks.

Some contracts stipulate that a part of the reinsurance premium must be kept in a special account, at the reinsured disposal for urgent needs to pay claims at low values, without contacting the reinsurance company. These accounts are opened on the reinsurer's name, this one receiving the interest and reporting in the accounting documents. This way of working is usual for the reinsurance programs under an *executive general agent's* control, and the reinsured makes fronting. Usually that amount is limited and recovered quarterly or on regular basis, as agreed by both parties. These amounts can be insufficient and do not cover the big amounts of losses, when the cash from reinsurer is needed.

State bonds, treasury bonds (certificates) are used as warranties especially in the cases the reinsurance company is not recognized or approved in the reinsured home country. Law settles the requirements regarding the warranties. In such cases, the contract must stipulate the allowance for the reinsured to ask and obtain a credit for the reinsurance program. The usage of these bonds requires the involvement of a third party, usually a deposit bank.

The most "clean" warranty for financial risks reinsurance is the letter of guaranty. There are rules concerning guarantee letters stating that those has to be unreserved and no validity limits, so that the renewal would be automatically done as long as the reinsurance contract is in force. Banks in the reinsured favour issue the letters of guaranty. The reinsurer has no control and receives no interest. The reinsured companies prefer this type of guarantee since in case of bankruptcy or insolvency the liquidators cannot foreclose on guarantee letters (doesn't mean that liquidators will not act in order to prevent an unjustified request from the reinsured).

As a conclusion we can say that in order to build a proper reinsurance program, possible risks and their effects on the business, as well as the real potential of the reinsurance companies have to be taken into account.

The homogenisation of the risks done through reinsurance, allows the insurance company to maintain the financial status at a certain level in order to keep the policyholders trust and the image on the market.

The financial function of the reinsurance focuses on the stability of the financial indicators keeping the insurance company over the minimum solvency level requested by the supervising authorities.

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<sup>(1)</sup> See Larry P. Shiffer, Lamb LeBoeuf, Greene&MacRae LLP, *Avoiding the Reinsurance Credit Risk*, Expert Articles, Shiffer09, 2005.

The last years economical growth leaded, as was shown, to a quick development of the financial risks insurance, of the insurance products covering financial losses, to an important growth of the companies portfolio by offering packages and consequently, to the development of the insurance industry itself.

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## ECONOMETRICAL MODELS FOR ESTIMATING THE LIFE INSURANCE DEMAND

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**Abstract.** *The article uses some results obtained in a preceding study regarding the estimation of the life insurance demand for a Romanian company. By employing a novel device - the ROC curve for Discrete Choice Models - we compare three models from a predictive power point of view: the Multinomial Logit, the Conditional Logit and the General Multinomial Logit.*

**Key words:** life insurance; demand; ROC curve; Logit.

**REL Classification:** 11C, 10E

In the first part of the article we will present the models that can be used for modeling the decision to buy life insurance, as well as an instrument for appreciating the accuracy of the model: the area under the ROC curve (Receiver Characteristic Curve). In the second part we will estimate the demand for life insurance products using the three models, comparing their predictive power by using the area under the ROC curve.

### ***The modeling of the decision by multinomial models***

The multinomial models are used when the qualitative dependent variable  $y$  has more than two states:  $y_i = j$ ,  $j = 0, 1, \dots, m$ .

#### **The multinomial logit**

The Multinomial Logit is in fact an extension of the binary logit model to more alternatives of choice. Let  $m+1$  alternatives of choice and  $(p_0, p_1, \dots, p_m)$  the associated probabilities. The probabilities are given by the expression:

$$\tilde{p}_j = P\{Y_i = j\} = \frac{\exp(x_i \tilde{b}_j)}{1 + \sum_{j=1}^m \exp(x_i \tilde{b}_j)} \quad j = 1, 2, \dots, m \quad (1)$$

The proportion between two probabilities  $p_j$  and  $p_k$  is independent by other alternatives of choice than  $j$  and  $k$ . The estimating methods are similar with those from the binary models – maximising a verosimilarity function throughout numerical methods.

#### **The logit conditional multinomial model of McFadden**

The generalization of the Logit model to the multinomial case is made by considering different parameters for the alternatives of choice (products), as well as the explanatory variables are constants for the alternatives. Still, there is another possibility – the Logit conditional model of McFadden – by considering a vector of parameters constant

and by permitting the explicative variables to depend on alternatives (McFadden, 1973, 1980). The probabilities are:

$$p_j = P(y_i = j) = \frac{\exp(x_{ij}b)}{\sum_{k=1}^m \exp(x_{ik}b)} = \frac{\exp(x_{ij}^*b)}{1 + \sum_{k=1}^m \exp(x_{ik}^*b)} \quad j=1,2,\dots,m \quad (2)$$

where  $x_{ij}^* = x_{ij} - x_{i0}$ , and the proportion of the probabilities is:

$$\frac{P(y_i = j)}{P(y_i = l)} = \frac{\exp(x_{ij}^*b)}{\exp(x_{il}^*b)} = \frac{\exp(x_{ij}b)}{\exp(x_{il}b)} = \exp[(x_{ij} - x_{il})b] \quad \forall j,l=1,2,\dots,m \quad (3)$$

which, as in the case of the multinomial logit is independent of the others alternatives of choice.

In order to calculate the marginal effects, we are interested in the estimated variation of the probability that an individual  $i$  will chose the alternative  $j$  when the explicative variable  $k$  associated to an alternative  $l$  varies. We have:

$$p_{ij} = \frac{\exp\left(\sum_{k=1}^K x_{ijk}b_k\right)}{1 + \sum_{h=1}^m \exp\left(\sum_{k=1}^K x_{ihk}b_k\right)} \quad (4)$$

$$\text{then the marginal effect } \frac{\partial p_{ij}}{\partial x_{ilk}} \text{ is: } \begin{cases} b_k p_{ij}(1 - p_{ij}) & \text{if } j=l \\ -b_k p_{ij}(1 - p_{il}) & \text{if } j \neq l \end{cases} \quad (5)$$

For the multinomial logit, the vector of the parameters  $b$  is interpreted as the difference between the original parameters and those of the reference case  $b_0$ . For the conditional logit, the variables  $x_{ij}$  are normalized:  $x_{ij}^* = x_{ij} - x_{i0}$ . The estimated parameters must be interpreted as being associated to the differences between the variables for each alternative of choice in relation with the variables of the reference case. This comes from the constraint  $\sum_{j=0}^m p_{ij} = 1 \quad \forall i$ . This specifications are very useful when we want to estimate the probability of choosing a new alternative.

#### The general multinomial logit model

Because our application implies both variable that characterizes the products as well as variables of the individual, we will use a more general model, which contains the logit multinomial and also the logit conditional. The probability for an individual  $i$  to chose the alternative  $j$  is given by:

$$p_{ji} = P(y_i = j) = \frac{\exp(x_{ij}b + x_i b_j)}{\sum_{k=1}^m \exp(x_{ik}b + x_i b_k)} \quad j,k=1,2,\dots,m \quad (6)$$

After the estimation of the parameters, by replacing the values of the explicative variables with the sample mean, we can obtain an estimation of the probability  $\tilde{p}_j$  that the average individual to choose the product  $j$ . By multiplying this number with the total number of the consumers  $N$ , we obtain an estimation of the demand (or the market share) for the  $j$ :

$$\tilde{D}_j = \tilde{p}_j \times N \quad (7)$$

We can also obtain simulation of the market shares, calculated for other values of the explicative variables, facilitating the foundation of some product policies.

**ROC Curve for the multinomial models**

**ROC curve for an alternative of choice (a product)**

For the binary models the definition of the ROC curve is based on two proportions namely *sensitivity* and *specificity*. Two extensive definitions of these notions are provided for the discrete choice models (Dragoş, 2006). For estimating the predictive accuracy, we keep from the binary models the same criteria: the maximization of the area under the ROC curve (AUROC). In order to define these notions we use the following notations:

$i = \overline{1, N}$  indexes the individual or observation

$j = \overline{1, M}$  indexes the alternatives of choice (types of insurance products)

$z_{ij} = y_{ij}$  is the observed value of the dependent variable;

$$z_{ij} = \begin{cases} 1 & \text{if } j \text{ is chosen by } i \\ 0 & \text{otherwise} \end{cases} \quad (8)$$

$$\bar{z}_{ij} = \begin{cases} 1 & \text{if } \text{Prob}(y_{ij} = 1) \geq c \\ 0 & \text{otherwise} \end{cases} \quad (9)$$

$$\bar{y}_{ij} = \begin{cases} 1 & \text{if } \text{Prob}(y_{ij} = 1) > \text{Prob}(y_{ik} = 1) \quad \forall k, j = \overline{1, M}, k \neq j \\ 0 & \text{otherwise} \end{cases} \quad (10)$$

$c \in [0; 1]$  is a cut-off.

The way that we defined  $\bar{z}_{ij}$  (which will be used to build the ROC curve) allows us for different values of  $c$ , to predict for the same individual, one, several, or all alternatives. However,  $\bar{y}_{ij}$  let as predict only a single choice for each individual. Under these circumstances, we build  $M$  cross-tables for each value of cut-off  $c$ .

**The cross-table for the alternative  $j$  and an arbitrary cut-off  $c$**   
*Table 1*

$z_{ij}$ \ $z_{ij}$	1	0	Total
1	$N_{11(j)}$	$N_{10(j)}$	$N_{1T(j)}$
0	$N_{01(j)}$	$N_{00(j)}$	$N_{0T(j)}$
Total	$N_{T1(j)}$	$N_{T0(j)}$	$N$

Source: Dragoş C. (2006).

Based on the notations presented in the above-table, we define (Dragoş C., 2006):

$\frac{N_{11(j)}}{N_{1T(j)}} = \text{sensitivity}_{(j)}$  proportion of correct predictions for individuals choosing the product  $j$

$\frac{N_{00(j)}}{N_{0T(j)}} = \text{specificity}_{(j)}$  proportion of correct predictions for individuals not choosing  $j$ .

This way of defining the *sensitivity* and the *specificity* allows an analysis of the alternatives predicted by the model for each individual, which is more complete than the ordinary “percentage of correct predictions in the sample”. To emphasize this increased

pertinence, we consider an arbitrary example with three products and two concurrent models. For an arbitrary individual, the probabilities of choice based on the two models are calculated in Table 2.

#### The first example

Table 2

	A	B	C
Model 1	0.5 * +	0.3	0.2
Model 2	0.7 * +	0.2	0.1

\* the alternative chosen by the individual  
+ the alternative predicted by the model

Source: Dragoş C. (2006).

Both models have correctly predicted the decision of the individual, but the second is better, because it returns a greater probability. The criterion of the “percentage of correct predictions in the sample” cannot make any difference. In the ROC curve, for any  $C \in (0.5; 0.7]$  the *sensitivity* of the second model is greater than that of the first model, for the same value of the *specificity* (we are only considering the individuals that have chosen the *A* alternative). Consequently, the area under the ROC curve (AUROC) of the *A* alternative is greater for the second model than that of the first model. For the alternatives *B* and *C*, for any cut-off  $C \in (0.2; 0.3]$  and respectively  $C \in (0.1; 0.2]$ , the *specificity* of the second model is greater than that of the first model, for the same value of *sensitivity*. The AUROC of alternatives *B* and *C* will also be superior for the second model than that of the first model. For another arbitrary individual we are assuming that none of those two models succeeded to correctly predict the decision of the individual as described in Table 3.

#### The second example

Table 3

	A	B	C
Model 1	0.2 *	0.6 +	0.2
Model 2	0.3 *	0.4 +	0.3

\* the alternative chosen by the individual  
+ the alternative predicted by the model

Source: Dragoş C. (2006).

Based only on the criterion “percentage of correct predictions in the sample”, we cannot differentiate the two models. However, the second model is better since it succeeds to emphasize the explicative variables. Without repeating the reasoning we deduce that the area under the *ROC curve* of the second model is greater than that of the first model for all alternatives *A*, *B* and *C*.

#### The ROC curve for all the products

In the previous section we constructed the ROC curve for any alternative *j*. This can indicate the predictive performance of a model for each particular alternative. A model can perform well for some alternatives but not so well for the others. To determine the most globally efficient model (for the entire set of alternatives) we must construct a global ROC curve by defining the *global sensitivity* and the *global specificity*.

The *sensitivity* for the alternative *j* is defined on the number of individuals, which choose *j*, respectively  $N_{IT(j)}$ . For the entire set of  $j=1, M$ , this number is  $\sum_{j=1}^M N_{IT(j)}$ . For the



entire set of the alternatives, for  $\sum_{j=1}^M N_{11(j)}$  individuals the model has correctly predicted their decision to choose  $j$ . We define the *global sensitivity* as follows (Dragoş C., 2007):

$$\text{sensitivity}_{(G)} = \frac{\sum_{j=1}^M N_{11(j)}}{\sum_{j=1}^M N_{1T(j)}} = \frac{\sum_{j=1}^M N_{11(j)}}{N} = \sum_{j=1}^M \frac{N_{11(j)}}{N} = \sum_{j=1}^M \left( \frac{N_{11(j)}}{N_{1T(j)}} \times \frac{N_{1T(j)}}{N} \right) = \sum_{j=1}^M \left( \text{sensitivity}_{(j)} \times \frac{N_{1T(j)}}{N} \right) \quad (11)$$

The *global sensitivity* can be also written as a weighted average of the *sensitivities* of the  $M$  alternatives. In the sample, the weights are the relative frequencies of the individuals that had chosen those alternatives.

The *specificity* for the alternative  $j$  is defined on the number of individuals, which did not choose  $j$ , respectively  $N_{0T(j)}$ . For the entire set of  $j = \overline{1, M}$ , this number is  $\sum_{j=1}^M N_{0T(j)}$ . For the entire set of the alternatives, for  $\sum_{j=1}^M N_{00(j)}$  individuals the model has correctly predicted, their decision not to choose  $j$ . We define the *global specificity* as follows (Dragoş C., 2007):

$$\begin{aligned} \text{specificity}_{(T)} &= \frac{\sum_{j=1}^M N_{00(j)}}{\sum_{j=1}^M N_{0T(j)}} = \frac{\sum_{j=1}^M N_{00(j)}}{\sum_{j=1}^M (1 - N_{1T(j)})} = \frac{\sum_{j=1}^M N_{00(j)}}{(M-1)N} = \sum_{j=1}^M \left( \frac{N_{00(j)}}{N_{0T(j)}} \times \frac{N_{0T(j)}}{(M-1)N} \right) = \\ &= \sum_{j=1}^M \left( \frac{N_{00(j)}}{N_{0T(j)}} \times \frac{(1 - N_{1T(j)})}{(M-1)N} \right) = \sum_{j=1}^M \left( \text{specificity}_{(j)} \times \frac{(1 - N_{1T(j)})}{(M-1)N} \right) \end{aligned} \quad (12)$$

Similar with the *global sensitivity*, the *global specificity* can be also written as a weighted average of the *specificities* of the  $M$  alternatives.

**An application to the Romanian life insurance market**

The case study is considering the clients of a Romanian life insurance company, whose name will not be specified from concurentials motives. In the months of july-august 2005 we have formed a sample of 203 individuals who possessed an insurance contract at the specified insurance company. We have considered three insurance products: term insurance, endowment insurance and unit linked insurance, which all together represents 80% of the turnover of the company. In order to estimate the parameters we have used the LIMDEP 7.0. soft.

**Estimation of the parameters of the model**

Discrete choice (multinomial Logit) model. Maximum Likelihood Estimates.  
Number of observations: 203. R-sqrd = 0.485

Table 4

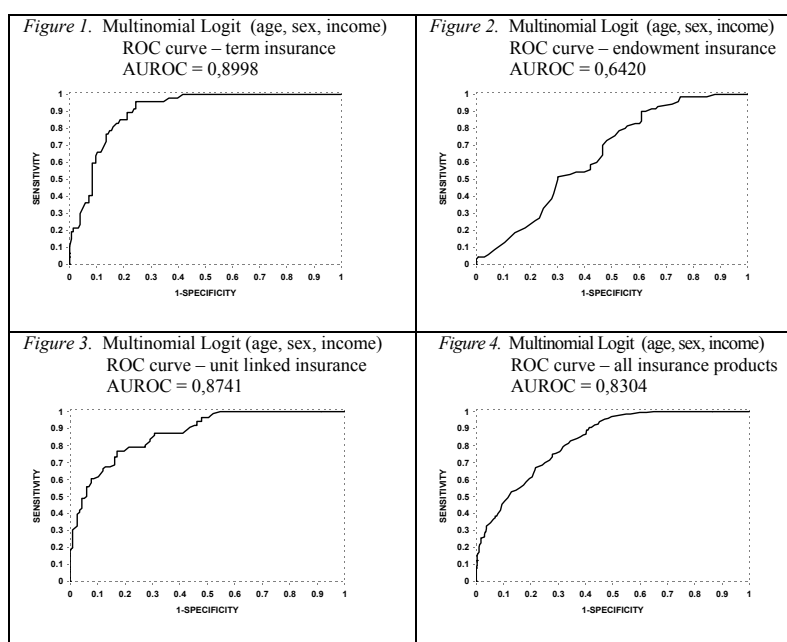
Variable	Coefficient	Standard Dev.	t-statistic
Rentability***	0.5977	0.1421	4.206
Risk***	-1.1344	0.1809	-6.268
Age_term	0.000	Fixed parameter	-
Age_endowment***	-0.0978	0.0193	5.068
Age_unit linked***	-0.1785	0.0258	6.915
Sex_term	0.000	Fixed parameter	-
Sex_endowment	0.5516	0.5199	1.061
Sex_unit linked**	1.2394	0.6143	2.017
Income_term	0.000	Fixed parameter	-
Income_endowment**	0.0027	0.0013	2.102
Income_unit linked***	0.0084	0.0015	5.641

\*\*\* $p < 0.01$  \*\* $p < 0.05$  \* $p < 0.10$

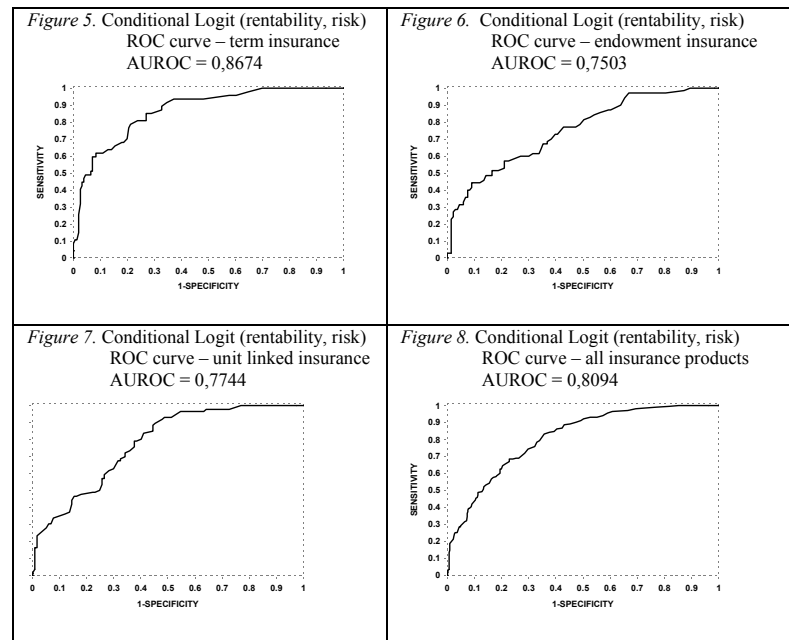
### The accuracy of the prevision of the model

The predictive power of the model will be judged through the area under the ROC curve, respectively AUROC.

In the figures 1-4, we represent the ROC curves and the corresponding areas if we use a multinomial logit and the variables that characterise the individual: age, sex, and income.

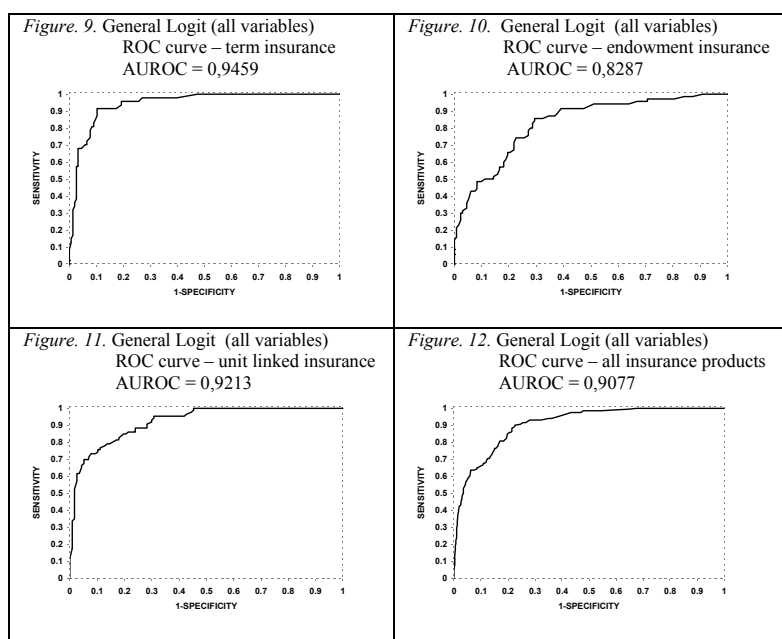


In the figures 5-8 we represent the ROC curves and the corresponding areas if we use a conditional logit and the variables which characterises the insurance products: rentability and risk.



We observe that the demand for the term insurance is better predicted by the multinomial logit, while the demand for the endowment insurance and unit linked insurance is better predicted by the conditional logit. This means that the option of an individual to choose a term insurance is better explained by the characteristics of the individual: age, sex, income. On the other hand, the decision to choose a unit linked or endowment insurance is explained mostly by the variables that characterise the product: rentability and risk. These conclusions allow the construction of some product policies for each type of insurance. Globally, for the assembly of the three products, the multinomial logit is a little bit more performing than the conditional logit.

In the figures 9-12, we represent the ROC curves and the corresponding areas if we use a general logit and all the variables which characterises the individual and the insurance products.



The Logit general model, which uses all the variables, has a better predictive power than the multinomial and conditional logit, for each type of insurance product, as well as for the assembly of the three products.

In conclusion the multinomial logit model better predicts the demand for the term life insurances, while the conditional logit model better predicts the demand for endowment and unit-linked insurance. These results suggest that the variables that characterise the product (rentability and risk) explain better the decision to choose an endowment or unit linked insurance and that the characteristics of the individual (age, sex, income) explain better the decision to buy a term insurance. But the general multinomial logit has the best predictive power, for each product in part, as well as for the assembly of the three insurance products.

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# A MODEL FOR GENERATING EFFICIENT INVESTMENT PORTFOLIOS FOR THE INSURANCE COMPANIES ON THE ROMANIAN MARKET

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***Abstract.** This study proposes a model of investment portfolios selection for insurance companies on the Romanian market, taking into account the legal restrictions referring to them. In solving the problem I used the Kuhn-Tucker method applied to a portfolio consisting of four types of assets. Results indicate that insurance companies should focus their investments on shares and treasury bills, while paying less attention to deposit accounts and real estates. Moreover, the model provides an algorithm which generates efficient portfolios depending on the rate of return expected by the insurer.*

**Key words:** portfolio management; insurance companies; Pareto optimum; efficient portfolios, expected rate of return

**REL classification:** 11C

## 1. Introduction

The management of the investment portfolio represents a continuous challenge for the insurers, this issue being more important in the context of European integration (which will increase competition on the insurance market), that means also transposing the European legislation into the Romanian law. In the insurance field this process was completed in November 2006 when the Insurance Supervision Commission (ISC) adopted the rules regarding the assets in which general and life insurance companies are allowed to invest their gross technical reserves and the dispersion rules associated to these assets<sup>(1)</sup>.

The financial literature offers a wide variety of studies on portfolio management. In this paper I will stick to the fundamental theory of the portfolio (see, for example, Markowitz, 1952; Sharpe, 1963) which defined models for optimizing the portfolio when there is a risk-free asset on the financial market. Concerning the characteristic features of the portfolio management for an insurance company, the studies are less numerous: for example, Armeanu (2005) developed an analysis of the investment portfolio of the insurers.

The goal of this study is to create a model which generates efficient investment portfolios for the insurance companies on the Romanian market, taking into account the legal restrictions referring to the categories of assets allowed for investment and their dispersion rules, as well as the target rate of return of the insurers.

In order to simplify the model I selected from the fourteen assets allowed for investment, the following four categories considered to be the most relevant: treasury bills, real estates, deposit accounts and shares. The selection was made taking into account the preferences of the insurance companies for certain categories of assets (on the basis of ISC annual reports regarding the investment portfolio of the insurers) and the dispersion rules (meaning that I selected the assets with higher weight limit).

The analysis was developed in two stages: in the first stage I considered that the investment portfolio of the insurer is solely composed of the four categories of assets

mentioned above; in the second stage I considered that, in addition to the four assets included in the study, there are other assets in the portfolio. During this stage I discriminated general insurance companies from life insurance companies, because statistical data showed a quite significant difference regarding the weight of other assets in the portfolio, depending on the type of the insurance company. The results achieved in the second stage were compared to the structure of the aggregated investment portfolio of the insurance companies on the Romanian market reported by ISC at the end of 2006, and I formulated investment recommendations.

## 2. Data and methods

In order to achieve the goal of this study I used the following primary data:

- the dispersion rules concerning the four categories of assets included in the model, specified as maximum weight of an asset in the portfolio. The assets allowed for investment and the dispersion rules associated to them are the same for both general and life insurance companies, and this fact is going to simplify the problem. The dispersion rules for the assets included in the model are shown in the table below:

**Assets allowed for investment and their dispersion rules**

*Table 1*

Assets allowed for investment	Treasury bills	Deposit accounts	Real estates	Shares
Maximum weight in the portfolio	No restrictions	90%	40%	50%

**Source:** Order no. 113130 and Order nr. 113131 published in MO no. 960 from 29 Nov 2006.

- the rate of return and volatility values for the assets included in the study, as well as the covariances between them. The estimation of these indicators was made on the basis of statistical data covering the period from January until August 2007. Further specifications are required: although they are subject to country risk, treasury bills were considered to be risk-free assets in this study; the average rate of return for both treasury bills and deposit accounts was determined by using the data from the statistical section included in the monthly bulletins released by The National Bank of Romania (NBR) while the volatility of deposit accounts was taken over from a study developed inside the NBR (Moinescu, 2007, p. 20); the average rate of return and the volatility for real estates were taken from a study on the Romanian real estate market developed by Global Property Guide; concerning the investment in shares I considered that a portfolio built on the structure of BET-C index is quite difficult to manage, although it would ensure risk diversification. The insurance company has certain performance and liquidity targets which would be better accomplished by a portfolio built on the structure of BET index, a portfolio which would ensure an acceptable risk diversification. Thus, the average rate of return and the volatility for shares were determined on the basis of daily data series of BET index for the considered period. In determining the covariances between the four categories of assets it was considered that all covariances with treasury bills are zero, because treasury bills were considered risk-free assets. The other covariances were calculated on the basis of correlation coefficients resulted from previous studies (Armeanu, 2005, p. 148), assuming that their value is relatively stable in time.

In formulating the methodology of this study I set out from the definition of the efficient portfolio (Pareto optimum): "A portfolio P is called efficient if there isn't any other portfolio Q which generates the same average rate of return as P, but incurring a

lower risk.” (Altăr, 2002, p. 13) Therefore, in order to generate efficient portfolios I wanted to determine the structure of a portfolio which, taking into account the primary data used in the study and the legal restrictions, will ensure an average rate of return  $\rho$  with minimum risk.  $\rho$  is a decision variable and it is set by the insurers according to their profitability objectives regarding the investment portfolio.

The following notations were used:  $R_S$  – the rate of return of treasury bills;  $R_D, \sigma_D$  – the rate of return and volatility of deposit accounts;  $R_T, \sigma_T$  – the rate of return and volatility of real estates;  $R_A, \sigma_A$  – the rate of return and volatility of shares;  $\sigma_{DA}, \sigma_{DT}, \sigma_{TA}$  – the covariances between shares, deposit accounts and real estates;  $\sigma_P$  – the volatility of the portfolio;  $x_S, x_D, x_T$  and  $x_A$  represent the weight of the four assets in the portfolio, and the goal of this study is to determine these values for efficient portfolios.

In the model it was inserted the variable  $\alpha$  representing the sum of  $x_S, x_D, x_T$  and  $x_A$ . Through it I could study the hypothesis in which the portfolio is solely composed of the four categories of assets included in the model ( $\alpha = 1$ ). Then I have taken into account the more realistic situation in which there are other assets in the portfolio and  $\alpha$  takes values below 1 ( $\alpha = 0.64$  for general insurance companies and  $\alpha = 0.89$  for life insurance companies; these values were calculated as an average for the period 2003-2006 on the basis of ISC annual reports regarding the structure of the aggregated investment portfolio of the insurance companies on the Romanian market). The additional categories of assets that are included now in the model are, according to ISC reports, accounts receivable from insurance premiums and other tangible assets. As a simplifying assumption I considered that neither the accounts receivable from insurance premiums nor the other tangible assets generate profitability and, correspondingly, they are not subject to volatility.

On the account of the variables specified above and the primary data used in the model I formulated the following problem of minimizing the portfolio volatility under the conditions of a given rate of return  $\rho$  and taking into account the legal restrictions:

$$\text{Min} \left( X_D^2 \times \sigma_D^2 + X_T^2 \times \sigma_T^2 + X_A^2 \times \sigma_A^2 + 2 \times X_D \times X_T \times \sigma_{DT} + 2 \times X_D \times X_A \times \sigma_{DA} + 2 \times X_T \times X_A \times \sigma_{TA} \right)$$

under the following restrictions:  $X_S \times R_S + X_D \times R_D + X_T \times R_T + X_A \times R_A = \rho$

$$X_S + X_D + X_T + X_A = \alpha$$

$$0 \leq X_D \leq 0.9$$

$$0 \leq X_T \leq 0.4$$

$$0 \leq X_A \leq 0.5$$

In solving the minimum problem with equality and inequality restrictions it was used the Kuhn-Tucker method and the solution is given in section 3.

In the end, I calculated the average rate of return and the volatility of the aggregated investment portfolios of both general and life insurance companies reported by ISC at the end of 2006. Then, I determined the structure of the efficient portfolios that generate the same average rate of return, respectively the same volatility in 2007, and I made comparisons between the portfolios resulted from this model and the ones reported by ISC. The discussion of the results I obtained and the recommendations regarding the management of the investment portfolios of the insurance companies are given in section 4.

### 3. Results

After solving the minimum problem defined in the previous section I obtained the following parametric equations of the weight of the assets in the investment portfolio:

$$X_D = 3.6977 \times \rho - 0.2437 \times \alpha$$

$$X_T = 1.4541 \times \rho - 0.0958 \times \alpha$$



$$X_A = 6.4678 \times \rho - 0.4262 \times \alpha$$

$$X_S = \alpha - X_D - X_T - X_A = 1.7657 \times \alpha - 11.6196 \times \rho$$

In case the investment portfolio of the insurer is solely composed of the four categories of assets included in the model ( $\alpha = 1$ ), for various values of the expected rate of return I obtained the following efficient portfolios:

#### Efficient portfolios for $\alpha = 1$

Table 2

$\rho$	0.0659	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.1432
$X_D$	0	0.0152	0.0521	0.0891	0.1261	0.1631	0.2000	0.2370	0.2740	0.2858
$X_T$	0	0.0060	0.0205	0.0350	0.0496	0.0641	0.0787	0.0932	0.1077	0.1124
$X_A$	0	0.0285	0.0912	0.1559	0.2206	0.2852	0.3499	0.4146	0.4793	0.5000
$X_S$	1	0.9523	0.8362	0.7200	0.6037	0.4876	0.3714	0.2552	0.1390	0.1018
$\sigma_P$	0	0.0051	0.0175	0.0299	0.0423	0.0547	0.0670	0.0794	0.0918	0.0958

Source: author's calculations.

Here are some specifications concerning the results for  $\alpha = 1$ :

- The minimum average rate of return is 6.59% and it corresponds to the portfolio composed only of treasury bills, which has no risk;
- The maximum average rate of return that could be acquired by the efficient portfolios is 14.32% because, above this value, it would be exceeded the weight limit for shares (maximum 50% in the portfolio). Thereby, the insurer may choose a target rate of return between 6.59% and 14.32%, the undertaken risk varying correspondingly between 0% and 9.58%;

In the second stage, when it was considered that other assets are also included in the portfolio, for general insurance companies ( $\alpha = 0.64$ ) I obtained the following efficient portfolios for various values of the expected rate of return:

#### Efficient portfolios for general insurance companies ( $\alpha = 0.64$ )

Table 3

$\rho$	0.04218	0.05	0.06	0.07	0.08	0.09	0.097255
$X_D$	0	0.0289	0.0659	0.1029	0.1399	0.1768	0.2037
$X_T$	0	0.0114	0.0259	0.0405	0.0550	0.0695	0.0801
$X_A$	0	0.0506	0.1153	0.1800	0.2446	0.3093	0.3562
$X_S$	0.64	0.5491	0.4329	0.3166	0.2005	0.0844	0
$\sigma_P$	0	0.0097	0.0221	0.0345	0.0469	0.0593	0.0683

Source: author's calculations.

Here are some specifications concerning the results for  $\alpha = 0.64$ :

- The minimum average rate of return is 4.218% and it corresponds to the portfolio with no risk which contains 64% treasury bills, the rest of the portfolio being composed of other assets that were not included in the model (for further details see section 2);
- The maximum average rate of return that could be acquired by the efficient portfolios is 9.7255% because, above this level, the model gets negative values for the weight of treasury bills in the portfolio. Taking into account that short-selling transactions are not allowed on the Romanian capital market, these negative values for the weight of treasury bills in the portfolio cannot be accepted. Thereby, the insurer may choose a target rate of return between 4.218% and 9.7255%, the undertaken risk varying correspondingly between 0% and 6.83%;

In the second stage, when it was considered that other assets are also included in the portfolio, for life insurance companies ( $\alpha = 0.89$ ) I obtained the following efficient portfolios for various values of the expected rate of return:

**Efficient portfolios for life insurance companies ( $\alpha = 0.89$ )**

Table 4

$\rho$	0.05865	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.135245
$x_D$	0	0.0050	0.0420	0.0789	0.1159	0.1529	0.1899	0.2269	0.2638	0.2832
$x_T$	0	0.0020	0.0165	0.0310	0.0456	0.0601	0.0747	0.0892	0.1037	0.1114
$x_A$	0	0.0087	0.0734	0.1381	0.2028	0.2674	0.3321	0.3968	0.4615	0.4954
$x_S$	0.89	0.8743	0.7581	0.6420	0.5257	0.4096	0.2933	0.1771	0.0610	0
$\sigma_P$	0	0.0017	0.0141	0.0265	0.0388	0.0512	0.0636	0.076	0.0884	0.0949

Source: author's calculations.

Here are some specifications concerning the results for  $\alpha = 0.89$ :

- The minimum average rate of return is 5.865% and it corresponds to the portfolio with no risk which contains 89% treasury bills, the rest of the portfolio being composed of other assets that were not included in the model (for further details see section 2);
- The maximum average rate of return that could be acquired by the efficient portfolios is 13.5245%. Above this level, the model gets negative values for the weight of treasury bills in the portfolio. Because short-selling transactions are not allowed on the Romanian capital market, these negative values for the weight of treasury bills in the portfolio cannot be accepted. Thereby, the insurer may choose a target rate of return between 5.865% and 13.5245%, the undertaken risk varying correspondingly between 0% and 9.49%;

The results regarding the structure of the efficient portfolios that generate in 2007 the same average rate of return, respectively the same volatility as the aggregated investment portfolios of both general and life insurance companies reported by ISC at the end of 2006, are as follows:

**Comparison between portfolios with the same rate of return**

Table 5

Type of insurer	General insurance companies		Life insurance companies	
	2006	2007	2006	2007
Year				
Rate of return	0.0507	0.0507	0.06376	0.06376
Deposit accounts	0.3840	0.0320	0.2500	0.0357
Real estates	0.1060	0.0126	0.0550	0.0140
Shares	0.0430	0.0560	0.0930	0.0625
Treasury bills	0.1050	0.5374	0.4230	0.7088
Accounts receivable from insurance premiums and other assets	0.3620	0.3620	0.1790	0.1790
Risk	0.0197	0.0107	0.0211	0.0120

Source: author's calculations.

**Comparison between portfolios with the same risk**

Table 6

Type of insurer	General insurance companies		Life insurance companies	
	2006	2007	2006	2007
Year				
Rate of return	0.0507	0.05794	0.06376	0.07113
Deposit accounts	0.3840	0.0588	0.2500	0.0630
Real estates	0.1060	0.0231	0.0550	0.0248
Shares	0.0430	0.1028	0.0930	0.1101
Treasury bills	0.1050	0.4533	0.4230	0.6231
Accounts receivable from insurance premiums and other assets	0.3620	0.3620	0.1790	0.1790
Risk	0.0197	0.0197	0.0211	0.0211

Source: author's calculations.

#### 4. Discussion

The goal of this study was to determine an algorithm which generates efficient investment portfolios for the insurance companies on the Romanian market in the context of year 2007, taking into account the legal restrictions. I consider that the results achieved in the study account for the following conclusions:

- The algorithm of generating efficient portfolios is represented by the parametric equations of the weight of the assets in the investment portfolio. Therefore, any insurer could determine the structure of an efficient investment portfolio on the account of its target rate of return and its preferences for other assets that were not included in the model, measured through the variable  $\alpha$ ;
- The effect of the legal restrictions regarding the structure of the investment portfolio is given by the fact that the average rate of return and the risk of the portfolio take values in a clearly determined interval. For all the hypotheses analyzed in this study I obtained that the maximum risk which could be undertaken by an insurer is 9.58% for a correspondent rate of return of 14.32%. Therefore, the legal restrictions limit the insurers' possibility to undertake too many risks, even though riskier portfolios generate a higher expected rate of return;
- The weight of treasury bills in the portfolio is a decreasing function of the expected rate of return, while the weight of the other three assets in the portfolio increases with the expected rate of return;
- The efficient portfolios determined in this study are superior to the aggregated investment portfolios reported by ISC at the end of 2006, and this conclusion is proved by the fact that they generate the same average rate of return with a lower risk or, they undertake the same risk at a higher expected rate of return;
- Concerning the structure of the investment portfolios, comparatively to the situation reported by ISC, the results of this model indicate that insurance companies should focus their investments on shares and treasury bills, while paying less attention to deposit accounts and real estates. Several explanations may be given for this conclusion: treasury bills are risk-free assets lowering the volatility of the entire portfolio; deposit accounts have a low profitability and the model proposed by this study doesn't take into account the liquidity of the investments; the profitability of investments in real estates continued to follow a downward trend in 2007; shares offer the highest profitability compared to the other assets included in the model and the risk associated to them is decreasing in the context of the maturation of the Romanian capital market and that of the markets' convergence;
- There are several causes that explain the differences between the investment portfolios reported by ISC at the end of 2006 and the ones proposed by this study: there were only two issues of treasury bills in 2006, so there weren't enough treasury bills on the market for the insurers to invest in; liquidity is the main reason that favors investment in deposit accounts; the manifestation of a certain reticence towards the investment in shares, due to the distrust in the Romanian capital market or due to risk aversion.

In conclusion, the results of this study could be considered relevant, as long as the limits of the model, derived from the simplified hypotheses on which it is built, are taken into account. A further improvement of the model would imply the definition of a variable, which measures the liquidity of the assets in the portfolio, as well as the inclusion of the assets from foreign countries, especially those from the European Union, in the model.

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**Note**

<sup>(1)</sup> Order nr. 113130, 2006: pp. 1-3; Order nr. 113131, 2006: pp. 3-4.

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## THE PORTFOLIO ADMINISTERING AT THE INSURANCE COMPANIES BY A.P.T. MULTIFACTORIAL MODEL

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***Abstract.** In order to approach the A.T.P. model (arbitrage price theory) the understanding of some aspects related to arbitrage in general is necessary, APT being only one of the implications of this finance central theory (of the lack of arbitrage opportunities), among the others one being able to quote: the theory of including the parity buying power opportunities, the theories concerning the company value and the indebtedness degree, et...*

*An opportunity of arbitrage represents an investment strategy that guarantees a positive result in at least one of the nature states without the possibility of a negative result and without an initial investment.*

*The lack of arbitrage opportunities presumes that, being given a portofolio the value of which at  $t$  is 0,  $V_t = 0$ , there is no admitted strategy so that at  $t+1$  moment it should be  $V_{t+1} > 0$  in least one state. If the no other arbitrage opportunities it is said that the market is viable.*

**Key words:** arbitrage; price theory; the principle of diversification; value of risk; insurance market.

**REL: 11C**

### **General considerations**

The modern study of the arbitrage is, in fact, the study of the hypothesis implications of the arbitrage opportunity lack. This hypothesis is natural as the presence of the arbitrage is incompatible with the equilibrium, more precisely with the existence of an optimal administering portofolio strategy for any agent which prefers a greater to a smaller one. Consequently, in principle, the absence of the arbitrage is the direct implication of an agent individual rationality.

The law of the small price is also an application of the lack of arbitrage opportunities which essentially says that two perfectly substitutable actives should be transacted at the same price (but the two theories are equivalent).

A fundamental principle of the finances is the accomplishment of an equilibrium between risk and profitableness. With the exception of the case in which the manager of a portofolio detains special information, a portofolio is expected to surpass the other only if it is less risky.

Presently there are only two theories that offer a rigorous substantiation for the measuring the risk – profitableness relationship:

- CAMP model of W. Sharp;
- APT model of S. Ross.

APT is more general than CAMP by accepting a variety of different sources of risk. These are explained by means of the fact that factors such as the inflation rate, the

market interest rate, etc.. has an important impact on the volatility of the financial title beneficiary.

The APT model offers the administering of the portfolio with new “instruments” and with facility, implemented in such a way that it may control the risks and it may increase the performance of the portfolio.

Both of the models – CAMP AN APT – explain the fact that, although numerous forces specific to the company and to its environment may influence the profile on any individual title, these effects tend to cancel themselves in large and well diversified portfolios. This cancelling is called “the principle of diversification” and it has a long history in the domain of the insurances. Just like the insurance companies which, owing to the fact they insure a great number of individuals, one cannot say that it is totally lacked of risk ( natural calamities, for example, they can provoke great loses for the insurance company), in the same way the great, well diversified portfolios are not lacked of risk because there are common economic forces which spread their influences and which are not eliminated by diversification.

In APT also, these common forms are called systematic risks or existing on the market.

According to CAMP, the systematic risk depends only on the exposing to the risk of the market, this exposing being measured by the model by B coefficient. More precisely, if  $r_m(t)$  is the profitability of the market at t moment, then, according to CAMP, the measuring risk of the active which has a profitability  $r_i(t)$  is done by means of the coefficient B:

$$B_i = \text{cov}(r_i(t), r_m(t)) / \text{var}(r_m(t))$$

By exposing to risk one understands the actual value of all the losses and supplementary expenditures which the investor can stand or would be able to stand.

APT takes into consideration the fact that there is no method for measuring the systematic risk. While APT takes into consideration is perfectly general and it does not specify the systematic risks, or even any of such existing risks, the academic researches suggest that there are some main risk sources which had a certain impact on the beneficiary of the titles. These risks appear from the unanticipated risks in the following fundamental economic variables: the trust of the investors, the interest rate, the inflation and the index of the market.

Each action or portfolio is exposed to each of these systematic risks. The model of the economic exposure for an action or portfolio is denominated “exposure to risk”.

Exposure to risk are “rewarded” on the market with an additional portfolio and, consequently, the exposure to risk determines the performance and the volatility of a well diversified portfolio. This exposure also indicates us the way a portfolio behaves in certain circumstances.

A portfolio manager can control this exposure to risk. These managers have different traditional styles, consequently it results that they have inherent different exposures to risk. That is why the exposure to risk of a manager corresponds to a particular APT style.

Any ATP style being given (or a certain modality of exposure to risk), the difference between the expected income by a portfolio manager and his actual performance is attributed to the selection of the individual titles, which behave better or worse than it was expected. This performance defines the APT SELECTION.

#### **Short Conclusions**

The administering model study of the portfolios shows us the fact the analysis of the title portfolio administering is accomplished with the help of the Marcowitz model, which allows, after correlating two by two of the existing actives in the portfolio, the determination of the portfolio with the absolute minimum variant. Also, the Markowitz method allows us the determinations of the efficiency frontier, which groups the

portfolios that presents the best profitability for a certain risk. Although difficult and requiring a greater number of information, this is the first method which allows the financial analysis of the titles to be found in the portfolio, considering the existing correlation among them. Consequently, this method allows us the accomplishment of an optimum portfolio for the Insurance Companies commencing from a series of hypotheses, namely: the full investment of the available funds is achieved; the short sales operations are not permitted; profitability adjusted to the portfolio according to the risk is the objective of the investor. By forbidding the short sales one understands the fact negative shares of the portfolio titles are not admitted, consequently titles which are not in someone's possession cannot be sold. For determining the investment opportunities the following stages are followed: the portfolio with the minimum absolute variant is determined; the determination of the portfolio title shares, the classification of the portfolios into legitimate and illegitimate portfolios; the determination of the efficiency frontier, applying the principle of domination, that is between two portfolios that have the same risk, the portfolio with the highest profitability is chosen or between two portfolios that have the same profitability, the portfolio with a minimum risk is chosen. Thus, the determination of an optimum action line presumes the accomplishment of a sharing of the possible solution ensemble into two sets which include the efficient solutions and the prevailing solutions and after that one determines the efficient solution which maximizes the utility function of the investor and which has as parameters the profitability and the risk of the portfolio.

However, the great number of information necessary for the applying of the model, respectively dispersions equal with the number of considered titles ( $n$ ) and a number of covariants equal with  $n(n - 1/2)$  determined the development of this model and led to the appearance of a simplified model for the analysis of the portfolio by Sharpe. This presumes a new modality of financial active valuation according to objective criteria of the financial market, thus he proposes a unifunctional model which presumes that the profitability of any financial title is in a linear relationship with a macroeconomic factor. The number of necessary information in this model is much more reduced, being equal with  $3n+2$ . This model eliminates the grouping of the titles two by two within the portfolio and gives the possibility of an individual grouping according to a chosen macroeconomic factor, usually this one identifies with the market average profitability. The expected profitability of the active is influenced by two parameters: a positioning coefficient and a volatility index besides a macroeconomic factor. The risk of the title is composed, according to his theory, of two parts namely: the risk related to the capital market in general and explained by the dependence on the macroeconomic factor and the risk specific to each title which can be removed by diversification. This model, known under the denomination of diagonal model, gave the possibility of a subsequent development of a CAMP model which establishes the existences of a possible investment on the capital market in actives with zero risks and with characteristic profitability, usually the bonds issued by the state. These models deal with the problem of the portfolio being followed both by the optimum proportion of the titles and by the influences of a macroeconomic factor considered in relationship with the efficiency and risk level of these ones, CAMP has come from the examination of the investor's behavior in a model of hypothetical economy in which these ones act only for a certain period. In reality, the investors act on more periods, that is why, when CAMP is empirically, using the capital market data, it is necessary that certain hypotheses with presumptive character should be made. One of the basic hypotheses is that beta remains constant in time. This is not a sufficiently reasonable measure as the relative risk of the cash – flow is little probable to remain constant in time without having variations. There is a series of inadvertences of the

model when it is empirically applied, which affects the quantification proceeding of the profitability and of the risk of movable goods titles within the portfolio.

The model presumes the existence of a single factor which influences the profitability of a title which, usually, is considered the general profitability of the market, which does not represent a solution as the coefficients which are obtained are very small, suggesting the existence of other factors.

The applying of the model presumes the transparency and the gratuitousness of the stock market information, a think which is not possible on the Romanian capital market especially because of the lack of transparency and the raised price of the information.

The possibility to lend and to borrow amounts of money at the interest ratio without risk, hypothesis which, in fact, is not valuable for the Romanian financial market as the interest is fluctuating and many times its real value is much more different than the nominal value.

The absence of fiscality and the transaction costs is another hypothesis unchecked because of the changing fiscality and of the great transaction costs which affect the relevance of the mathematical calculus.

The atomicity of the financial placements and the common prediction horizon are hypothesis that can be considered as being unfulfilled by the insurance market, although certain titles can be influenced by investing small amounts of money.

The capital market from Romania does not offer the possibility of some homogenous anticipations because of the lack of correct information and that is why the anticipations of the investors are obviously different, and the placements are not perfectly liquid – characteristic of insurance market.

These limits of CAMP model determined the necessity of a new administering model of profitability and movable goods placement risk, which should take into account the aspects related to the influence existence of more macroeconomic factors, as a conclusion the appearance of the multi criteria models ( the representation on the market of the insurances).

The APT model (arbitrage price theory) was introduced as a development of the CAMP unifactorial model, in other words, the above mentioned model constitutes only the particular form of the APT model, having in view the establishing of a connection between the individual profitability of a title within a portfolio and more macroeconomic factors having an influence on the title profitability and on the establishing individually the influence of these factors by applying the APT model.

The arbitrage price theory is formulated by Ross, who starts in its elaboration from the hypothesis of the lack of arbitrage opportunities, that is the existence of an investment strategy which guarantees a positive result in at least one of the nature state, without the possibility of a negative result and without initial investment. The most important implication of the arbitrage opportunity lack is the existence of a valuing law, a linear and positive one which implicates the fact that any linear operator can be represented as a sum or integrally, according to the states, of the product between prices and quantities.

The linear relation represented by Ross starts from the idea according to which there is a mechanism that generates the profitability rate for the financial actives starting from the expected profitability of the initial investment to which the influence of the exogenous factors having the form of the macroeconomic factors. Each factor has an attributed coefficient according to its importance and the way in which it contributes to the forming of the share price. One should use valuation methods which should permit the establishing of some interrelationships between the profitability of the financial title and the evolution of the macroeconomic factors. For the calculus one has resorted to the covariant matrix of the profitability of the actives based on the dynamic series of these ones



with the purpose to calculate the profitability disperses and their covariants, and to estimate intuitively the factors used in the matrix calculus. The most important attempt to apply the model on the international market was formulated by Chen, Roll and Ross, who chose a series of macroeconomic variables considered as being more important: inflation, the rates on short and long term of the government bonds of USA, the profitability of the NYSE index, the increasing rates of the industrial production. The calculi checked the APT model showing the influence of the macroeconomic factors in order to explain the profitability and the risk of the actives which register values that can be explained only on the account of the expected profitability of the performed investment. Roll and Ross performed a study by means of which grouped the profitability of a number of 1.260 of actives from NYSE and AMEX for a period of ten years in 42 groups of 30 actives and discovered significant influences of three factors: the rates on a long term of the government bonds, the average profitability of the market given by the stock exchange indexes, the inflation. These studies stress upon the profitability of the titles and also the quantification of their influence becomes debatable. Thus, one can notice that the application of the model has as a consequence the identification of the macroeconomic factors, the identification of the titles which are subject to observation, the sharing of these titles in homogenous groups, the applying of the model for a preestablished period of time.

#### **Interferences between the capital market from Romania.**

##### **The investment behaviour**

“The mattress money”	Insurances
Currencies	Investment funds
State titles	Pension funds
Banking Deposits	Listed Stock Exchanges

##### **The Stock Exchange and the insurance companies**

- A developed stock exchange market needs institutional investors and new companies:
  - Pension funds;
  - Investment funds;
  - Insurance Companies;
- For the insurance companies, the capital market has a dual character:
  - It may represent an alternative;
  - It may represent an opportunity for an efficient placing of the resources which the insurance companies have available;
- The presenting on the stock exchange market of the insurance companies will determine:
  - The increasing of the stock market exchange liquidity;
  - The reducing of the stock market volatility;
  - The promoting of the corporative governing principles;

##### **Listing advantages on the capital market**

- Increased visibility between the business partners and actual and potential clients;
- Free of charge publicity;
- “Market Value” establishing of the company, value that can be much greater than the value registered in documents;

- Trust increasing of the Romanian and foreign business partners;
- Promptness and efficiency increasing of the share exchanges among shareholders;
- Capital attracting by issuing shares and bonds;

#### **Insurance companies listed on the capital market**

##### **Bucharest value Stock Exchange**

#### **AGRAS WIENER STADTISCHE GROUP**

- Symbol: ASA
- Listing date at BVB: 15.09.1999
- Actual social capital (thousands lei): 89,121,526
- Stock exchange capitalizing (thousands lei): 133,682,289

#### **Insurance Companies listed on the Capital Market**

##### **THE ELECTRONIC STOCK EXCHANGE RASDAQ**

#### **BUCHAREST ASIROM SA**

- Symbol: ASRA
- Listing date at BER: 09.12.1997
- Social capital (thousands lei): 637,865,323
- Stock exchange capitalizing (thousands lei): 2,870,394,822

#### **BUCHAREST ASTRA SA**

- Symbol: ATRA
- Listing date at BER: 27.11.1997
- Social capital (thousands lei): 637,865,323
- Stock exchange capitalizing (thousands lei): 1,274,516,904

#### **Insurance Companies listed on the Capital Market**

##### **THE ELECTRONIC STOCK EXCHANGE RASDAQ**

#### **CLUJ-NAPOCA ARDAF SA**

- Symbol: ARDF
- Listing date at BER: 07.08.2008
- Actual social capital (thousands lei): 175,000,000
- Stock exchange capitalizing (thousands lei): 227,500,000

#### **OMNIASIG AGI SA**

- Symbol: ASPR
- Listing date at BER: 15.11.1999
- Actual social capital (thousands lei): 128,389,860
- Stock exchange capitalizing (thousands lei): 131,471,217

#### **AGRAS AT BVB**

- The average daily value of the transactions – 63.43 thousand lei\*
- Transactioned list for the II BVB quota;
- 3 capital increases since listing, the increasing social capital from 22,26 thousand million to 133,68 thousand million lei;
- Significant increasing of the stock exchange capitalizing.

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# ASYMMETRY IN THE STOCHASTIC VOLATILITY MODELS

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**Abstract.** *This article proposes a different point of view on the pricing in the stochastic volatility models when the underlying price is uncorrelated with its volatility. Heston (1993) established a closed-form formula of the European option price. This paper proposes a new closed-form formula of the option price when the price is uncorrelated with its volatility.*

**Key words:** stochastic models; stochastic volatility; option pricing; Fourier transform; closed-form formula.

**REL Classification:** 11B, 11F.

## Introduction

The most important models of options pricing with stochastic volatility are those proposed by Hull and White (1987), Stein and Stein (1991) and Heston (1993). Bates (1996) extended the jump-diffusion model, incorporating stochastic volatility, in order to explain the structure of option prices while Bakshi, Cao and Chen (1997) developed option pricing models that simultaneously admit stochastic volatility, stochastic interest rate and random jumps. Hull and White (1987) proved that the option price with stochastic volatility is the price of Black and Scholes integrated over the probability distribution of the average of future volatilities during the life of the option. Other authors like Heston (1993), Bates (1996), Bakshi, Cao and Chen (1997), Bakshi and Madan (2000) use the characteristic function in order to determine the risk-neutral probabilities of final prices of the underlying asset.

In the stochastic volatility models, the price of the European call option depends on the price of the underlying asset and on its volatility. In the Heston model (1993), in a risk-neutral world these two state variables verify the stochastic differential equations, as follows:

$$dS_t = rS_t dt + \sigma_t S_t dw_t \quad (1)$$

$$d\sigma_t^2 = k(\theta - \sigma_t^2) dt + \sigma_v \sigma_t dz_t \quad (2)$$

where  $S_t$  represents the underlying non-dividend-paying stock price at time  $t$ ,  $r$  represents the risk-free interest rate and  $\sigma_t$  represents the volatility at time  $t$ . The Brownian motions  $w_t$  and  $z_t$  are correlated ( $dw_t \cdot dz_t = \rho dt$ ) and the coefficient of instantaneous correlation is  $\rho$ . The parameters  $k$ ,  $\theta$  and  $\sigma_v$  represent the speed of adjustment of the volatility, the long-run mean of the volatility and the volatility of the volatility. The parameters  $k$  and  $\theta$  include the market price of the volatility risk. Therefore, risk premium factor has been incorporated in the stochastic structure of the variance.

In a risk-neutral world, the option price formula with stochastic volatility is analogous to the Black-Scholes formula:

$$C = SP_1(x > \ln K) - Ke^{-rT} P_2(x > \ln K) \quad (3)$$

where  $S$  is the present value of the underlying asset,  $K$  is the strike price and  $\tau$  is the time to maturity.  $p_1$  and  $p_2$  are the risk-neutral probabilities that the log-price of underlying asset at maturity date is greater than  $\ln K$ , where  $x = \ln S_T$ .

Heston (1993) obtains the characteristic functions corresponding to the risk-neutral probabilities using the Fokker-Planck forward equation. When the underlying asset price is uncorrelated with the volatility ( $\rho=0$ ), these characteristic functions are defined by:

$$f_j(\alpha) = \exp(C + D\sigma^2 + i\alpha \ln S) \tag{4}$$

where

$$C = i\alpha r\tau + \frac{a}{\sigma_v^2} \left\{ (b + \gamma)\tau - 2 \ln \left[ \frac{1 - \delta \exp(\gamma\tau)}{1 - \delta} \right] \right\} \tag{5}$$

$$D = \frac{b + \gamma}{\sigma_v^2} \left[ \frac{1 - \exp(\gamma\tau)}{1 - \delta \exp(\gamma\tau)} \right] \tag{6}$$

$$\delta = \frac{b + \gamma}{b - \gamma} \tag{7}$$

$$\gamma = \sqrt{b^2 - \sigma_v^2 (2u_j \alpha i - \alpha^2)} \tag{8}$$

and  $j=1,2$ ;  $u_1=1/2$ ;  $u_2=-1/2$ ;  $a=k\theta$ ;  $b=k$ . In these formulas,  $\sigma$  represents the volatility at the current date.

The article is organized as follows. In the second section, the characteristic functions are used in order to obtain a relation between the risk-neutral probabilities. In the third section, a new closed-form formula of the option price with stochastic volatility is presented considering the case with no correlation between the state variables. The fourth section summarizes and concludes.

**The characteristic function**

In the expression of the characteristic functions of the risk-neutral probability density, the value of  $\gamma$  is  $\sqrt{b^2 + \sigma_v^2 (\alpha^2 - i\alpha)}$  if  $j=1$  and the value of  $\gamma$  is  $\sqrt{b^2 + \sigma_v^2 (\alpha^2 + i\alpha)}$  if  $j=2$ . Using the hyperbolic sine and hyperbolic cosine definitions, the expression (4) of the characteristic function can be written in a tractable form:

$$f_1(\alpha) = e^{i\alpha(\ln S + r\tau)} e^{\frac{ab\tau}{\sigma_v^2} \left[ \frac{1}{\cosh\left(\frac{\gamma_1\tau}{2}\right) + \frac{b}{\gamma_1} \sinh\left(\frac{\gamma_1\tau}{2}\right)} \right]^{\frac{2a}{\sigma_v^2}} e^{-\sigma^2 \frac{\alpha^2 - i\alpha}{b + \gamma_1 \coth\left(\frac{\gamma_1\tau}{2}\right)}} \tag{9}$$

$$f_2(\alpha) = e^{i\alpha(\ln S + r\tau)} e^{\frac{ab\tau}{\sigma_v^2} \left[ \frac{1}{\cosh\left(\frac{\gamma_2\tau}{2}\right) + \frac{b}{\gamma_2} \sinh\left(\frac{\gamma_2\tau}{2}\right)} \right]^{\frac{2a}{\sigma_v^2}} e^{-\sigma^2 \frac{\alpha^2 + i\alpha}{b + \gamma_2 \coth\left(\frac{\gamma_2\tau}{2}\right)}} \tag{10}$$

where:  $\gamma_1 = \sqrt{b^2 + \sigma_v^2 (\alpha^2 - i\alpha)}$  and  $\gamma_2 = \sqrt{b^2 + \sigma_v^2 (\alpha^2 + i\alpha)}$ .

From now on the Gil-Pelaez inversion theorem<sup>(1)</sup> can be used in order to obtain the risk-neutral probabilities,  $P_1(z < d)$  and  $P_2(z < d)$ , that the variable  $z = \ln \frac{S_T}{S e^{rT}}$  is lower than the threshold  $d$ . Thus,

$$P_1(z < d) = \frac{1}{2} + \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_1(-\alpha) - e^{-i\alpha d} \phi_1(\alpha)}{i\alpha} d\alpha \quad (11)$$

$$P_2(z < d) = \frac{1}{2} + \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_2(-\alpha) - e^{-i\alpha d} \phi_2(\alpha)}{i\alpha} d\alpha \quad (12)$$

where the characteristic functions,  $\phi_1$  and  $\phi_2$ , and the threshold  $d$  are defined by:

$$\phi_1(\alpha) = e^{\frac{abT}{\sigma\sqrt{V}}} \left[ \frac{1}{\cosh\left(\frac{\gamma_1 T}{2}\right) + \frac{b}{\gamma_1} \sinh\left(\frac{\gamma_1 T}{2}\right)} \right]^{\frac{2a}{\sigma\sqrt{V}}} e^{-\sigma^2 \frac{\alpha^2 - i\alpha}{b + \gamma_1 \coth\left(\frac{\gamma_1 T}{2}\right)}} \quad (13)$$

$$\phi_2(\alpha) = e^{\frac{abT}{\sigma\sqrt{V}}} \left[ \frac{1}{\cosh\left(\frac{\gamma_2 T}{2}\right) + \frac{b}{\gamma_2} \sinh\left(\frac{\gamma_2 T}{2}\right)} \right]^{\frac{2a}{\sigma\sqrt{V}}} e^{-\sigma^2 \frac{\alpha^2 + i\alpha}{b + \gamma_2 \coth\left(\frac{\gamma_2 T}{2}\right)}} \quad (14)$$

$$d = \ln \frac{Ke^{-rT}}{S} \quad (15)$$

One of the properties of a characteristic function stipulates that  $\phi_1(\alpha)$  and  $\phi_1(-\alpha)$  or  $\phi_2(\alpha)$  and  $\phi_2(-\alpha)$  are complex conjugate<sup>(2)</sup>. Because of the obtained characteristic functions symmetry the quantities  $\phi_1(\alpha)$  and  $\phi_2(\alpha)$  are also complex conjugate:

$$\phi_1(-\alpha) = \phi_2(\alpha) \text{ and } \phi_1(\alpha) = \overline{\phi_2(\alpha)} \quad (16)$$

$$\phi_2(-\alpha) = \phi_1(\alpha) \text{ and } \phi_2(\alpha) = \overline{\phi_1(\alpha)} \quad (17)$$

and that involves

$$\int_0^{\infty} \frac{e^{i\alpha d} \phi_2(\alpha) - e^{-i\alpha d} \phi_2(-\alpha)}{i\alpha} d\alpha = \int_0^{\infty} \frac{e^{i\alpha d} \phi_1(-\alpha) - e^{-i\alpha d} \phi_1(\alpha)}{i\alpha} d\alpha \quad (18)$$

Thus

$$P_1(z < d) = \frac{1}{2} + \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_2(\alpha) - e^{-i\alpha d} \phi_2(-\alpha)}{i\alpha} d\alpha \quad (19)$$

#### The relation between risk-neutral probabilities

Knowing that the first risk-neutral probability can be written as depending on the second characteristic function  $\phi_2(\alpha)$  it is possible to determine a relation between the risk-neutral probabilities which appear in the theoretical option price formula.

The first step is to determine the risk-neutral probability  $P_1(z < -d)$ . Using the Gil-Pelaez formula and the fact that the characteristic functions are complex conjugate, this probability can be written:

<sup>(1)</sup> See Gil-Pelaez (1951), "Note on the inversion theorem", *Biometrika*, 38, pp. 481-482.

<sup>(2)</sup>  $\phi_1(\alpha) = \overline{\phi_1(-\alpha)}$  and  $\phi_2(\alpha) = \overline{\phi_2(-\alpha)}$ .

$$\begin{aligned}
 P_1(z < -d) &= \frac{1}{2} - \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_2(-\alpha) - e^{-i\alpha d} \phi_2(\alpha)}{i\alpha} d\alpha \\
 &= \frac{1}{2} - \left[ P_2(z < d) - \frac{1}{2} \right] = 1 - P_2(z < d)
 \end{aligned}
 \tag{20}$$

In the same way, an analogous relation between  $P_2(z < -d)$  and  $P_1(z < d)$  is obtained. Summarizing, the relations between risk-neutral probabilities are the following:

$$\begin{cases}
 P_1(z < -d) = 1 - P_2(z < d) \\
 P_2(z < -d) = 1 - P_1(z < d)
 \end{cases}
 \tag{21}$$

The next step is to obtain a relation between the risk-neutral probabilities which appear in the option price formula. Knowing that,

$$\begin{cases}
 P_1(-d < z < d) = P_1(z < d) - P_1(z < -d) \\
 P_2(-d < z < d) = P_2(z < d) - P_2(z < -d)
 \end{cases}
 \tag{22}$$

and using the Gil-Pelaez formula for each probability, the result is:

$$P_1(-d < z < d) = \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} - e^{-i\alpha d}}{i\alpha} [\phi_1(-\alpha) + \phi_1(\alpha)] d\alpha
 \tag{23}$$

From the Euler formulas and from the properties of the complex conjugate, the expression of this probability is:

$$P_1(-d < z < d) = \frac{2}{\pi} \int_0^{\infty} \frac{\sin \alpha d}{\alpha} \operatorname{Re}[\phi_1(\alpha)] d\alpha
 \tag{24}$$

Similarly, the second probability is:

$$P_2(-d < z < d) = \frac{2}{\pi} \int_0^{\infty} \frac{\sin \alpha d}{\alpha} \operatorname{Re}[\phi_2(\alpha)] d\alpha
 \tag{25}$$

Once again, the relation between the two characteristic functions gives an advantage. They are complex conjugate, hence  $\operatorname{Re}[\phi_1(\alpha)] = \operatorname{Re}[\phi_2(\alpha)]$ . Consequently, the risk-neutral probabilities (24) and (25) are identical. Making the notation  $P$  for this probability, it can be written:

$$P = P_1(-d < z < d) = P_2(-d < z < d)
 \tag{26}$$

It remains to use the relations (21) and (26) in order to determine the final relation between the risk-neutral probabilities which appear in the option price formula. The relation obtained is the following:

$$\begin{cases}
 P_1(z > d) = P_2(z < d) - P \\
 P_2(z > d) = P_1(z < d) - P
 \end{cases}
 \tag{27}$$

**A closed-form formula of the option price**

Taking into consideration the relation between the risk-neutral probabilities, this section presents a closed-form formula of the theoretical price of a European call option when the volatility is stochastic and uncorrelated with the underlying asset price.

In the risk-neutral world, the option price is defined by:

$$C = SP_1(z > d) - Ke^{-rT} P_2(z > d)
 \tag{28}$$

In order to obtain a closed-form formula, the risk-neutral probabilities can be expressed starting from the Gil-Pelaez formula. Consequently, the risk-neutral probability  $P_2(z > d)$  can be written as follows<sup>(1)</sup>:

<sup>(1)</sup> See the proof in the appendix A.

$$P_2(z > d) = \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] - \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \quad (29)$$

Therefore<sup>(1)</sup>,

$$P_2(z < d) = \frac{1}{2} + \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] - \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \quad (30)$$

Taking into account the relation between risk-neutral probabilities, the probability  $P_1(z > d)$  is derived from:

$$P_1(z > d) = P_2(z < d) - P = \frac{1}{2} + \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] - \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha - \frac{2}{\pi} \int_0^{\infty} \frac{\sin \alpha d}{\alpha} \operatorname{Re}[\phi_2(\alpha)] d\alpha \quad (31)$$

Therefore, the expression of the risk-neutral probability  $P_1(z > d)$  is defined by:

$$P_1(z > d) = \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] + \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \quad (32)$$

Knowing the expressions (29) and (32) of the risk-neutral probabilities, the closed-form formula of the option price with stochastic volatility is given by:

$$C = S \left\{ \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] + \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \right\} - Ke^{-r\tau} \left\{ \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] - \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \right\} \quad (33)$$

In this closed-form formula of the option price, the risk-neutral probabilities are explained only by one characteristic function. Moreover, the risk-neutral probabilities are perfectly symmetrical.

#### A Heston-like option price formula

The above closed-form formula of the option price can be written in the same manner like the Heston formula. The option price formula proposed by Heston is the following:

$$C = S \left\{ \frac{1}{2} + \frac{1}{\pi} \int_0^{\infty} \operatorname{Re} \left[ \frac{e^{-i\alpha d}}{i\alpha} \phi_1(\alpha) \right] d\alpha \right\} - Ke^{-r\tau} \left\{ \frac{1}{2} + \frac{1}{\pi} \int_0^{\infty} \operatorname{Re} \left[ \frac{e^{-i\alpha d}}{i\alpha} \phi_2(\alpha) \right] d\alpha \right\} \quad (34)$$

Taking into consideration the relation between the risk-neutral probabilities and the fact that the characteristic functions are complex conjugate, the closed-form formula proposed by Heston can be simplified. Thus, the following closed-form formula is obtained:

$$C = S \left\{ \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \operatorname{Re} \left[ \frac{e^{-i\alpha d}}{i\alpha} \phi_2(\alpha) \right] d\alpha - \frac{2}{\pi} \int_0^{\infty} \frac{\sin \alpha d}{\alpha} \operatorname{Re}[\phi_2(\alpha)] d\alpha \right\} - Ke^{-r\tau} \left\{ \frac{1}{2} + \frac{1}{\pi} \int_0^{\infty} \operatorname{Re} \left[ \frac{e^{-i\alpha d}}{i\alpha} \phi_2(\alpha) \right] d\alpha \right\} \quad (35)$$

#### Conclusion

The above closed-form formulas express the option prices in terms of Fourier-inversion integrals, which in practice are evaluated numerically. The symmetry between the risk-neutral probabilities allows a numerical accuracy of the computing of the option price. The relation between the risk-neutral probabilities works like a restriction. The risk-

<sup>(1)</sup> See the same definition in Kendall, M., & Stuart, A. (1977). *The Advanced Theory of Statistics*, Volume 1, New York, Macmillan Publishing Co., p. 96.



neutral probabilities are forced to respect this restriction and, thus, the numerical pricing error of the computations using the discrete transform is bounded. Moreover, the computational advantage is that only one integral transform needs to be inverted, instead of two distinct characteristic functions<sup>(1)</sup>.

#### APPENDIX A

In order to obtain the relation (29), the expression of the probability  $p_2(z > d)$  can be written:

$$p_2(z > d) = 1 - p_2(z < d) \quad (\text{A.1})$$

Using the Gil-Pelaez definition of the probability  $p_2(z < d)$ , the above relation becomes:

$$\begin{aligned} p_2(z > d) &= 1 - \left[ \frac{1}{2} + \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_2(-\alpha) - e^{-i\alpha d} \phi_2(\alpha)}{i\alpha} d\alpha \right] \\ &= \frac{1}{2} - \frac{1}{2\pi} \int_0^{\infty} \frac{e^{i\alpha d} \phi_2(-\alpha) - e^{-i\alpha d} \phi_2(\alpha)}{i\alpha} d\alpha \end{aligned} \quad (\text{A.2})$$

From Euler formulas,

$$\begin{aligned} p_2(z > d) &= \frac{1}{2} - \frac{1}{2\pi} \int_0^{\infty} \left[ \left( \frac{\sin \alpha d}{\alpha} - i \frac{\cos \alpha d}{\alpha} \right) \phi_2(-\alpha) - \left( -\frac{\sin \alpha d}{\alpha} - i \frac{\cos \alpha d}{\alpha} \right) \phi_2(\alpha) \right] d\alpha \\ &= \frac{1}{2} - \frac{1}{2\pi} \int_0^{\infty} \left[ \frac{\sin \alpha d}{\alpha} [\phi_2(-\alpha) + \phi_2(\alpha)] - i \frac{\cos \alpha d}{\alpha} [\phi_2(-\alpha) - \phi_2(\alpha)] \right] d\alpha \end{aligned} \quad (\text{A.3})$$

But, the quantities  $\phi_2(-\alpha)$  and  $\phi_2(\alpha)$  are complex conjugate. Therefore, the equation (29) is obtained:

$$p_2(z > d) = \frac{1}{2} - \frac{1}{\pi} \int_0^{\infty} \frac{\sin \alpha d \operatorname{Re}[\phi_2(\alpha)] - \cos \alpha d \operatorname{Im}[\phi_2(\alpha)]}{\alpha} d\alpha \quad (\text{A.4})$$

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<sup>(1)</sup> The inherent relationship between the probabilities has been exploited in the inversion formula. Therefore, the model requires only one characteristic function, instead of two characteristic functions. The same argument is used by Heston and Nandi (2000).

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## EPISODIC DEPENDENCIES AND THE PROFITABILITY OF MOVING AVERAGE STRATEGY ON ROMANIAN CAPITAL MARKET

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***Abstract.** Episodic dependencies and moving averages profitability of Romanian capital markets. The evolution of informational efficiency of Romanian stock market is illustrated by means of a test which takes into account nonlinear dynamics. According to this test, we cannot consider a significant amelioration of the efficiency degree of Romanian stock market. Moreover, knowing that random walk are joint tests of the efficiency hypothesis, there was researched the profitability of moving averages on the identified linear and nonlinear correlation sub periods. The results revealed that only nonlinear dependencies are profitably exploited by the moving averages strategies. The most profitable strategy of 15000 strategies was analyzed. The originality of this research is given by the combination of random walk tests with the technical analysis tests, which led to the construction of a new methodology for the evaluation of informational efficiency in weak form.*

**Key words:** emergent market; episodic dependencies; bicorrelation test; window testing procedure.

**REL:** 11B, 10F, 10G.

### **Introduction**

The main characteristic of classical informational efficiency studies is the fact that they express conclusions on the whole studied sample. Still, there are enough reasons to consider that emerging markets efficiency improves over the time due to the gradual financial liberalization and to the institutional and technological changes. As a consequence, during the last decade, research methodology was adapted to the emerging markets specific features, so that it would emphasize the eventual changes of the efficiency degree on the emerging capital markets over the time.

The first efficiency evolution tests took into account just the short term linear dependencies. Zalewska-Mitura and Hall (1999), Rockinger and Urga (2000, 2001), Tsukuda *et al.* (2006) and Schotman and Zalewska (2006) estimated, using Kalman filters, the parameters of some autoregressive models with heteroskedastic residual structures, while Kvedaras and Basdevant (2004) proposed the dispersion rapport variation over the time, based on linear autocorrelation coefficients estimated using the same method. Long term linear dependencies were studied by Cajuerio and Tabak (2006), who suggested calculating the Hurt exponent on rolling windows. All these studies confirm, with little exceptions, the increase of the efficiency degree of Central and Eastern European capital markets.

Elaboration of some efficiency evolution tests that also considers the non-linear dependencies is opportune by various reasons. Firstly, classical autocorrelation, run,

spectral or stationary tests are suitable in case the information tends to be incorporated in the stock price in a linear manner, which is specific for the developed markets. Emerging markets are described by a reduced liquidity, high volatility and by the presence of poorly informed investors. These features, and also the possibility that the investors on the emerging markets don't have a completely rational behavior, can lead to a non-linear information inclusion in the price. In this context, the existence of non-linear dynamics on the emerging markets is highlighted by estimating the statistics of the return rates bivariate correlation test on rolling windows. This technique was used for the first time by Todea and Zoicas (2005) to estimate the informational efficiency degree on the Romanian stock market. More recently, it was applied on the Asian emerging markets by Lim, Brooks and Hinich (2007), Lim, Brooks and Kim (2007) and Lim (2007). Secondly, Neftci (1991) or Clyde and Osler (1997) proved that the profitability of technical analysis strategies results especially from non-linear dynamics of the stock prices, and not from the linear ones. Andrada-Félix *et al.* (2003) demonstrates the profitability of non-linear transaction rules, and Lim and Liew (2004) bring in arguments that the non-linearity favors non-linear methods of technical analyses. Thirdly, weak transaction can induce an artificial linear autocorrelation of the return rates, so the classical efficiency evolution tests, that take into consideration just the linear dependencies, can lead to false conclusions. Muthuswamy (2003) proved that, inside a portfolio, artificial autocorrelation due to stock data synchronism is positive and can go up to 0.5.

The random walk test for stock prices is a test associated to the weak informational efficiency hypothesis and not a direct one. Thus, accepting the random walk hypothesis involves the informational efficiency, while rejecting it is not synonym with the inefficiency. This is why random walk tests must be also accompanied by direct ones, like technical analyses tests. Studies about technical analyses strategies profitability made on emerging markets are more recent than the ones made on developed countries and most of them confirm their forecasting potential. Maybe the most cited study carried out on emerging markets is the one realized by Ratner and Leal (1999). They adjusted the methodology to the emerging markets specific features, like weak transaction, considering of the inflation and building a band that would take into account the different volatility on the markets. Thus, the two authors analyze stock indexes on 10 emerging markets in Asia and South America, and also SP 500 and Nikkei 225 indexes, to have a comparison term. There were tested 10 moving average strategies for each emerging market. In 22 cases from 100 the results were significant, and after taking into consideration transaction costs, there remained 21 cases. Profitable strategies and concentrated especially on Mexico, Taiwan, Thailand and Philippines markets.

Parisi and Vasquez (2000) test moving average strategies and trading range break on Chile's stock market, and the analyzed period is 1987 – 1998. The results are in favor of the profitability for both technical analyses methods, as the rates of return for the buying signals are superior to the ones from selling signals sub periods. Sehgal and Garyhan (2002) analyze technical analyses strategies on 21 shares included in the Indian BSE Sensitive Index, during April 1996 – March 1998. The rates of return are adjusted to take into consideration the cost of transaction and risk. The empirical results show that abnormal returns can be obtained when using technical analyses strategies and the most powerful indicator is OBV (On Balance Volume). Atmeh and Dobbs (2004) test the profitability of 14 moving average strategies on the Jordanian ASE index. Half of the strategies are profitable if the cost of transaction is not considered, but after including it into research, just the (1.5) strategy generates abnormal returns. Also, the authors apply the bootstrap methodology, specifying different behaviors for the rate of return, as random walk, AR(1) and GARCH-M. Behaviors like random walk and AR(1) don't generate

profits when using moving average strategies, while a GARCH-M behavior explains part of these profits. On the Romanian capital market, Todea (2006) highlights the profitability of mobile average applied on BET index. From all the analyzed strategies, after considering the cost of transaction, the most profitable is the (1.50) strategy. As for volatility, in the sub periods with buying signals it is lower than in the sub periods with selling signals. So, the well-known leverage, emphasized for the first time by Black (1976), can be found on the Romanian market. According to it, the volatility associated with the negative rates of return is higher than volatility associated with positive returns.

The originality of this research consists in combining a modified version of the Hinich and Patterson (1995) window-test procedure with the moving average strategies. As a matter of fact, it will be made a test for the informational efficiency evolution and the profitability of moving average strategies will be studied on the sub periods identified by accepting or rejecting the random walk hypothesis. It is expected that these strategies to be more profitable during the sub periods of rejecting the hypothesis, than in the ones of accepting it. At the same time, it is interesting to see which dependencies generate the profitability of these strategies: the linear or non-linear ones?

The paper is structured in three parts. In the first one it is presented the date used and its main statistic features. In the second part it is presented the methodology used, and in the last one the empirical results obtained as a consequence of using it. The study is ended by the conclusions.

### 1. The data sample and its statistical characteristic

The data sample consists of daily closing prices of the official Bucharest stock market index, BET, between 19.09.1997 – 30.08.2007. Based on this series we have obtained the following returns, using the formula:  $R_t = \ln(P_t/P_{t-1}) * 100$ , where  $P_t$  stands for the closing price of the index from trading session.

#### Statistics regarding index BET distribution returns

Table 1

Statistics	Values
Average	0.000946
Standard Deviation	0.0175
Skewness	-0.131**
Kurtosis	8.928*
Jarque – Bera test	3611.44*

Note: \* significant at 1% level; \*\* significant at 5% level.

As we can see from Table 1 the distribution of daily returns of the BET index diverts substantially from the normal law of probability. Therefore a negative asymmetry can be found, together with the existence of some powerful negative extreme variations and a leptokurtic character that implies a concentration of the process around the average value. Mandelbrot (1963) thinks that this behavior of the returns is explained by the way the new information arrives and it's incorporated in the market price. In fact, the long distribution tails are the first sign of a nonlinear return behavior, heteroskedastic in this particular case. The rejection of the normality hypothesis for all the sample data it's the first sign that the technical analysis' strategies might be profitable. At the same time, we have also studied the stationary hypothesis of returns in the weak form, using ADF tests and KPSS. The results of these tests uphold the stationary hypothesis around a deterministic tendency of index' returns.

## 2. Methodology

The construction of the evolution of informational efficiency of Romanian stock market test it's based on a modified version of the Hinich and Patterson (1995) "window" procedure. In order to understand this test it is necessary to first acknowledge the classic methodology. The return sample,  $\{R(t)\}$ , is considered to be the realization of a stochastic process, where  $t$  (integer) is the time unit. The procedure implies the division of the returns sample in non overlapped sub samples of volume  $n$ , named windows. A  $k$  window consists of  $\{R(t_k), R(t_k+1), \dots, R(t_k+n-1)\}$ , and a  $K+1$  window is  $\{R(t_{k+1}), R(t_{k+1}+1), \dots, R(t_{k+1}+n-1)\}$ , so that  $t_{k+1} = t_k + n$ . In each window, the null hypothesis is that  $R(t)$  is the realizations of a white noise process with null correlations and bi-correlations, described by  $C_{RR}(r) = E[R(t)R(t+r)]$  and  $C_{RRR}(r,s) = E[R(t)R(t+r)R(t+s)]$ , where  $r$  and  $s$  are integers satisfying  $0 < r < s < L$  with  $L$  being the number of lags. Correlations identification is made using the portmanteau test (C) for linear correlations, similar to the Box-Pierce test, and the bi correlation test (H) for the nonlinear ones.

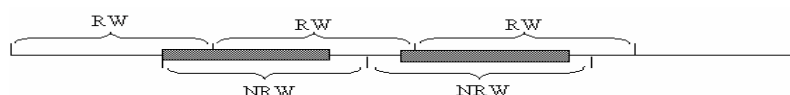
In order to compute them, a standardized series ( $Z(t)$ ), reduced and centered, is used:  $Z(t) = \frac{R(t) - m_R}{\sigma_R}$ , where  $t$  takes values from 1 to  $n$  and  $m_R$  and  $\sigma_R$  are the mean and standard deviation within the window. The correlation between this standard returns, within the window, is given by:  $C_{RR}(r) = (n-r)^{-1/2} \sum_{t=1}^{n-r} Z(t)Z(t+r)$ ,

and the bi correlation by:  $C_{RRR}(r,s) = (n-s)^{-1} \sum_{t=1}^{n-s} Z(t)Z(t+r)Z(t+s)$ , for  $0 \leq r \leq s$ .

The C statistics, which will detect the linear correlations within the window, is distributed according to a  $\chi^2$  law of probability with  $L$  degrees of freedom, having the following formula:  $C = \sum_{r=1}^L [C_{RR}(r)]^2$ . The H statistics, will detect the non-linear correlations within the window and is distributed according to a  $\chi^2$  law with  $(L-1)(L/2)$  degree of freedom, having the following formula:  $H = \sum_{s=2}^L \sum_{r=1}^{s-1} G^2(r,s)$ , where  $G(r,s) = (n-s)^{1/2} C_{RRR}(r,s)$ .

The number of lags ( $L$ ) is specified as  $L = n^b$ , with  $0 < b < 0.5$ . Hinich and Patterson (1995) recommend, based on Monte Carlo simulations, the usage of  $b = 0,4$  in order to maximize the power of the test assuring at the same time a good asymptotical approximation. Another important parameter that needs to be set is the window length. It must be long enough to offer a robust statistical power and yet short enough for the test to be able to identify any changes in the variables behavior. Brooks and Hinch (1998) recommend windows of 35 observations corresponding to a period of approximately 7 weeks of transactions, but in recent studies Lim, Brooks and Hinch (2007) and Lim, Brooks and Kim (2007) recommended windows of 50 observations. The research on the Romanian capital market takes into consideration the second recommendation. The accepted risk level of the nonlinear and linear non - correlation will be 1%.

The Hinich and Patterson (1995) classic methodology does not allow an accurate identification of sub-periods exhibiting linear/nonlinear dependencies, because the test results depend on how the first day of the sample is chosen. The following example shows how the RWH can be accepted in the first window just because dependencies exist in a small time fraction of the windowed sub-period, while, if we considered the first day of the sample the last fraction of the first window, RWH is rejected.



Todea and Zoicas-Ienciu (2007) eliminated the first day effect by running the Hinich–Patterson methodology in a successive way, considering the first day of the sample each of the first  $n-1$  days of the first window. Due to the translation, each successive application eliminates a return from the last window until it disappears. Theoretically, with the exception of the last return, each return from the first window can be considered with the same probability the starting point of the sample. Thus, for each sample, the percentage of significant windows rejecting RWH is given by:

$$p(\%) = \frac{1}{n-1} \times \left( \frac{x_1}{NW} + \sum_{i=2}^{n-1} \frac{x_i}{NW-1} \right) \times 100$$

where  $X_i$  denotes the number of windows rejecting RWH found in step  $i$ ;  $N$  – the volume of returns sample;  $n$  – the window size;  $NW$  - the biggest integer number of non overlapped windows, that makes  $NW \leq (N-1)/(n-1)$  true. This study emphasizes the episodic character of linear and nonlinear dependencies of the central and eastern European markets.

This methodology allows the construction of an evolution efficiency test that we have applied on the Romanian capital market, on the returns of the BET index. The statistics of correlation and bi correlation tests were estimated using 50 days windows that move and we marked with 0 if the random walk hypothesis is accepted within the window and with 1 if the RWH is rejected as a consequence of linear and nonlinear dependencies.

In order to establish the predictability rate of return it is not enough to identify the sub periods of linear and nonlinear correlation and those of non correlation. By using different technical analysis strategies, the successful exploitation of these dependencies can be considered as a sign of the low informational efficiency degree. For this reason we have studied the probability of moving average strategies on this sub - periods of correlation and non correlation.

The usage of moving average is based on the fact that financial series are volatile and have certain tendencies. The intersection of the price line or short term moving average with long term moving average stands for a signal for the initiation of a tendency. If the short term moving average is bigger than the long term moving average then it's a buying signal. If it's the other way around, it's a selling signal. A percentage strip has been introduced concerning the long term moving average in order to eliminate false signals ("noisy" signals). For the selection of the most profitable strategy we have analyzed a range of 15,000 strategies by combining all possible short term moving average, between 50 and 200 days and 10 strips between 0.1% and 1% (multiple of 0.1%). In the end, the execution of the program identified the strategy (1.186, 0.9%) with the highest return excess compared to the return of a buy and hold passive strategy. In order to include in the category of those who use these strategy, the less sophisticated investors, that usually pay higher commissions, a transaction commission of 0.5% was used.

A daily average excess return compared to passive investment strategy was determined in each window. These returns are at the base of the following determinations:

- the average daily excess return of the entire sample ( $R$ );
- the average daily excess return of the linear no correlation sub- periods ( $R_{0\_lin}$ );
- the average daily excess return of the linear correlation sub- periods ( $R_{1\_lin}$ );
- the average daily excess return of the nonlinear no correlation sub- periods ( $R_{0\_nlin}$ );

- the average daily excess return of the nonlinear correlation sub- periods ( $R_{1\_nlin}$ ).

The testing of this returns' equality was made through t statistics of the Student test and F statistics of the ANOVA test.

### 3. Empirical results

The application of the modified Hinch – Patterson methodology (1995) led to the formation of 2460 windows of 50 trading sessions each. The linear correlation hypothesis is accepted in 133 windows, which represents 5.4% from the total of windows. As far as non – linear correlation is concerned there were obtained 409 windows representing 16.62% from the whole total. Generally the random walk hypothesis was rejected because of the existence in 527 cases, 21.42% from total of windows, of the linear or non – linear dependencies. These results, concerning alternation between long random walk sub periods and relatively long sub periods of linear and non – linear correlation, are similar to the ones obtained by Todea and Zoicas – Ienciu(2006) on the Central and East – European capital markets. And so it is emphasized the episodic character of the dependencies on Romanian capital market, characteristic found as well by Lim and Hinch (2005) on emergent markets from Asia or by Bonilla (2006) on emergent markets from Latin America. It can be observed that the hypothesis of random walk is rejected especially because of the non - linear dynamics.

As these dependencies tend to reduce their number, it can be talked by an increase in the weak – form informational efficiency degree on the Romanian capital market. The frequency of the linear dependencies can be observed in Figure 1.

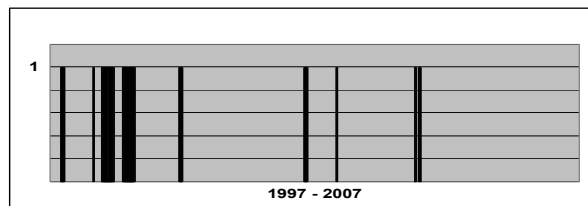


Figure 1. The evolution of linear dependencies – BET index

From the linear dependencies point of view we can observed in Figure 1 an increase in the weak – form informational efficiency degree. Practically, most of the windows in which the random walk hypothesis is rejected because of non – linear dynamics can be found in first part of the studied period.

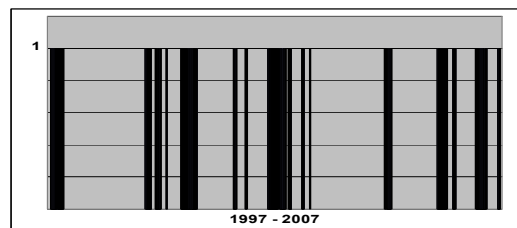


Figure 2. The evolution of non – linear dependencies – BET index

We can't draw the same conclusions in the non – linear dependencies case. In Figure 2 it can be observed, through the end of the studied period, a pretty high frequency of the windows in which the random walk hypothesis is rejected based on the existence of non – linear dynamics. The existence of these dynamics leads us to believe that there wasn't a positive evolution of the weak – form informational efficiency on Romanian capital market. This conclusion is valid as long as these dependencies can be exploited profitably by the actors on Romanian market.

From the 15000 moving average strategies taken into consideration, the most profitable strategy was chosen in calculation, the one (1.186 ,0.9%). This refers to a short mobile average of 1 day, a long mobile average of 186 days and a strip around the long mobile average of 0.9%. The excess of the daily average return on the whole sample and on different sub periods can be found in Table 2:

**The excess of the daily average return  
on the whole sample and on different sub periods**

Table 2

Index	R	R 0 lin	R 1 lin	R 0 nlin	R 1 nlin
BET	0.000004	0.00001	-0.00029**	-0.00015**	0.00064**

Note: \* significant at 1% level; \*\* significant at 5% level.

The average excess of daily returns doesn't differ significantly from zero, on the whole sample, which shows that even the best strategy of mobile averages from the 15,000 taken into consideration doesn't lead to profits when we consider transaction costs. This result must be seen with a certain restraint because it is possible that some institutional investors that use a transaction cost lower than the others, may obtain superior profits to a passive strategy.

When studying the correlation sub periods and the non - correlation ones, linear and non – linear, it can be found that the results differ substantially. The linear dependencies are not being exploited by this strategy concerning the profit revenue. On the contrary, when the random walk hypothesis is rejected because of the linear dependencies, the return excess is negative and significant with a risk level of 5%. In the non – linear correlation sub period, the return excess is significantly positive, its value being 16.64%.

More than that the sub periods in which there aren't non - linear dynamics, the return excess is negative and significantly different from zero. So it can be affirmed that the mobile average strategy exploit not only non - dynamics. This result together with the fact that non - linear dependencies frequency doesn't lower its level towards the end of the studied period makes us reach the conclusion that there isn't a positive evolution of the weak - form informational efficiency on Romanian capital market.

### Conclusions

Taking into consideration just the linear dependencies in the construction of the tests concerning the evolution of informational efficiency leads us to the conclusion that we are dealing with an improvement of the informational efficiency degree on Romanian capital market. Considering non - linear dependencies in the construction of these tests radically changes the conclusions in the sense that this amelioration doesn't exist. This result is supported by the fact that only these non - linear dependencies are being exploited by the adopted moving average strategy. Under these circumstances it is recommended to use those strategies of technical analysis which are capable to exploit as much as possible the non - linear dynamics on Romanian capital market.



In the end it can be affirmed that during the last years the financial liberalization, the structural and institutional changes in the Romanian economy and the continuous regulation process as well, didn't conduct to a significant increase in the weak-form informational efficiency degree on Romanian capital market.

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# VALUE-AT-RISK. MEASUREMENT AND EVALUATION METHODS FOR MARKET RISK

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***Abstract.** The prudential regulation of financial institutions requires the maintenance of minimum levels of capital as reserves against financial risks. Banks now have the option to use their own VaR risk-management model as the basis for required capital ratios. The main objective of this paper is to illustrate a VaR methodology that could be used by the banks in elaborating their internal models such as: standard GARCH, GJR and EGARCH models under three distributional assumptions (normal, GED and Student-t). VaR models are useful as they can be demonstrated to be reasonably accurate. To do this, we must check systematically the validity of the underlying valuation and risk models through comparison of predicted and actual loss levels, namely backtesting.*

**Key words:** Value-at-Risk; GARCH models; backtesting.

**REL Classification:** 10B, 10J

## **1. Introduction**

The last few years were characterized by significant changes in the banking sector regarding risk management. The prudential regulation of financial institutions requires the maintenance of minimum levels of capital as reserves against financial risks. In this way, Basle II is based on a *forward-looking* approach regarding capital adequacy which intends to identify the source of the risk, the development and the improvement of the risk management using some robust methods (*International Convergence of Capital Measurement and Capital Standards – Basel Committee*, June 2006). Basel Committee on Banking Supervision and regulation authorities from European Union have recognized Value-at-Risk as a benchmark for risk measurement. Therefore, banks can implement their own internal models for risk management.

Romanian regulations require bank's capital adequacy with respect to market risk, credit risk and operational risk. Regarding market risk, the laws in force (OUG no. 99/6.12.2006) require that "National Bank of Romania allows banks to calculate capital requirements for positions risk, currency risk and/or commodity risk by using their own internal models or a combination with standardized models [...] and establishes the conditions under these models can be used".

## **2. Data**

To quantify market risk, I used daily returns for the BET index between period 19.09.1997 and 26.10.2007 (2509 observations). Table 1 shows the summary statistics for the returns of the BET index.

Summary statistics for the returns of BET index

Table 1

	Mean	Median	Standard Deviation	Skewness	Kurtosis	Jarque-Bera	Probability
BET Returns	0.0011	0.0005	0.0172	0.0650	8.5691	3244.1590	0.0000

It can be observed that the Kurtosis is higher than 3 and the tails of the returns distribution are fatter, and the Jarque-Bera statistic shows that the returns are far from being normal distributed. Those stylized facts are similar to other results from the literature concerning the behavior of the financial time series.

To test the autocorrelation of the returns, I compute the autocorrelation function with 25 lags. From figure 1, we can observe that the returns are autocorrelated with order 1, because the autocorrelation coefficient for the first lag is 0,256. Hence, to eliminate the autocorrelation I have introduced in the mean equation an MA(1) term. Also, it can be observed that the Student-t fits better the returns distributions than the normal distribution.

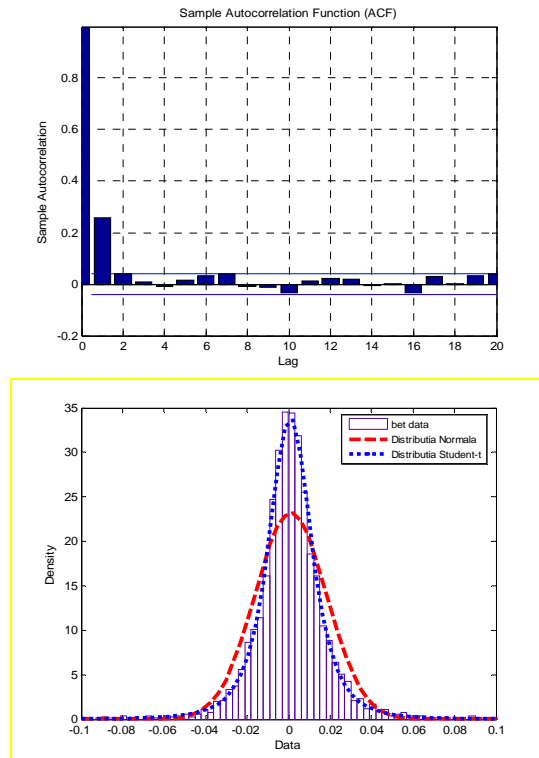


Figure 1. The autocorrelation function and the distribution of returns for the BET index

The implementation of the internal models that apply Value-at-Risk represents a challenge because of the permanent development of new more complex methods, proposed for example by Alexander and Barbosa, 2007, Christoffersen, 2006, Andersen, Bollerslev, Christoffersen and Diebold, 2005, Stulz, 2004.

### 3. VaR forecasting

In this paper, the estimation of Value-at-Risk was realized in the following steps: I. the estimation of standard deviation using univariate GARCH models (GARCH(1,1) – Bollerslev, 1986, GJR(1,1,1) - Glosten, Jagannathan și Runkle, 1993, EGARCH(1,1,1)) – Nelson 1993), assuming three distributions: normal, Student-t and GED – Generalised Error Distribution; II. forecasting standard deviation with a rolling window (one step ahead forecasts); III. VaR computation; IV. Expected Shortfall estimation.

As was revealed above, Student-t and GED fits better the BET leptokurtic (fat tails) returns distribution. Bollerslev (1987) proposed for the return shocks in the GARCH models to use Student-t distribution with the following probability density function:

$$f(z_t^2, \nu) = \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)\sqrt{\pi(\nu-2)}} \left(1 + \frac{z_t^2}{\nu-2}\right)^{-\frac{\nu+1}{2}} \quad (1)$$

The use of the GED distribution in GARCH models was proposed by Nelson (1991) and has the probability density function of the form:

$$f(z_t^2, \nu) = \frac{\nu \exp\left(-0.5 \left|\frac{z_t}{\lambda}\right|^\nu\right)}{2 \left(1 + \frac{1}{\nu}\right) \Gamma(\nu^{-1}) \lambda} \quad (2)$$

$$\lambda = \left(\frac{\Gamma(1/\nu)}{2^{2/\nu} \Gamma(3/\nu)}\right)^{\frac{1}{2}} \quad (3)$$

According to Basle II, Value-at-Risk represents the expected loss with 99% confidence level and 10 days horizon. In this paper, VaR was estimated for 250 days as Basel recommends, and also for 500 days. For example, in the first case from the total number of 2,509 observations, 2,259 were used to estimate the GARCH parameters and then using a one step ahead rolling window to forecast the VaR for the next day obtaining 250 daily VaR estimates.

After estimating standard GARCH(1,1), GJR(1,1,1) and EGARCH(1,1,1) models for the three distributions mentioned above for a sample of 2,259 observations, I have found significant parameters for the standard GARCH model for all the distributions proposed here, for the GJR and the EGARCH models the parameters were significant under the normal and GED distribution. For the second sample with 2009 observations the relevant models are the same as for the first sample except the EGARCH model where the parameters are significant only for the normal distributions. The GARCH models performance in volatility forecasting was tested with indicators such as RMSE (Root Mean Squared Error), MAE (Mean Absolute Error), MAPE (Mean Absolute Percent Error) and Theil's U statistic (see table 2). We can observe from table 2 that the models with GED and Student-t distributions for the return shocks perform better in volatility forecasting. For

instance, under RMSE criteria for the first sample with 250 observations, the lowest values for this indicator are recorded for the EGARCH(1,1,1) model with GED distribution – 0.014077, followed by the GJR(1,1,1) and GARCH(1,1) models with GED distribution – 0.014085. The superiority of the GARCH models with leptokurtic distributions over the models with the normal distribution for the return shocks can be observed also for the MAE and MAPE criterion.

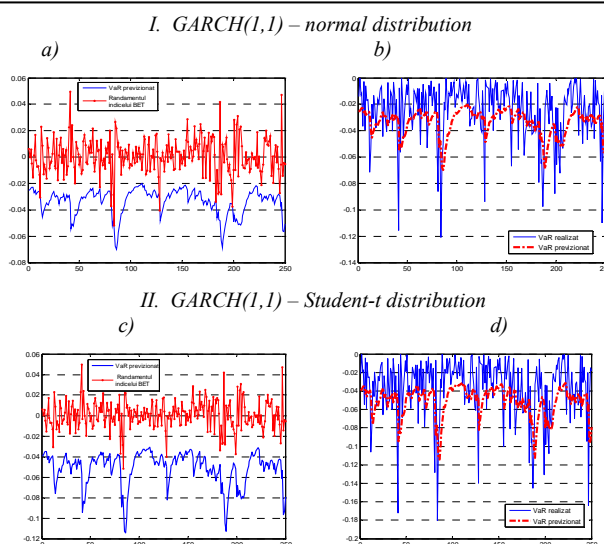
The GARCH models performance in volatility forecasting

Table 2

Model	Sample of 250 observations	Sample of 500 observations	MAPE	Theil U	RMSE	MAE	MAPE	Theil U
	RMSE	MAE						
GARCH(1,1)N	0.014118	0.010646	214.6731	0.818915	0.013877	0.010572	301.6314	0.807227
GARCH(1,1)T	0.014086	0.010632	195.5089	0.832568	0.013849	0.010538	280.0294	0.820233
GARCH(1,1)GED	0.014085	0.010632	193.0624	0.833911	0.013849	0.010536	277.9166	0.821394
GJR((1,1,1)N	0.014120	0.010646	210.5397	0.819887	0.013881	0.010569	299.5725	0.808131
GJR(1,1,1)GED*	0.014085	0.010633	190.6895	0.835041	0.013848	0.010534	275.6610	0.822645
EGARCH(1,1,1)N	0.014116	0.010644	206.7184	0.821996	0.013879	0.010564	296.4848	0.809892
EGARCH(1,1,1)GED**	0.014077	0.010630	186.0253	0.839039	-	-	-	-

The volatility forecast for the next 250 days and 500 days respectively was used to estimate VaR measures. In practice, the complexity of the implementation of the VaR models consist in an appropriate model selection, considering the fact that different methodology can lead to different results. Kupiec (1995), Christofferson (1998, 2001, 2004), Sarma (2003), Lopez (1999) proposed some methods for VaR evaluation. Thus, it is necessary to apply some backtesting methods for VaR models forecasting accuracy. Therefore, it must be systematically verified whether the forecasted loss is close to the actual one. A VaR measure of 100.000 RON for 99% significant level indicates that the probability of a portfolio to record a loss higher than 100.000 RON is 1%. If the actual loss is higher than the estimated loss (VaR), then we have an exception. It is important to know the optimal number of exceptions that can be accepted for a VaR model to be robust.

Figure 2 illustrates the BET index returns and the forecasted VaR for the normal distributed shocks (plot a) and for Student-t distributed shocks (plot c). The same figure also shows the realized VaR (the proxy used for this measure was the daily squared returns) and the forecasted VaR (plots b and d). It can be observe from the plot c that under the Student-t distribution there are no exceptions which imply a higher capital retained by the banks for prudential reasons.



**Figure 2.** VaR estimation

#### 4. Backtesting VaR models

The backtesting methods can be classified as: *statistical tests* (unconditional coverage test – Kupiec, 1995, conditional coverage test – Christofferson, 1998) and *loss functions* proposed by Lopez (1999, 2000), Sarma (2003), Angelidis and Degiannakis (2007).

The Kupiec's test is based on the fact that the ratio ( $\alpha = x/N$ ) between the number of exceptions and the number of forecasted VaR measures (250 and 500 respectively) must be close to 0.01 (if the level of significance for the VaR computation is 99%). If the ratio is higher than 1%, then the reported VaR measure systematically understates the portfolio risk, in the opposite case the risk is overestimated. This test is based on the binomial distribution with a sample 250 observations and the null hypothesis  $\alpha = 0.01$ . The Likelihood Ratio in this context has the following form:

$$LR_{uc} = 2 [\ln(\alpha^x (1 - \alpha)^{250-x}) - \ln(0.01^x * 0.99^{250-x})] \quad (4)$$

This test is asymptotically Chi squared distributed with one degree of freedom.

Christofferson (1998) proposed another test for VaR evaluation taking into account the unconditional coverage property and also the independence property, using the indicator function  $I_t$ , which takes the value 1, if there is an exception at day  $t$  and 0 otherwise.

$$I_t = \begin{cases} 1, & \text{if } RBET_t < VaR_t \\ 0, & \text{if } RBET_t \geq VaR_t \end{cases} \quad (5)$$

The independence property of the test assumes that the exceptions are independent events. The likelihood function for the independence test has the following form:  $LR_{ind} = 2 \ln(L_A - L_0)$ , where:

$$L_A = (1 - \pi_{01})^{T_{00}} \pi_{01}^{T_{01}} (1 - \pi_{11})^{T_{10}} \pi_{11}^{T_{11}} \tag{6}$$

$$L_0 = (1 - \pi)^{T_{00} + T_{10}} \pi^{T_{10} + T_{11}} \tag{7}$$

The  $T_{ij}$  terms represents the number of observations in state  $j$  after being in state  $i$  and  $\pi_{01} = T_{01}/(T_{00}+T_{01})$ ,  $\pi_{11} = T_{11}/(T_{10}+T_{11})$ ,  $\pi = (T_{01}+T_{11})/250$ .

Christofferson proposed a conditional coverage joint test under the null hypothesis  $\bar{\alpha} = 0.01$  and  $\pi_{01} = \pi_{11} = \pi$ , which is the sum of the likelihood ratio of the unconditional coverage and the likelihood ratio of the independence ( $LR_{cc} = LR_{uc} + LR_{ind}$ ). This test is asymptotically Chi squared distributed with two degree of freedom.

In this paper, I used the Kupiec's test and Christofferson's test for the samples of the VaR forecasts. Table 3 illustrates the estimated values for the likelihood ratios for the GARCH models considered above. As it was mentioned earlier the conditional and unconditional test are asymptotically Chi squared distributed and their critical values are relevant for very large samples. Our samples have 250 observations and 500 observations respectively, so the theoretical critical values may not be reliable for our small samples. Therefore, more relevant critical values were simulated for small samples approximating the distribution for the  $LR_{cc}$ ,  $LR_{uc}$  and  $LR_{ind}$  with 10,000 draws (table 4).

Under the finite sample critical values obtained by Monte Carlo simulations we do not reject the null hypothesis and so the GARCH models for the 250 observations sample can be considered appropriate. For the second sample of 500 observations we reject the null hypothesis for the unconditional test in the case of GARCH(1,1) with Student-t distribution. In addition, Kupiec established some non-rejection intervals for the number of exceptions which are [1,6] for the sample of 250 observations and [2,9] for the sample of 500 observations. Under this considerations, the GARCH(1,1) model with Student-t distributions is again considered inappropriate for VaR estimation because the numbers of exceptions equals 0.

**Kupiec's and Christofferson's test**

Table 3

$\alpha = 0.01$	T = 250 observations			T = 500 observations		
	LRcc	LRuc	LRind	LRcc	LRuc	LRind
GARCH(1,1)N	2.1617	1.9568	0.2049	0.3359	0.1899	0.146
GARCH(1,1)T	NA	5.0252	NA	NA	10.0503	NA
GARCH(1,1)GED	1.1846	1.1765	0.0081	2.3691	2.353	0.0161
GJR(1,1,1)N	2.1617	1.9568	0.2049	0.3359	0.1899	0.1460
GJR(1,1,1)GED*	0.1408	0.1084	0.0324	0.9794	0.9431	0.0363
EGARCH(1,1,1)N	0.1681	0.0949	0.0732	0.9794	0.9431	0.0363
EGARCH(1,1,1)GED**	1.1846	1.1765	0.0081	-	-	-

**The critical values**

Table 4

	T=250			T=500		
	LRcc	LRuc	LRind	LRcc	LRuc	LRind
1%	5.9785	5.4970	4.1070	6.8482	7.1107	4.4799
5%	3.8517	5.0252	0.2963	4.8174	4.8134	0.5914

The second approach refers to the constructions of some loss functions for VaR evaluation. Lopez (1999) proposed three loss functions: a) a loss function implied by the binomial method; b) a "zone" loss function, which reflects the current backtesting pattern proposed by the Basle Committee; and c) a loss function that addresses the magnitude of the exceptions. In this paper I used functions a) and c), where the loss function implied by the binomial method has indicator function (such as the one in Christofferson test) and the function that addresses the magnitude of the exceptions has the form:

$$C_t = \begin{cases} 1 + (\text{RBET}_t - \text{VaR}_t)^2, & \text{if } \text{RBET}_t < \text{VaR}_t \\ 0, & \text{if } \text{RBET}_t \geq \text{VaR}_t \end{cases} \quad (8)$$

Angelidis and Degiannakis (2006) proposed loss functions that are based on Expected Shortfall,  $E(X | X \leq \text{VaR})$ . In 1997, Artzner et al. explain that VaR does not have the subadditivity property which means that the VaR of a portfolio can be higher than the sum of the individual VaR of the portfolio components. For this reason, Artzner proposes Expected Shortfall as an alternative risk measure (the expected value of all losses in excess of VaR) which has the subadditivity property. The loss functions introduced by Angelidis and Degiannakis have the following form:

$$C_t = \begin{cases} (\text{RBET}_t - \text{ES}_t)^2, & \text{if } \text{RBET}_t < \text{VaR}_t \\ 0, & \text{if } \text{RBET}_t \geq \text{VaR}_t \end{cases} \quad (9)$$

$$C_t = \begin{cases} |\text{RBET}_t - \text{VaR}_t|, & \text{if } \text{RBET}_t < \text{VaR}_t \\ 0, & \text{if } \text{RBET}_t \geq \text{VaR}_t \end{cases} \quad (10)$$

According to Lopez, a risk model is better than another if the sum of the values of a loss function,  $C = \sum_{t=1}^{250} C_t$ , is smaller. In this paper, it was used loss functions proposed by

Lopez (table 5), but also loss functions proposed by Angelidis and Degiannakis (table 6). The GARCH(1,1) model with Student-t distribution was removed from our analysis because it was rejected by the Kupiec test.

Table 5 illustrates the loss function implied by the binomial method and the loss function that addresses the magnitude of the exceptions. With the binomial method the lowest value for the loss function is obtained by the GARCH(1,1) and EGARCH(1,1,1) with GED distribution. It can be observed that the loss function has the same value within the binomial method for different GARCH models such as: GARCH(1,1)N and GJR(1,1,1)N with 250 and 500 observations; GARCH(1,1)GED and EGARCH(1,1,1)GED with 250 observations; GJR(1,1,1)GED and EGARCH(1,1,1)N with 500 observations. Further more, using the magnitude loss function we can make a distinction between the accuracy of the GARCH models. For the 250 observations sample, the magnitude loss function has the smallest value for the EGARCH(1,1,1)GED, followed by the GARCH(1,1)GED and by the GJR(1,1,1)GED model. For the 500 observations sample, I found the GARCH(1,1)GED model as being the most accurate, followed by GJR(1,1,1) with GED distribution.

#### The Lopez's loss functions

Table 5

Model	T = 250	T = 500	T=250	T=500
	Binomial method		Magnitude loss function	
GARCH(1,1)N	5	6	5+1.2679*10 <sup>-4</sup>	6+4.0892*10 <sup>-4</sup>
GARCH(1,1)GED	1	2	1+0.1855*10 <sup>-4</sup>	2+1.3001*10 <sup>-4</sup>
GJR((1,1,1)N	5	6	5+1.2828*10 <sup>-4</sup>	6+3.4180*10 <sup>-4</sup>
GJR(1,1,1)GED*	2	3	2+0.1731*10 <sup>-4</sup>	3+0.7690*10 <sup>-4</sup>
EGARCH(1,1,1)N	3	3	3+0.6674*10 <sup>-4</sup>	3+2.6886*10 <sup>-4</sup>
EGARCH(1,1,1)GED**	1	-	1+0.0219*10 <sup>-4</sup>	-



To quantify the Expected Shortfall (ES), I used the Accept-Reject Algorithm for simulating the tail of the distributions. The ES was estimated running 5000 draws from the tails and determining their mean,  $E(X | X \leq VaR)$ . The Accept-Reject Algorithm (John von Neumann, 1951) represents a technique for generating random variables. It can be used to generate random variables from a desired distribution (but hard to simulate),  $f(x)$ , by applying another distribution  $g(x)$  easy to simulate. The latter distribution is also known as instrumental distribution and it must satisfy the restriction  $f(x) < M g(x)$ , with  $M > 1$ . Table 6 presents the results obtained after applying the loss functions proposed by Angelidis and Degiannakis, where  $C^2$  represents  $C_t = (RBET_t - ES_t)^2$  and  $Cabs$  is  $C_t = |RBET_t - ES_t|$ . Figure 3 depicts some of tails used for ES estimation. It can be noted that the function  $C^2$  take low values for GARCH(1,1)GED, GARCH(1,1,1)N and GARCH(1,1)N when the sample size is 250. For a sample size of 500, the order is GARCH(1,1)GED, GJR(1,1)GED and EGARCH(1,1,1)N. In the case of the Cabs function, GARCH(1,1)GED, EGARCH(1,1,1)N și EGARCH(1,1)GED present low values when the sample size is 250 and for the other sample size we observe in top three the same models as for  $C^2$ .

The loss function based on the expected shortfall

Table 6

Model	T = 250			T = 500		
	$C^2 * 10^7$	$Cabs * 10^5$	ES	$C^2 * 10^7$	$Cabs * 10^5$	ES
GARCH(1,1)N	1.8017	5.2998	-0.041468	3.6911	5.0627	-0.04203
GARCH(1,1)GED	0.4673	1.3955	-0.042786	0.3646	1.0267	-0.04448
GJR(1,1,1)N	2.0825	6.0081	-0.042445	2.8551	4.9145	-0.04279
GJR(1,1,1)GED*	2.2244	4.1963	-0.044242	1.6209	2.8123	-0.04507
EGARCH(1,1,1)N	1.0004	2.7413	-0.038544	1.6542	2.3003	-0.03841
EGARCH(1,1,1)GED	1.9739	2.8197	-0.047412	-	-	-

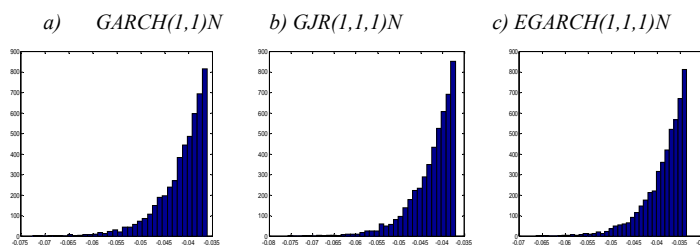


Figure 3. Simulated tails used for expected shortfall estimation

### 5. Conclusions

The European Union regulators allow banks to implement their internal models for risk measurement and capital adequacy. In Romania, according to the Financial Stability Report elaborated by the National Bank of Romania (2006), the banking sector remains the main component of the financial system (83.8% from the total financial assets). Therefore, Romanian financial institutions and the NBR are the main players interested in the implementation and the validation of the internal models. This paper discussed VaR computations using univariate GARCH models, i.e. GARCH(1,1), GJR(1,1,1) and EGARCH(1,1,1) with normal, Student-t and GED distributions. Each model was validated through backtesting applying statistical tests and loss functions.

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# STOCHASTIC VOLATILITY MODELS AND STYLIZED FACTS

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**Abstract.** *This paper highlights the ability of the discrete stochastic volatility models to predict some important properties of the data, i.e. leptokurtic distribution of the returns, slowly decaying autocorrelation function of squared returns and the Taylor effect. Although, there are many methods proposed for stochastic volatility model estimation, in this paper Markov Chain Monte Carlo techniques were considered. It was found that the existent specifications in the stochastic volatility literature are consistent with the empirical properties of the data. Thus, from this point of view the discrete stochastic volatility models are reliable tools for volatility estimation.*

**Key words:** stochastic volatility; stylized facts; Markov Chain Monte Carlo.

**Clasificare REL:** 10 B, 10 J

## 1. Introduction

Stochastic volatility (SV) models find many financial applications, such as volatility estimation and forecasting, option pricing, asset allocation, and risk management. They are also considered in the literature as an alternative to ARCH-type models, introduced by Engle (1982). Although, the improvement of stochastic volatility models corresponds in time with the ARCH-type models, the former models are less popular in the empirical literature because of their complexity and difficulty of estimation. After the seminal work of Jacquier, Polson and Rossi (1994), who perform fully Bayesian inference through Markov Chain Monte Carlo scheme, a vast literature on the Bayesian analysis of SV models have appeared.

In this paper, it is investigated the ability of the stochastic volatility models to capture some important properties of the data, i.e. the so called stylized facts. If they do not predict this properties, their usefulness in volatility estimation and prediction is questionable. The stylized facts considered here are: leptokurtic distribution, slow decaying autocorrelation function and the Taylor effect.

## 2. Stochastic volatility models

In the theoretical finance literature, the SV model is often formulated in terms of stochastic differential equation of the form:

$$\begin{cases} ds(t) = \sigma(t) \cdot dB_1(t) \\ d \ln \sigma^2(t) = \alpha + \beta \cdot \ln \sigma^2(t) \cdot dt + \eta \cdot dB_2(t) \end{cases} \quad (1)$$

where  $s(t)$  represents the logarithm of the asset price,  $\sigma^2(t)$  the volatility of the asset return,  $B_1(t)$  and  $B_2(t)$  are two Brownian motions which can be independent or not.

In the empirical literature the above continuous time model is discretized via Euler–Maruyama approximation. Using the notations  $s(t+1) - s(t) = y(t)$ ,  $B_1(t+1) - B_1(t) = u_t$ ,  $B_2(t+1) - B_2(t) = v_t$ ,  $1 + \beta = \varphi$ ,  $\ln \sigma^2(t) = h_t$  and  $\mu = \alpha(1 + \varphi)$  the SV model becomes:

$$\begin{cases} y_t = \sigma_t \cdot u_t = \exp(h_t / 2) \cdot u_t \\ h_{t+1} = \mu + \varphi \cdot (h_t - \mu) + \eta \cdot v_t \end{cases} \quad (2)$$

where  $y_t$  is the asset return at the moment  $t$ ,  $h_t$  is the log-volatility of the return,  $\phi$  the persistence parameter,  $\eta$  is the standard deviation of the log-volatility process,  $u_t$  and  $v_t$  are the return shock and volatility shock respectively. If the two shocks are non-correlated and i.i.d. and  $v_t$  is standard normal distributed then we will denote this as the *standard SV model*. If it is also assumed that  $u_t \sim \text{i.i.d. } N(0,1)$  then the basic SV model is also known in the literature as *lognormal SV model*. Changing the specification for the return error distribution and considering  $u_t \sim t[\text{df}]$  yields a second model denoted here as *t SV model*. If we consider that the error terms from the discrete model are also correlated ( $\text{corr}(u_t, v_t) = \rho$ ), then the model (2) becomes an *asymmetric SV model*.

### 3. Model estimation and comparison

The stochastic volatility models were estimated in this paper by means of Bayesian inference using Markov Chain Monte Carlo methods (MCMC), originated in the statistical physics literature. MCMC algorithms such as *Metropolis algorithm* (Metropolis et al., 1953), *Metropolis-Hastings algorithm* (Hastings, 1970), *Gibbs sampling* (Geman, Geman, 1984) and *Independence sampler* (Tierney, 1994) are a class of algorithms for sampling from probability distributions based on constructing a Markov chain that has the desired distribution as its stationary distribution. The state of the chain after a large number of steps is then used as a sample from the desired distribution.

Of course, this is not the only method that someone can use to estimate the SV models. In the literature, there are some other proposals, such as: Generalized Method of Moments (Melino, Turnbull (1990), Sorenson, 2000); Quasi – Maximum Likelihood (Harvey, 1994); Efficient Method of Moments (Gallant, 1997); Simulated Maximum Likelihood (Danielsson, 1994, Sandmann, Koopman, 1998).

Markov Chain Monte Carlo procedures for the SV models have been first suggested by Jacquier, Polson and Rossi (1994). They proposed a single mover algorithm which proved to have some drawbacks such as slow convergence, a highly dependent consecutive states and inefficient mixing. To improve the simulation efficiency Shephard and Pitt (1997), Kim, Shephard and Chib (1998), Chib, Nardari and Shephard (1998), Liesenfeld and Richard (2006) and Gerlach and Tuyl (2006) proposed multi-mover algorithms that sample the latent volatility vector in a single block.

I had two reasons for choosing MCMC techniques. First, among all the above methods, MCMC ranks as one as the best estimation tools (see for example, Andersen, Chung and Sorenson (1999)), and second, Bayesian analysis of stochastic volatility models can be easily implemented using WinBUGS (Bayesian Analysis Using Gibbs Sampling for Windows).

The Bayesian approach involves the specification of the full probability model, that is the specification of the *likelihood*,  $p(y|\theta)$ , and the *prior distribution* for the parameters,  $p(\theta)$ . The likelihood represents the probability of the data,  $y = (y_1, y_2, \dots, y_n)$ , given the parameters,  $\theta = (\mu, \phi, \eta, \rho, v, h)$  where  $h = (h_1, h_2, \dots, h_n)$ , and the prior distribution represents the prior knowledge about the parameter distribution. Having the likelihood and the priors one can calculate the joint probability distribution,  $p(y, \theta)$ :

$$p(y, \theta) = p(\theta) \cdot p(y|\theta)$$

After observing the data, Bayes theorem is used to determine the joint *posterior distribution* of the parameters,  $p(\theta | y)$ :

$$p(\theta | y) = \frac{p(\theta) \cdot p(y|\theta)}{\int p(\theta) \cdot p(y|\theta) d\theta} \propto p(\theta) \cdot p(y|\theta) \quad (3)$$

The high-dimensional integral can be interpreted as the normalizing constant that makes the area under the posterior distribution to be one. It is common in the Bayesian

statistics to ignore the normalizing constant and to write the posterior as a proportional distribution to the product of the joint prior distribution and likelihood.

As priors I used very common distributions from the empirical literature (Kim, Shephard and Chib (1998), Meyer et al.(2000), Yu (2004)):  $\mu \sim N(0, 25)$ ,  $\phi^* \sim Beta(20, 1.5)$ ,  $\varphi = 2\phi^*-1$ ,  $\eta^2 \sim InverseGamma(2.5, 0.025)$ ,  $\rho \sim Uniform(-1, 1)$  and  $\psi \sim N(0, 25)$ .

In this paper for model selection it was used the Deviance Information Criterion (DIC) that was proposed by Spiegelhalter, Best, Carlin and Linde (2002). DIC is a generalization of Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), also known as Schwartz Criterion, and can be computed in WinBUGS for many models, including stochastic volatility models.

#### 4. Data and stylized facts

To test whether the stochastic volatility models predict the leptokurtic distributions of the returns, the slowly decaying autocorrelation function of the squared returns and the Taylor effect, I used seven exchange rates (CHF/RON, EUR/RON, GBP/RON, JPY/RON, NOK/RON, SEK/RON, USD/RON) from 4 January 2000 to 4 June 2007 and five indices (BET-C, CAC-40, DAX, FTSE-100, MIB-30) from 4 January 2000 to 4 April 2007.

##### Summary statistics

###### a. exchange rates

Table 1

	CHF/RON	EUR/RO N	GBP/RON	JPY/RO N	NOK/RO N	SEK/RO N	USD/RON
Skewness	0.206333	0.241668	-0.063077	0.073039	0.078485	0.259145	-0.317956
Kurtosis	8.007229	9.164532	8.523430	5.949496	6.203464	8.779745	10.71887
ACF(1)	0.132	0.137	0.151	0.095	0.188	0.155	0.174
Jarque-Bera	1987.858	3011.011	2403.780	686.7681	810.0873	2651.833	4723.850
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

###### b. indices

	BET-C	CAC-40	DAX	FTSE-100	MIB-30
Skewness	-0.390028	0.032458	0.077256	-0.071905	-0.130834
Kurtosis	13.02025	6.073581	5.741223	6.172357	6.930179
ACF(1)	0.37	0.195	0.251	0.163	0.168
Jarque-Bera	7841.211	733.6428	585.1510	782.8117	1204.334
Probability	0.000000	0.000000	0.000000	0.000000	0.000000

Summary statistics for this time series are reported in table 1. For all time series considered here, the null hypothesis for the Jarque-Bera test is rejected and also they reveal high levels for kurtosis, i.e. their distributions are leptokurtic. Among the classical summary statistics, table 1 also reports the autocorrelation function at the first lag, ACF(1). To show that the time series used in this paper also have the property of slow decaying autocorrelation function and the Taylor effect, the autocorrelation functions for squared returns and for absolute returns are illustrated in figure 1. For JPY/RON, GBP/RON and NOK/RON series, the autocorrelation function for squared returns and for absolute returns are overlapping and it is not clear whether they share the Taylor effect property.

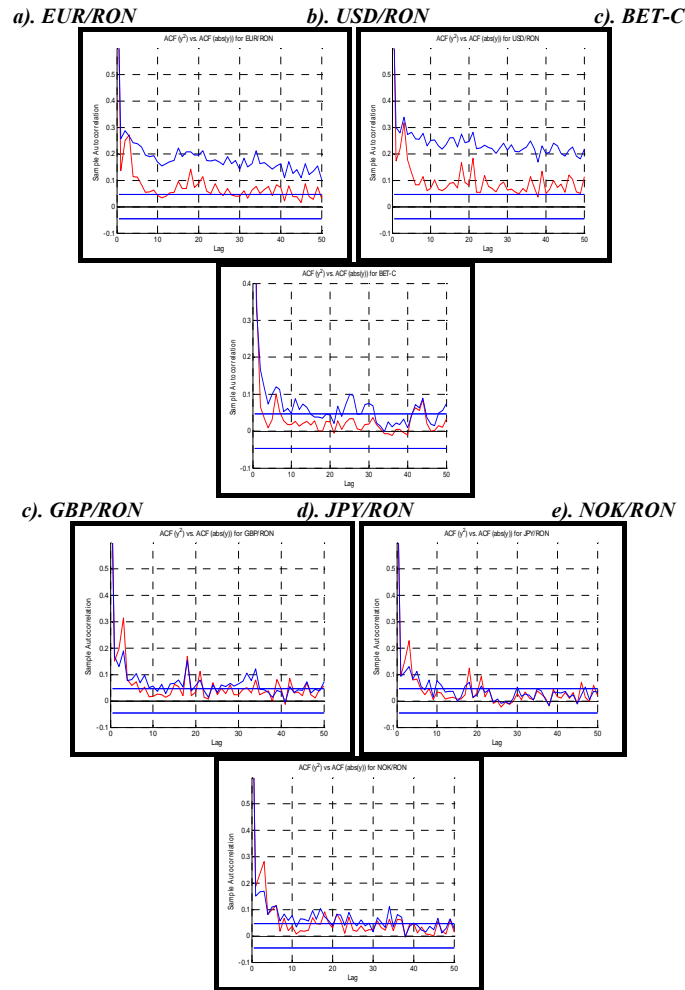


Figure 1.  $ACF(y^2)$  vs.  $ACF(|y|)$

### 5. Stochastic volatility models and stylized facts

In this section we will analyze the ability of the SV models to capture adequately stylized facts: the leptokurtic distribution of returns and the slow decaying autocorrelation function of squared returns, and the Taylor effect. The first two stylized facts are analyzed together, because, as will be shown later, they are related. Specifically, the ACF of the squared returns depends on the kurtosis of the returns.

It can be shown that the SV model imply a theoretical relationship between the autocorrelation function and kurtosis ( $k$ ) that has the following form:

$$ACF(t) = \frac{\left[ \frac{k}{E(u_t^4)} \right]^{\varphi t} - 1}{k - 1} \tag{4}$$

Where  $E(u_t^4) = 3$  for the log-normal model, but  $E(u_t^4) = 3 \cdot \frac{v-2}{v-4}$  for the t-SV model ( $v$  represents the degrees of freedom). The ACF – kurtosis relation is depicted in figure 2, for the both models. In this figure, 12 points were also added, that represents the empirical ACF-kurtosis relation. It can be observed that the log-normal SV model can capture the empirical ACF-kurtosis for some time series if the persistence parameter ( $\varphi$ ) is about 0.7. This value for the persistence parameter is not relevant from an empirical perspective, in practice  $\varphi$  usually has values higher than 0.9.

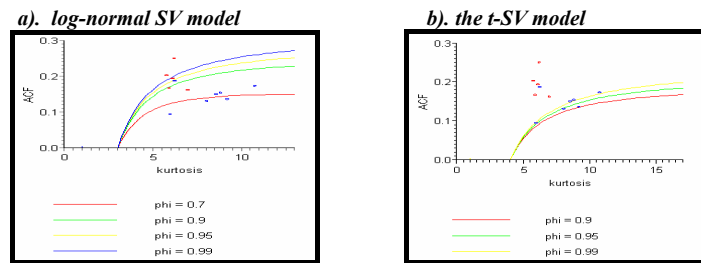


Figure 2. The theoretical relation between ACF(1) and kurtosis

This problem can be solved by using the t-SV model, which can capture the empirical ACF-kurtosis relation for more relevant values of the persistence parameter. This is due to the extra parameter that is the degree of freedom ( $v$ ). In the figure 2.b the theoretical ACF-kurtosis relation was plotted with a value of 10 for  $v$ . As  $v$  goes to infinity, the ACF-kurtosis relation for the t-SV model tends to the one implied by the log-normal SV model.

After examining 40 series of returns, Taylor (1986) observes that the sample autocorrelation of absolute returns seem to be larger than the sample autocorrelation of squares. Granger and Ding (1995), although they were the first who denote this empirical property of financial series as the “Taylor effect” their definition is more restrictive: if  $y_t$  is the series of returns and  $acf(\theta, k)$  represents the sample autocorrelation of the order  $k$  of  $|y_t|^\theta$  then the Taylor effect is defined as  $acf(1, k) > acf(\theta, k)$  for any  $\theta$  different from 1. This definition was based on the results found by Ding, Granger and Engle (1993) that the autocorrelations of the absolute returns raised to the power  $\theta$  are maximized when  $\theta$  is around one.

Following Harvey (1998), the autocorrelation function of  $|y_t|^\theta$  can be written as:

$$acf(\theta, \varphi, \eta, v, k) = \frac{\exp\left(\frac{\theta^2}{4} \cdot \sigma_h^2 \cdot \varphi^k\right) - 1}{\beta(\theta, v) \cdot \exp\left(\frac{\theta^2}{4} \cdot \sigma_h^2\right) - 1}, k > 1 \tag{5}$$

$$\beta(\theta, \nu) = \begin{cases} \frac{\Gamma\left(\theta + \frac{1}{2}\right) \cdot \Gamma\left(\frac{1}{2}\right)}{\left\{\Gamma\left(\frac{\theta+1}{2}\right)\right\}^2}, & u_t \sim N(0,1) \\ \frac{\Gamma\left(\theta + \frac{1}{2}\right) \cdot \Gamma\left(-\theta + \frac{1}{2}\right) \cdot \Gamma\left(\frac{1}{2}\right) \cdot \Gamma\left(\frac{\nu}{2}\right)}{\left\{\Gamma\left(\frac{\theta+1}{2}\right) \cdot \Gamma\left(\frac{\nu-\theta}{2}\right)\right\}^2}, & u_t \sim t(0,1,\nu) \end{cases} \quad (6)$$

where  $\sigma_{\eta}^2 = \frac{\eta^2}{1-\phi^2}$ , and  $\Gamma(\cdot)$  is the Gamma function. It is obvious from relation (5) that the autocorrelation function is a very complicated non-linear function, and we can not have an analytical expression for the value of  $\theta$  that maximize it. Figure 3 plots the autocorrelation function of order 1 for a standard deviation of the log-volatility ( $\eta$ ) set to 0.15 (which is empirically reasonable) and for different (and relevant) values of the persistence parameter ( $\phi$ ). Setting  $\nu$  to infinity means that we consider a normal distribution for the error of the returns. It is clear from this graphical representation that the higher the persistence parameter, the lower the value that maximizes the autocorrelation function. Furthermore, we can observe that parameter  $\theta$  is larger than 1 for low values of  $\phi$ , and tends toward 1 as  $\phi$  increase.

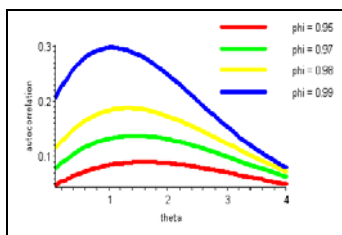


Figure 3.  $acf(\theta, \phi, 0.15, \infty, 1)$

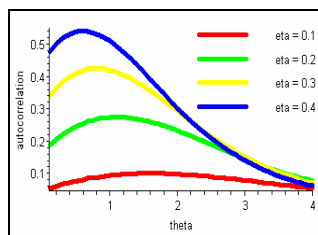


Figure 4.  $acf(\theta, 0.98, \eta, \infty, 1)$

It can be concluded from figure 4 that for a given persistence parameter value, the higher the standard deviation of the log-volatility ( $\eta$ ), the lower the value of the  $\theta$ , that maximize the  $acf(\cdot)$  function.

Figure 5.a illustrates the autocorrelation for one lag as a function of  $\phi$  and  $\eta$  for different values of  $\theta$  (1, 1.5, 2). For each value of  $\theta$ , we have a different surface. For low values of the parameters  $\eta$  and  $\phi$ , the three surfaces are very close one to another, but the surface for  $\theta = 2$  imply a higher value for the autocorrelation function (which means that the Taylor effect is rejected). The higher the  $\phi$  and  $\eta$ , the higher the distance between the surfaces and also the relation  $acf(\theta = 1) > acf(\theta = 1.5) > acf(\theta = 2)$  is satisfied, i.e. the Taylor effect. Figure 5.b represents a bidimensional representation of the figure 5.b ignoring the vertical axis, but includes the empirical  $\eta$ - $\phi$  combinations.



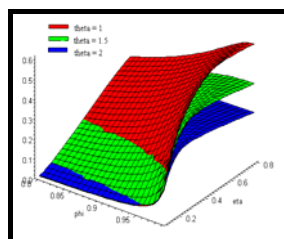
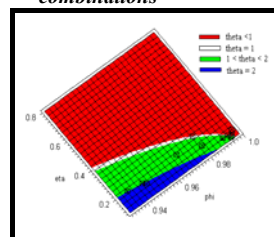
a. The theoretical  $\varphi - \eta$  combinationsb. The theoretical and empirical  $\varphi - \eta$  combinations

Figure 5. The  $\varphi - \eta$  combinations for the log-normal model consistent with the Taylor effect

It is obvious that the SV model captures very well this effect, because the empirical  $\varphi - \eta$  combinations are located on the regions where the model sustain the Taylor effect. The three points situated on the frontier between rejection and non-rejection of the effect corresponds to JPY/RON, NOK/RON and GBP/RON time series, the same for that we could not found clear evidence to support the Taylor effect.

## 6. Conclusions

This paper, analyze the ability of the discrete stochastic volatility models to capture three stylized facts: leptokurtic distribution of the returns, slowly decaying autocorrelation function and the Taylor effect. Comparing the theoretical autocorrelation – kurtosis relation with the empirical one, it was observed that the lognormal SV model for a given autocorrelation the theoretical kurtosis is not enough to capture the high excess kurtosis observed empirically. This problem was solved by imposing a fatter – tail distribution (here the Student-t distribution) for the return shocks. Therefore, the t-SV model (stochastic volatility model with Student distributed return shocks), captures more adequately slowly decaying autocorrelation function and excess kurtosis simultaneously, for empirically relevant values for the persistence parameter. The paper also demonstrates the ability of the log-normal SV models to predict Taylor effect, which proves the utility of these models for volatility estimation and forecasting.

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# THE IMPACT OF FINANCIAL STATEMENTS ANNOUNCEMENTS ON STOCK PRICES AT BSE

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***Abstract.** Conceived as an empirical study, the paper investigates investors' behavior as a reaction to the publication of financial statements by the main companies listed on Bucharest Stock Exchange (B.S.E.). Starting from the general framework of an event study analysis (ESA), the empirical research is doubled by two personal contributions to the ESA methodology represented by a parameters' generalization module and one for optimizing internal variables. This modified methodology was run using personally-developed software (EvStud1.1), the main conclusion, inferred from a sample of 313 events, being the significant impact of financial statements' publication on stock prices.*

**Key words:** stock market; event study analysis; empirical research; informational efficiency; optimization.

**REL Classification:** 10B

## **1. Introduction**

A company listed on the stock market experiences a series of advantages related especially to a relatively cheap positive advertising, a continuous valuation made by the market or preferentially access to financial capitals. Supplementary, the company has some obligations to fulfill towards the operator of that stock market. Indifferently of different particularities of the contemporary stock markets around the globe, the concept of transparency of the issuer is found in the regulatory packages dealing with the issuer's responsibilities towards the investors. The essential part of the transparency concept is represented by the issuer obligation of furnishing relevant data regarding its economic and financial activity.

While the domestic laws in this field kept changing<sup>(1)</sup>, within this obligations of the issuers was situated with priority the signaling of every significant event related to the issuer activity carrying an impact upon its economic coordinates: important contracts with major clients, new working spaces, activity reduction, mortgage contracts or other real warranties which represents a certain value (over 20% from the issuers total assets) or changes in the management, significant conflicts between the unions and the executive managers. Apart from these events, somehow with an occasionally character, beginning with the year 2004, the companies listed on the Bucharest Stock Exchange (BSE) communicates to the investors the so-called financial calendar, that is they indicate the date on which their quarterly and annually financial statements will be made public. After each semester some more complex reports are communicated also. Generally, this financial calendar is send to the specialized bureau of BSE during the first month of the year or sometimes in February.

Considering the fact that these reports are made on a regulate basis and that their releasing date is known in advance by the market, the publication of quarterly financial statements becomes a very important event in the life of a listed company. And that is because, depending on the dimension of the figures corresponding to the company turnover

or its profit, the share price will have a certain evolution on the stock market. In these conditions, the event is carefully managed both by the issuers (from their desire of presenting results as good as they can) and the active investors who, in the case in which their predictions are confirmed, can obtain an additional profit above the level corresponding to a naïve buy&hold strategy, the dimension of this profit being generally proportionally with the impact of that event on the market<sup>(2)</sup>.

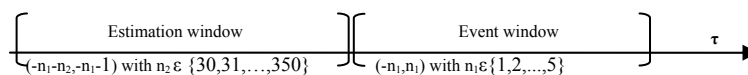
On the occasion of these kinds of events, significant profits can be made also by using privileged information because the quarterly financial statements arrive with a lag of two months at the investors' disposition and their finalizing process implies too many persons and days. We would expect though a certain discretion regarding the main figures from these financial statements, rather than their communication in private assembling before the release date and without being officially communicated to all investors.

## 2. Methodology

The main goal of this paper is the analysis of the impact of these reports of financial statements on the stock prices of the most important companies listed at BSE, analysis carried out in a period lying between January 2004 and August 2007 using the event study analysis methodology (ESA). In order to do this we started with an inventory of the public release date of these statements beginning with the year 2004, the main source being communicates sent by the issuers. Thus, the date on which the financial statements are made public is considered to be the event date or the critical moment on which the information penetrates the market. But in this aspect there are significant differences between the issuers because some of them communicate the financial statements after the closing of the trading day mentioned as release date, diminishing thus the attribute of critical for this date, while other issuers are communicating these statements before the opening of the trading day (for example OMV-Petrom).

For this reason but especially because we wished to analyze the impact of these results both before and after the date communicated to the stock exchange we used in this research an event window which includes apart from this date a symmetrical interval formed by  $2 \cdot n_1 + 1$  trading days,  $n_1$  anterior to the release date and  $n_1$  afterwards. Each value chosen for  $n_1$  leads to another set of results or even possibly other conclusions, in this context appearing the first contribution of this paper to the ESA methodology. More precisely, the problem of subjectivity in dimensioning the event window is solved by considering multiple choices for  $n_1$  (in our case 5<sup>(3)</sup>), followed by normal application of the ESA methodology and finally the evaluation of those results having in mind a certain conclusions convergence.

The definition of the  $n_1$  variable as a set of natural values ( $n_1 \in \{1, 2, \dots, 5\}$ ) solve only partially the problem of subjectivity in the parameterization of the ESA. A floatable event window indirectly implies a floatable estimating window determined by the left limit ( $-n_1$ ). Additionally, arises the question regarding what period of time should be considered when we estimate the parameters necessary to evaluate normal returns which, in other words, means that a new variable  $n_2$  must be considered. Generally, the selection of  $n_2$  is made considering the conflict between the case of using a relatively short period of time sustained by the possibility of isolating the local behavior of the stock price respectively the option for a longer period of time, necessary according to some authors, for the sedimentation of price evolution in a way in which it could induce a specific behavior to the price. We dealt with this problem in the same way by considering a set of values limited by a period of time considered minimal (30 days) and a maximal one (350 days) thus  $n_2 \in \{30, 31, \dots, 350\}$ . Graphically, the two variable  $n_1$  and  $n_2$  can be observed in the following figure.



The second contribution to the ESA methodology consists in the introduction of an optimization module for the parameters used to generate the normal returns. In this study we used in parallel two methods of estimating normal returns: the method of constant average return and the market model, both of them being the most frequently used in this situation<sup>(4)</sup>. More precisely, the object of optimization will be the average return and the two parameters alpha and beta from the market model, all of them computed over the estimation window, the objective being the minimization of the error's variance associated with each model. In our case, when the length of the event window is situated between 1 and 11 days, for each of these 5 cases, the 300 estimation windows will be formed resulting thus 300 averages, 300 alphas and 300 betas. The optimization module will select from all these parameters those which lead to minimum variances for the errors; in this way only the values which explain the best the price behavior are selected. Supplementary, it is needed a record of all the values of these parameters because somehow a triviality problem arise for this optimization.

Following these procedures, for each event there is an estimation needed for 4,500 parameters (=5x3x300) and for the whole research which contains 313 events 1,408,500 estimations are necessary (=313x4,500). This effort is relatively impossible if a “manually” approach is considered especially if we want to assure a certain research quality and, in these conditions, in order to overcome this computational effort we conceived and developed, using the C programming language, a software application (EvStud 1.1) which should automates the ESA methodology. This application tends to simplify the task<sup>(5)</sup> conferring to the research in the same time an extended generality and enlarging the potential fields of analysis by the possibility of studying phenomena like output (abnormal returns) sensitivity to variations of the estimation parameters (average, alpha, beta) or the study of redundancy related to an oversized event window.

Because this study did not differentiate between “good” and “bad” financial results (due to the subjectivity associated with such a decision) in order to test the informational effect of the publication of the results we will use a methodology which deals with squared abnormal returns<sup>(6)</sup>. The first step consists in calculating the square of the abnormal returns from the event window (it can be one or more) for each stock ( $RA_{j,t}$ ). The second step standardizes these squares by dividing them to the variance of abnormal returns from the estimation period of each event.

$$RA'_{j,t} = \frac{RA_{j,t}^2}{\sigma^2(RA_j)}$$

The average abnormal return at the t moment will be computed as an average of the standardized returns for each event which can coincide or not with a certain stock.

$$RAM'_t = \frac{1}{N} \times \sum_{j=1}^N RA'_{j,t}$$

A  $RA'_{j,t} > 1$  value indicates that the return is superior to the normal one respectively inferior if  $RA'_{j,t} < 1$ . The  $RA'_{j,t}$  variable is distributed according to a Fisher law of probability with 1 and T-2 degrees of freedom, where T represents the number of returns from the estimation period. For the average abnormal return,  $RAM'_t$ , a z statistics is used and it is described below:

$$z(RAM'_t) = \frac{\sum_{j=1}^N (RA'_{j,t} - 1)}{\sqrt{\sum_{j=1}^N 2 \times (T_j - 3) / (T_j - 6)}} \rightarrow N(0,1)$$

### 3. Data

For the carrying out of the research we chosen 18 of the most intensively traded stocks on the BSE because an acceptable liquidity represents an essential criterion for the estimation of both normal and abnormal returns. Of course, among these stocks there are the big caps but some relatively new listed companies especially via initial public offerings.

For all these issuers, an important difficulty was the identification of the communicates which contain the financial calendar because during a year an issuer sends tens or even hundreds of such communicates identified only through their publication date. But even more time consuming is the identification process of the changes of the data communicated initially because these modifications can arrive all along the year imposing in consequence a sequential search in the content of all communicates. It is worth mentioning that some companies (with perseverance Compa Sibiu) publish the dates of reporting the financial results not as a distinct day but as an interval consisting of 3 to 8 days making it thus more difficult the isolation of the event date but justifying the usage of an event windows.

In the case of the newly listed companies which do not have an acceptable trading history necessary for estimating the abnormal returns, and in this case we include Carpatica commercial bank (BCC), SSIF Broker (BRK) and Flamingo International (FLA), in order to test the impact of their first financial results reports we used as a solution: the return adjusted to the market model, which consists mainly in replacing the normal returns of the stock with the market returns here represented by the broader index of BSE, BET-C. More precisely, in the market model we have  $\alpha=0$  and  $\beta=1$ . Table number 1 contains the list of the acronyms associated with each of the 18 issuers, the beginning of the monitoring period and the number of the daily observations the last date being, for all stocks, 08/27/2007.

Another issue that must be stressed is the weak trading activity of some of these 18 stocks during certain periods, especially between 2000 and 2003, phenomenon manifested by few displayed orders for the stock and even by the absence of trades during a trading session. The problem of missing closing price is partially solved by adopting a reference price, which is the price of the last active day. If on an absolute level, of the price, this solution proves itself an acceptable one, we cannot consider likewise when we deal with the returns because they will be null during the whole inactivity period causing unwanted effects from the tendency of beta to move to zero to the formation of biased probability distribution for the returns. But it is important to emphasize that by choosing only the most "active" stocks these dysfunctions were at least minimized.

Description of the data used in the research

Table 1

Symbol	Start date	Nr. obs.	Symbol	Start date	Nr. obs.	Symbol	Start date	Nr. obs.
ALR	11.12.2000	1656	CMP	05.01.2001 18.07.2005	1644	PPL	06.01.2000	1896
ATB	06.01.2000	1896	FLA	(08.01.2001)	1643	SCD	05.01.2001	1644
AZO	06.01.2000 09.06.2004	1896	IMP	05.01.2001	1643	SNP	03.09.2001	1476
BCC	(8.01.2001)	1643	OIL	08.01.2001	1643	SRT	05.01.2000	1897
BRD	15.01.2001 03.02.2005	1638	OLT	05.01.2001	1643	TBM	22.01.2001	1633
BRK	(08.01.2001)	1643	PCL	05.01.2001	1644	TLV	05.01.2000	1897

For the 18 issuers we inventoried in the period January 2004 – August 2007 a total number of 313 report dates as they were extracted from the financial calendars send to the specialized compartment at BSE.

#### 4. Empirical results and conclusions

The results obtained after the software application was run are very diverse allowing, as we mentioned before, the development of a complex set of analysis. In the following sections we will present only the most important directions, stressing, in a manner which will allow a further practical usage, the main resulted conclusions.

##### 4.1 General results

After running the ESA methodology on the whole sample formed by the 313 reporting dates, the abnormal returns from table number 2 resulted, the value of the z statistic being also displayed with the probability of rejecting the null hypothesis,  $H_0: RAM_t=0$ . As we can easily observe,  $H_0$  is rejected for the whole event windows with a probability comfortably above 99%, as well for the constant mean return model and the market model.

As a consequence, the following conclusion results: the impact of the publication of the financial results upon the stock prices is a significant one and it is manifested both prior and after the publication date. Following this, the hypothesis of an informational efficient market, in the semi strong sense, is categorically rejected for the BSE.

**Squared average abnormal returns associated with the event window (the whole sample - 313 events)**

*Table 1*

Ziua t	Constant mean return			Market model		
	RAM <sub>t</sub>	z(RAM <sub>t</sub> )	Prob-H <sub>0</sub>	RAM <sub>t</sub>	z(RAM <sub>t</sub> )	Prob-H <sub>0</sub>
-5	1.8784	135.40	1.00	1.9207	141.93	1.00
-4	1.4652	71.71	1.00	1.8968	138.24	1.00
-3	1.6021	92.82	1.00	1.8843	136.32	1.00
-2	1.8301	127.97	1.00	1.9952	153.42	1.00
-1	1.2817	43.43	1.00	1.8140	125.48	1.00
0	1.7905	121.85	1.00	1.9999	154.14	1.00
1	2.6506	254.44	1.00	3.0753	319.91	1.00
2	2.2686	195.56	1.00	2.5558	239.82	1.00
3	1.8347	128.66	1.00	2.0202	157.27	1.00
4	1.7268	112.05	1.00	2.0940	168.65	1.00
5	2.1278	173.85	1.00	2.3816	212.97	1.00

Analyzing the level of the average returns (RAM<sub>t</sub>) it can be noticed that in both cases the +1 day from the event window, which is the first day following the publication date, exhibits the greatest value, 2.65 and 3.07, both of the levels exhibiting maximum values for the z statistic also. In a decreasing hierarchy, the +2 and +5 days follow as a sign of the persistence of the impact on the stock market. The high values obtained for RAM<sub>t</sub> can be attributed to a better identification of the abnormal returns respectively to a stronger differentiation of these from the return recorded in the event date. In the case of the constant mean model, the event date (day 0) does not seem to be a special one when compared to the others, recording a rather low abnormal average return of 1.72, phenomenon observed in the case of the market model also. It results thus that the issuer usually communicates their financial results after the closing of the trading session, postponing the impact for the following trading session.

#### 4.2 Results conditioned by the issuers

Running the application allowed us to carry on an analysis of the ESA results when each issuer is considered individually and thus we could identify some particularities of financial reporting related stock behavior. A first observation for these results was the reduction of the probability of rejection of  $H_0$  for certain days of the event window implying thus, that at an issuer level, the publication of the results have not a significant impact on the whole surrounding interval of the event date. A second observation relates to the fact that the  $RAM_t$  values resulted after using the two models of determining the normal returns (the constant mean model respectively the market model) tend to be very similar, but a superior quality associated with the market model is maintained. A third observation deals with the behavior of the abnormal returns variance when different days from the event window are considered, a direct relation being noticed between the level of the abnormal return for a day and the associated volatility. Yet, this result is not a very surprising one but stresses the fact that for these days significant departures from normality are recorded.

Adapting the number of examples to the length of this paper, we can punctuate that in the case of the Antibiotice Iași stock (ATB), significant abnormal returns are more frequent dominating the entire post-event period as well day -5. The surprise is that the highest level of departures from normal returns is recorded in day -2 which reflects an important anticipative behavior from the market concerning this stock. When compared with the other issuers, Carpatica commercial bank's stock (BCC) does not seem to be significantly affected by the publication of the financial results with the exception of a 3 day interval closing on the event date; in the rest of the event window the abnormal returns are recording low values, in some cases even the rejection of the null hypothesis being challenged (days -3 and +5).

In the case of BRD-GSG (BRD), the most significant impact is recorded in first following day after the publication of the financial statements, the effects maintaining themselves during day +2. Using the constant mean model, in the case of SSIF Broker (BRK) day -5, +4 and +5 appear to be highly abnormal the results suffering certain changes when the market model is used, changes due mostly to the use of the market adjusted model for assessing the normal returns. In this case, most of the days composing the event window exhibit highly intense behavior. For Compa Sibiu (CMP), the greatest impact is felt in the market exactly on the event date and somehow more reduced in day -2. For the company with the greatest market capitalization, Petrom (SNP), financial results tend to have a special importance managing to animate this stock on the whole post event period. We also noticed the existence of higher departures from the normal returns even in the event date because the issuer usually communicates its financials results before the opening of the trading session.

A special case is being represented by Transvania bank's stock (TLV) which exhibits the lowest abnormal returns within the event window which could mean that the publication of the financial results does not represent a significant surprise for the investors. What could be stressed is a higher volatility in the day preceding the event date but even here, the rejection of the null hypothesis is done with a probability of just 85%. We can conclude from these observations that the market for the TLV stock is exhibiting the highest level of informational efficiency in the semi-strong sense, its market anticipating relatively correctly the bank's financial results. But some additional details are required regarding this conclusion and firstly there is the possibility that information regarding the main financial figures to be reported could transpire in the market and the significant movements of the price, expected for the event date, to be realized prior. And



secondly, a greater volatility of the price may be the effect of other events gravitating in the period in which financial statements reports was scheduled. This hypothesis tend to verify especially in April-May when, along with the publication of the financial statements for the first quarter, the decisions taken by the shareholders regarding the distribution of last year profit are made also publicly. And the last ones tend to have a much heavier impact on the stock price.

#### *4.3 Results conditioned of financial reports type*

A natural question is if the quarter for which the financial report is made does not differently affect stock prices, especially in the case of the fourth quarter which is associated with the annual financial statements, statements which have superior informational content compared to the others quarters. On the other hand, it is possible that this annual financials will bring no additional information on the market because, before their communication with two-three months, the preliminary results, which represents, historically speaking, good approximations of the final statements are published. In consequence, we could state that there are at least two main factors which affect in opposite directions the level of the abnormal returns determined by the publication of the annual financial statements, the evolution of returns within the event window being the results of the action of these two forces.

Another important influencing factor is the general trend of the market in the moment in which the financial statements of the companies are published. Intuitively, when these reports are communicated during a bull market (or an upward trended market) it is very possible that relatively good financial results to have an amplified effect on the market, acting perfectly as an essential motivation for strengthening the buying decision regarding a stock. When the reported results are somehow below expectations it is possible that the enthusiasm existing in the market to attenuate this negative effect, the final result being again a combination of higher respectively lower abnormal returns as a normal situation would require. The market reacts in an analogue way when the main trend of it is downward but this time the effects of "good" financials statements is sub dimensioned while poor financials are leading to amplified stock price corrections.

In conclusion, the market trend can have a significant influence on the level of abnormal returns only when the research differentiate between financial results above expectations (qualified as good news) respectively below expectations (poor results). Because this study did not considered this differentiation (we remind that such delimitation are highly subjective, the real problem being what we understand by rational expectations regarding the financial results) we will not analyze very profoundly these influences but we will restrain our analysis for the abnormal returns associated to the preliminary results reports and those for the first quarter. We chosen these two categories because the preliminary annual results usually intervene during February and March months which were, at least between 2004 and 2007, the peak of upward tendencies at BSE while the reports for the first quarter intervene in April-May, a classical now correction period.

In order to answer to all these questions, we have restructured the ESA results forming five new samples of events associated with the five categories of financial reports: the first, the second, the third and the fourth quarter plus the annual preliminary results. The resulted data are presented in table number 3.

## The event study results – conditioned on the type of the financial report

Table 3

Ziua t	Trim I (65 even.)			Trim II (67 even.)			Trim III (50 even.)			Trim IV (65 even.)			Preliminat (66 even.)		
	RAM <sub>t</sub>	z	Pr.	RAM <sub>t</sub>	z	Pr.	RAM <sub>t</sub>	z	Pr.	RAM <sub>t</sub>	z	Pr.	RAM <sub>t</sub>	z	Pr.
-5	1.1980	1.11	0.87	1.3524	2.01	0.98	3.2035	10.78	1.00	2.2458	7.00	1.00	1.7165	4.06	1.00
-4	1.2297	1.29	0.90	1.1323	0.75	0.77	1.2327	1.14	0.87	2.0527	5.92	1.00	1.6325	3.58	1.00
-3	1.5325	2.99	1.00	1.0402	0.23	0.59	2.5793	7.72	1.00	0.7963	-1.14	0.13	2.2945	7.33	1.00
-2	1.5236	2.94	1.00	1.1272	0.72	0.77	2.5365	7.52	1.00	0.5694	-2.42	0.01	3.5521	14.46	1.00
-1	0.9137	-0.48	0.31	0.7243	-1.57	0.06	2.2240	5.99	1.00	1.3689	2.07	0.98	1.4103	2.32	0.99
0	1.6532	3.67	1.00	1.4376	2.49	0.99	3.6413	12.92	1.00	0.5650	-2.44	0.01	2.0887	6.17	1.00
1	1.7419	4.17	1.00	2.7343	9.87	1.00	5.7811	23.38	1.00	1.1544	0.87	0.81	2.5625	8.85	1.00
2	2.1239	6.31	1.00	1.7984	4.54	1.00	2.4870	7.27	1.00	2.9993	11.24	1.00	2.0033	5.68	1.00
3	2.2656	7.11	1.00	1.9671	5.50	1.00	1.3899	1.91	0.97	2.2480	7.01	1.00	1.2058	1.17	0.88
4	1.7173	4.03	1.00	1.1002	0.57	0.72	1.9724	4.76	1.00	1.8514	4.78	1.00	2.0638	6.03	1.00
5	2.0702	6.01	1.00	1.2443	1.39	0.92	2.1791	5.77	1.00	2.0340	5.81	1.00	3.1347	12.09	1.00

As we can observe from the above table, the highest abnormal returns are generated by the financial results associated with the third quarter followed by the preliminary results. Regarding this hierarchy we noticed the average abnormal return from day +1 of 5.78 (Q3) and 2.56 (preliminary results), the null hypothesis being rejected in both cases with a probability above 99.99%. Usually, November is the month during which the third quarter financial reports are communicated but it is also a month of price appreciations at BSE<sup>(8)</sup>, fact which can explain the level of the found abnormal returns.

The weakest influence is recorded for the financial statements associated to the second quarter because this report intervenes usually in August, a month with a turnover below the annual average. Consequently, an explanation for these weak influences associated with half-year financial statements could be a lower presence and activity of the investors during this time of the year. Regarding the abnormal returns determined by the financial statements of the first and fourth quarter of the year, both having the same magnitude, we could notice some significantly different from zero values in the whole post event period and in the case of the annually reports a higher volatility in days -5 and -4 which indicates the fact that these reports are seriously considered by the investors. It is also true that the publication of annually financial results is made usually after the ordinary and extraordinary shareholder's meetings fact which could imply some powerful influences through the decisions taken with such occasions, influences which can distort the effects induced by the publication of annually financial statements.

### Notes

<sup>(1)</sup> A current situation of the obligations held on the companies listed at the Bucharest Stock Exchange (BSE) can be found in the CNVM regulatory rule number /2006, chapter III (Reporting requirements), section 2, article 113, published in the O.M. nr. 312/06.04.2006.

<sup>(2)</sup> Especially for this purpose, some "active" investors are behaving somehow "unhealthy" (in our opinion) within the trading session right away after a stock is traded after being

suspended for the financial statements publication. And by unhealthy we meant inducing an artificially created hysteria state by posting and/or executing market orders, sometimes with huge amount of shares, but rapidly modifying these orders from an evident fear.

- <sup>(3)</sup> Of course, in the case of an informational inefficient market considering  $n_1 > 0$  is justified but still, the manifestations of these inefficiency can be reasonably restrained within a period of 11 days centered in the event date.
- <sup>(4)</sup> A comparative analysis regarding statistical characteristics of these two models was rigorously developed in Campbell, J.Y., Lo A.W, MacKinlay A.C., - "The Econometrics of Financial Markets", Princeton University Press, New Jersey, 1996 .
- <sup>(5)</sup> Using a significant number of functions, the software still requires a significant execution time especially because of the over solicitation of the memory stack determined by constant appeals of the functions' codes. Thus, depending on the number of the parameters and the length of the report which must be generated, the execution of the operations for a stock which contains 19 events can take between 1 minute 50 seconds and 24 minutes for a 0.9 GHz processor.
- <sup>(6)</sup> Beaver (1968) (see References [2]); the methodology has been used on the Romanian market also, see Todea A., - „The Informational Efficiency of Capital Markets”, Editura Casa Cărții de Știință, Cluj-Napoca, 2005.
- <sup>(7)</sup> This situation, frequently verified on the BSE is explainable because when the preliminary annually financial results are published, the main elements recorded in accounting were already made, some differences being possible from adjustments, error corrections or accounting rules.
- <sup>(8)</sup> Unfortunately (!), current November (2007) constitutes an exception from this “thumb rule”.

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## MULTIPLES AND THEIR USE FOR EQUITY VALUATION ON EUROPEAN CAPITAL MARKETS

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**Abstract.** *Multiples valuation represents the most used valuation approach. There are few studies that focus on this method and the majority of them use US data. The studies based on European companies' data have results that generally confirm those of the studies made with US data. At the same time, it is noticed a lower performance of European multiples, explained by the heterogeneity of European fiscal and accounting regulations, by a greater relevance of accounting information published in the United States and by a greater degree of efficiency of US capital market.*

**Key words:** equity valuation; relative valuation; multiples; comparable assets; capital market.

**REL classification:** 11B, 11F, 14I

Assets valuation represents a mandatory step that precedes any intelligent decision in investment selection, in the establishment of prices to be cashed or paid for mergers and acquisitions etc. As a rule, it can be made reasonable valuations for the majority of assets and the same fundamental principles determine the value of all types of assets (even if some assets are more easy to be valued than others, if valuation details are different from an asset to another), both real or financial<sup>(1)</sup>. In general terms, there are three valuation approaches (Damodaram, 2006, Chapter 1, pp. 13-28):

1) Discounted cash flow valuation that associates the value of an asset with the present value of expected future cash flows that will be generated by this. This approach is preferred in theory. There are three distinct ways of classification for discounted cash flows models:

- a) Approaches based on going concern valuation vs. asset based valuation;
- b) Approaches that value equity vs. approaches for company valuation;
- c) DCF method variations: the most used model discounts the expected cash flows at a risk-adjusted discount rate, another model separates the cash flows in excess return cash flows and normal return cash flows (which provide the risk-adjusted required return) and adjusted present value approach segregates the effects on value of debt financing from business' assets value.

2) Relative valuation estimates the value of an asset by looking to the prices of comparable assets relative to a common variable such as earnings, cash flow, book value, sales etc.;

3) Contingent claim valuation uses option valuation models to measure the value of assets that have similar characteristics with those of the option;

These approaches can lead to different values for the same assets and every one is recommended to be used in specific situations.

Relative valuation supposes the determination of the value of an asset based on prices at which similar assets are currently priced by the market. This method contains two components (Damodaram, 2006, Chapter 7):

- 1) Prices standardization, usually made by converting prices into multiples of some common variables. These variables (value drivers) depend on the type of analyzed assets. For public traded stocks it is usually appealed to earnings (EPS, EBITDA), book value (or the cost of company's assets replacement) and revenues (sales)<sup>(2)</sup>.
- 2) Finding of similar assets, that is difficult to be realized for equities if it is taken into account that businesses differ one from another from the viewpoint of risk, growth potential and cash flows.

Relative valuation supposes the deal with the following steps: 1) finding of similar assets that have prices established on the market; 2) scaling of market prices to a common variable to generate comparable standardized prices, which, in the case of equity, supposes converting of market value of equity or entity into multiples based on earnings, book value or revenues; 3) the adjustment for differences among assets when there are compared standardized values; 4) building of a synthetic standardized price for comparable assets identified (representative multiple) with the help of the harmonic mean, the arithmetic mean, the median etc.; 5) determination of analyzed asset's value by multiplying the value of valuated asset's common variable with the synthetic standardized price.

Although discounted cash flow approach is studied with priority and considered in theory as the most performing approach, the relative valuation is very popular in practice, being used for the majority of assets. Damodaram (2006, Chapter 7, p. 2). shows that most of equity research reports are based on multiples (P/E, EV/EBIT, Price/Sales etc.) According to the mentioned author, in a study of 550 equity research reports issued by investment banks from United States, Europe and Asia in the first half of 2001, it has been noticed that the ratio between relative valuations and discounted valuations is almost 10 to 1. Bonadurer (2003)<sup>(3)</sup> mentions the conclusion from a Morgan Stanley Dean Witter report issued in 1999 according to which only 20 % from equity research analysis were focused on discounted cash flow method while a much higher percentage use different earnings multiples. Also, Fernandez (2001) presents the most used methods by analysts from Morgan Stanley Dean Witter for European companies valuation and, among them, multiples valuation occupies three from the first four places (1.PER, 2.EV/EBIT, 4.EV/EG), while discounted cash flow valuation is placed only on the fifth place (Fernandez, 2001, p. 2).

The popularity of multiples valuation is due to the following reasons (Damodaram, 2006, Chapter 7: pp. 3-4): 1) consumes less time and resources than discounted cash flow valuation; 2) is easier to be sold; 3) is easier to be defended; 4) reflects the current market situation. However, these strengths represent at the same time, according to the author, weaknesses too: 1) the rapidity of the method can lead to value inconsistency, which can ignore essential variables such as risk, growth or potential cash flow; 2) because this type of valuation reflects the market situation leads to overvaluation when market overvalues similar companies and to undervaluation in the inverse situation; 3) the lack of transparency regarding the hypothesis makes multiples vulnerable to manipulations.

According to Goedhart, Koller și Wessels (2005) a careful analysis comparing a company's multiples with those of other companies can be useful in the realization of the forecasts needed for discounted cash flow valuations and, implicitly, can lead to an increased accuracy of the valuations they inform. Properly effectuated such an analysis can help a company to realize stress tests<sup>(4)</sup> for their cash flow forecasts, to understand the differences between its performance and those of its competitors and to evaluate if the company's strategic position allows more value creation than that generated by the other players from industry. A multiple analysis can also generate insights into the key factors which create value in an industry (Goedhart, Koller, Wessels, 2005, p. 7).

The general definition of multiples (5) allows the utilization of a wide range of multiples. For analyzing specific characteristics of multiples, Schreiner and Spremann (2007) used a two dimensional categorization scheme as is shown in the Figure 1 (Schreiner and Spremann, 2007, p. 25). The first dimension refers to the numerator of the multiple and distinguishes between equity value multiples and entity value multiples. The first category is based on the stock price, whereas the second category is based on the enterprise value of the firm. The origin of the value driver (of common variable) constitutes the main differentiation criteria for the second dimension of the categorization framework, according to which it can be distinguished: 1) accrual flow, 2) book value, 3) cash flow, 4) knowledge multiples, 5) forward looking multiples.

Categorization of multiples

Table 1

	Traditional/trailing multiples			Alternative multiples	Forward looking multiples
	Accrual flow multiples	Book value multiples	Cash flow multiples		
Equity value multiples	P/SA P/GI P/EBITDA P/EBIT P/EBT P/E	P/TA P/IC P/B	P/OCF P/D	P/(EBIT+R&D) P/(EBIT+AIA) P/(EBIT+KC) P/(E+R&D) P/(E+AIA) P/(E+KC)	P/SA 1 P/SA 2 P/EBITDA 1 P/EBITDA 2 P/EBIT 1 P/EBIT 2 P/EBT 1 P/EBT 2 P/E 1 P/E 2
Entity value multiples	EV/SA EV/GI EV/EBITDA EV/EBIT	EV/TA EV/IC	EV/OCF	EV/(EBIT+R&D) EV/(EBIT+AIA) EV/(EBIT+KC)	EV/SA 1 EV/SA 2 EV/EBITDA 1 EV/EBITDA 2 EV/EBIT 1 EV/EBIT 2

Note: P = (stock) price / market capitalization, EV = enterprise value, SA = sales / revenues, GI = gross income, EBITDA = earnings before interest, taxes, depreciation, and amortization, EBIT = earnings before interest and taxes, EBT = earnings before taxes/pre-tax income, E = earnings / net income available to common shareholder, TA = total assets, IC = invested capital, B = book value of common equity, OCF = operating cash flow, D = (ordinary cash) dividend, R&D = research & development expenditures, AIA = amortization of intangible assets, and KC = knowledge costs = R&D + AIA. Forward-looking multiples are based on mean consensus analysts' forecasts for the next two years (1 = one year, 2 = two years) provided by I/B/E/S. The multiples shown within this categorization framework are just a selection of the universe of possible multiples. However, any multiple can be classified within this framework.

In spite of the wide use of multiples, there is the opinion according to which multiples constitutes the subject of a surprisingly few studies (Bohraj, Lee, 2001, p. 1, Schreiner, Spremann, 2007, p. 2). Liu, Nissim and Thomas (2002) observe that there is little published research in the academic literature documenting the absolute (the valuation performance in relation with the market price) and relative (the performance of valuations compared one with another) performance of different multiples (Liu, Nissim, Thomas, 2002, p 138). According to the same study, while textbooks on valuation (e.g., Copeland, Koller and Murrin (1994), Damodaram (1996)<sup>(6)</sup> and Palepu, Healy and Bernard (2000)<sup>(7)</sup>) devote considerable space for multiples presentation, the most published papers that study

multiples examine a limited set of firm-years and consider only a subset of multiples, such as those based on earnings and EBITDA.

A direction in empirical research of multiples focuses on their accuracy, on the ability of multiples valuations to approximate the market prices of stocks. From this point of view, generally there was established that earning multiples result in more accurate forecasts than multiples based on book values or sales, that forward looking multiples perform better than multiples based on historical data and that the harmonic mean leads to more accurate predictions than those determined by the use of arithmetic mean or the median (Dittmann, Weiner, 2005, p. 2).

Another direction in empirical multiples research studies the selection criteria of comparable companies. Industry membership (where the industry is defined by the first three SIC digits) or the combination return on equity (as a measure of earnings growth) and total assets (as a surrogate for risk) represent efficient criteria for P/E valuation method (Alford, 1992, p. 106). Another study concludes that, in the case of P/E and P/B valuation methods the most effective selection criterion is based on the combination between industry membership and return on equity and, in the case of P/E – P/B combined method, is sufficient only the industry membership criterion (Cheng, McNamara, 2000, p. 349). Bhojraj and Lee (2000, p. 22) obtain superior results to those determined using industry membership and size criteria choosing companies based on profitability, growth and risk characteristics through a constructed “warranted” multiple. Goedhart, Koller and Wessels (2005) recommend the selection of comparable firms based on similar perspectives regarding Return on Invested Capital<sup>(8)</sup> and growth rates, this being one of the principles that can help companies to properly apply multiples (Goedhart, Koller, Wessels, 2005, p. 8).

It has to be noticed that there is only a little number of empirical studies in the multiples valuation field that use European capital markets data, the majority of studies being realized with US data. I have identified as analyzing European companies data (exclusively or partly), the following studies: Hermann and Richter (2003), Dittmann and Weiner (2005), Schreiner and Spremann (2007) and Liu, Nissim and Thomas (2007).

Hermann and Richter (2003) realize, based on a binominal process and a risk-neutral valuation approach, the empirical testing of the options regarding three major challenges in multiples valuation implementation, more precisely those referring to: the choice of an appropriate basis of reference (value driver), the selection method of comparable companies, and the choice of a suitable statistical multiple estimator (Hermann, Richter, 2003, p. 217). The analyzed sample is composed by the companies with the greatest market capitalization<sup>(9)</sup> listed on the capital markets from United States and Europe<sup>(10)</sup> (financial companies are excluded from the sample). The number of analyzed companies is 645 in 1997, 665 in 1998 and 664 in 1999. These companies' multiples are constructed using the total market capitalization as at the last day of trade of March month from the analyzed years, divided to the accounting indicator of the previous year. The authors examine a few selection methods of comparable firms, namely: 1) MARKET: This method selects all the companies from the sample, excluding the target company; 2) IND: This method uses SIC codes<sup>(11)</sup> for industries as a classification for industry membership; 3) FUND: These method ignores industry membership and selects firms based on fundamental factors: a) growth, measured through risk-adjusted growth rate (the geometric mean of annual historic sales growth rates of the preceding four years), and b) profitability, measured through actual return on equity. A company is considered comparable if these two mentioned fundamental factors deviate with less than 30 % from the value of analyzed companies' factors; 4) FUND<sup>P</sup>: Method similar to FUND, except for the fact that long term growth rates for different basis of reference are uniformly estimated via I/B/E/S long-term (five years) growth forecasts for earnings per share; 5) FUNDIND<sup>P</sup>:

This method chooses companies from the same industry and assures the control for fundamental factors (with I/B/E/S forecasts as proxies for long term growth rates). This time the accepted deviation interval is enlarged to 50 %.

The comparative analysis of multiples valuation results with different basis of reference suggests the use of earnings as a highly aggregated performance measure. According to Hermann and Richter (2003, p. 217): “Book equity, invested capital, or sales multiples generally lead to much smaller pricing accuracy than earnings based multiples, if relevant growth and profitability ratios are not controlled for. Sales multiples appear to be almost meaningless if comparisons are based on industry classification alone. After selecting comparable companies on the basis of control factors instead of industry classification, prediction accuracy increases, but is still lower than that produced by earnings multiples”. The complete empirical results obtained by the authors are presented in Table 2 (Hermann, Richter, 2003, p. 209).

Comparison of multiples based on different bases of reference

Table 2

Multiple	Absolute prediction errors*				
	PIATA	IND	FUND	FUND <sup>p</sup>	FUNDIND <sup>p</sup>
P <sup>Eq</sup> /E	0.365	0.334	0.333	0.287	0.293
P <sup>Ent</sup> /EBIAT	0.391	0.341	0.329	0.302	0.313
P <sup>Eq</sup> /BE	0.487	0.432	0.347	0.317	0.322
P <sup>Ent</sup> /EBIDAAT	0.462	0.372	0.351	0.324	0.329
P <sup>Ent</sup> /IC	0.519	0.455	0.357	0.335	0.349
P <sup>Ent</sup> /S	0.709	0.530	0.367	0.357	0.361

\* Prediction errors are calculated as an arithmetic mean of the three median errors in the three observation years.

Note: E = net income, BE = book equity, IC = invested capital, EBIAT= earnings before interest and after taxes, EBIDAAT = earnings before interest, depreciation, and amortization, after taxes, P<sup>Eq</sup> = price of equity, P<sup>Ent</sup> = price of entity.

The study shows that can be obtained predictions with a much higher accuracy if the selection of comparable companies is based on fundamental factors instead of SIC classifications. It is given the example of the median of P<sup>Eq</sup>/E multiples of the sets of comparable companies selected exclusively based on I/B/E/S predictions for long term earnings growth and return on equity (that means selected through FUND<sup>p</sup> method) that leads to much lower prediction errors than those of the traditional approach based on SIC codes (that means selected through IND method). The authors underline (Hermann, Richter, 2003, p. 217): “Moreover, the further control on industry membership does not increase the precision of multiples from different industries controlled from the point of view of performance. This fact suggest the conclusion that industry membership (at least when for this are used as proxies SIC codes) does not contain superior information to that contained by for which already was realized the control utilizing theoretically derived factors. The observation is robust against variations of industry, observation year, or basis of reference and even holds for less sophisticated proxies for earnings growth, such as historic sales growth rates.”

Regarding the selection of a properly statistical estimator, the empirical results of the study show that arithmetic mean leads to low performances and constantly overestimates the potential market price. Surprisingly for the authors<sup>(12)</sup>, the harmonic mean determines the same low performance, leading regularly to underestimation of potential market price. The median is by far the best estimator of potential market price (Hermann, Richter, 2003, p. 212).



An interesting observation of Hermann and Richter (2003) is that the limitation to the United States capital market generates a further improvement on valuation accuracy and that this effect is not noticed if the analysis is limited to the German capital market. This situation is considered to be due to a more efficient United State capital market or to a greater relevance of the US accounting data compared to the European ones or to a combination of the before mentioned factors.

Dittmann and Weiner (2005) investigate the method of selection of comparable companies that leads to the most accurate forecasts when valuating European companies with EV/EBIT multiple. The analyzed sample contains 67,433 firm-year observations from 29 of the 30 OECD member states, observation made in the period 1993 – 2002. The study compares the five methods proposed by Alford (1992)<sup>(13)</sup> on a sample with companies from 16 countries (15 UE member states and United States). This research design allows verifying if the results of previous empirical studies for United States are valid in the individual European states too and if these results are stable over time. Because of the much lower sizes of the European states compared to the United States size, the authors analyses what country pool the comparables should be selected from. The variants taken into consideration are: companies from the same country, from the same region (the UE 15 member states or for the United States the NAFTA member states) or from all OECD states.

The analysis of Dittmann and Weiner (2005) presents two main results relevant for firms' valuation in practice. First, the selection of the comparables from the same industry (as they are proxied by SIC codes) proves to be suboptimal for all countries. Instead, comparables should be chosen based on the similarity from the point of view of assets return (ROA). For United States, United Kingdom and Ireland, this selection method can be further improved by selecting companies that are the most similar from the point of view of ROA and total assets. Second, the analysis has shown that the comparable companies for the USA, the UK, Denmark, and Greece should be chosen from the same country only. In the case of all remaining European countries, forecasts are more accurate when firms are chosen from the 15 European Union member states or from the 30 OECD countries.

Schreiner and Spremann (2007) examine the accuracy of different types of multiples in European equity markets based on a sample of 592 firms included on DOW JONES STOXX 600 index analyzed in the period 1996 – 2005. They have found out that multiples generally estimate market values reasonably well, with median absolute errors of less than thirty percent and fractions of errors below 15 percent of higher than thirty percent for the majority of multiples. In relative accuracy terms, study's results show that: 1) equity value multiple have superior performances compared to the entity value multiples; 2) knowledge multiples have a greater accuracy than those of traditional multiples in science-based industries<sup>(14)</sup>; 3) forward-looking multiples, especially the two year forward-looking P/E, have superior performances compared to traditional multiples<sup>(15)</sup>.

The results have been confirmed by testing a data set from United States constituted by a sample of 500 companies included in S&P 500 index followed over the same period. One aspect that results for the US sample is that the accounting information presents greater value relevance on the US capital markets than anywhere in the world<sup>(16)</sup>. The median absolute valuation error, respectively the fraction of valuation errors below 15 percent, across the equity value multiples analyzed, is on average 10.0 percent lower, respectively 8.9 percent higher, for the US sample compared to the European sample. The authors present three explanations for these superior performances of the US sample results: 1) the heterogeneity of fiscal and accounting regulations across Europe; 2) the demand for published value relevant accounting information is higher in equity- and market-orientated financial systems (e.g., US) than in debt- and bank-orientated financial systems (e.g., Germany and France) due to the fact that banks have typically direct access

to information about firms; and 3) the higher degree of capital market efficiency which characterizes the US capital market.

Liu, Nissim and Thomas (2007) compare the performances of earnings multiples valuations, from the point of view of the proximity to the traded prices, with the performances of multiples based on two cash-flow measures – operational cash flow and dividends – for a wide sample of companies drawn from 10 national markets. The authors have discovered that, although the moving from actual numbers to forecasts improves the cash flow multiples' performance, this moving improves the earnings multiples performance on a greater extent. EPS forecasts represent better summary measures of value than the forecasts of operating cash flow in all five countries examined<sup>(17)</sup> and this relative superiority has been observed in most industries. Comparing dividends with earnings for a sample derived from seven countries<sup>(18)</sup> the authors have found, again, that earnings forecasts were a better summary measure of value than dividend forecasts in all countries and most industries and that the moving from actual numbers to forecasts improved the performance more for earnings than for dividends. Overall, the study concludes that the results obtained suggest the preference of earnings multiples because their valuations have a remarkable accuracy for the majority of companies (Liu, Nissim, Thomas, 2007, p. 66).

In conclusion, multiples valuation represents the preferred method for equity valuation in practice although in theory the focus is on discounted cash flow valuation method. It has to be taken into account the fact that the use of this method without a careful selection both of the multiple and of the comparable firms selection method, can determine unsatisfactory results. In spite of the wide use of multiples there have appeared only few empirical studies in the academic world that focus on this method, most of them using US data, while the studies with European are only a few. Comparing the results of the studies based on European data with those based on US data is generally observed a reciprocal confirmation of their conclusions. At the same time, there are observed lower performances in the case of European multiples compared to those of corresponding US multiples, explained by a greater efficiency of the US capital markets, a greater relevance of the accounting information published in the United States and by the heterogeneity of fiscal and accounting European regulations.

#### Notes

- <sup>(1)</sup> This is the premise used by Damodaram (2006, Chapter I, p. 1).
- <sup>(2)</sup> Another category of common variable is represented by measures specific to companies from certain sectors, such as the number of subscribers for cable companies.
- <sup>(3)</sup> Bonadurer, W., *Valuation by multiples*, University of St. Gallen, Swiss Institute of Banking and Finance, 2003, p. 7.
- <sup>(4)</sup> A simulation technique used to determine the reaction of one variable to different scenarios.
- <sup>(5)</sup> Penman, in *Financial Statement Analysis and Security Valuation*, 2<sup>nd</sup> edition, New York, McGraw-Hill, 2004, defines a (market) multiple as the ratio of a market price variable (such as stock price, market capitalization or the entire value of the enterprise) to a particular value driver (such as earnings, incomes or the labor force) of a firm (Schreiner and Spremann, 2007, p. 4).
- <sup>(6)</sup> Damodaram, A., (1996). *Damodaram on valuation*, Wiley, New York.
- <sup>(7)</sup> According to Palepu, K.G., Healy, P.M., Bernard, V.L., *Business Analysis and Valuation Using Financial Statements*, 2<sup>nd</sup> edition, South-Western, Cincinnati, OH, 2000.
- <sup>(8)</sup> The general equation of ROIC is:  $ROIC = (\text{Net income} - \text{Total Dividends}) / \text{Total Capital}$ . The total capital includes long term debts, common and preferred stock.

- <sup>(9)</sup> The authors justify the use of large companies with the fact that, taking into account the more intense trading of their shares, they expect a higher informational content of market prices for their shares.
- <sup>(10)</sup> The European companies are mainly from Euro zone and from Switzerland, United Kingdom, Norway, Sweden and Denmark.
- <sup>(11)</sup> SIC (Standard Industrial Classification) codes represent a standard series of four digits codes created by US Government at 1937 for business activities classification.
- <sup>(12)</sup> This result contradicts the results obtained by Beatty, Riffe and Thompson (1999), Baker and Ruback (1999) and Liu, Nissim and Thomas (2002), but is in line with the result reported by Schreiner and Spearmann (2007, p. 11) that indicates the superiority of the median compared to the harmonic mean and to a fifty-fifty combination of the median and harmonic mean.
- <sup>(13)</sup> The selection rules for comparable companies from this paper are the following: MARKET – it refers to the use of the entire group of firms; INDUSTRY – it refers to an algorithm which selects the companies from the same sector according to the SIC codes; ROA – represents an algorithm that selects the 2 % from the comparable firms group whose ROA is the most close to that of the analyzed company; TA – it refers to an algorithm that selects 2 % (or five) of the most similar companies from the point of view of total assets; ROA&TA – represents an algorithm that selects firms at the intersection between 14 % of the most close firms to the ROA of analyzed company and 14 % of the most close companies to the total assets of the analyzed firm.
- <sup>(14)</sup> The definition of the knowledge industries used in the present paper includes: oil and gas, raw materials, industry, health, telecommunication, utilities and technology.
- <sup>(15)</sup> The same result has been obtained in the empirical studies based on US data made by Kim and Ritter (1999) and Liu, Nissim and Thomas (2002).
- <sup>(16)</sup> This phenomenon was also observed by Ali Ashiq and Lee-Seok Hwang in their study, “Country specific factors related to financial reporting and the value relevance of accounting data.” *Journal of Accounting Research* 38, 2000.
- <sup>(17)</sup> Australia, France, Hong Kong, Taiwan and Great Britain.
- <sup>(18)</sup> Australia, France, Germany, Hong Kong, Japan, South Africa and Great Britain.

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# QUANTITATIVE ANALYSIS OF BANKS' MANAGEMENT PERFORMANCE

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**Abstract.** *One of the consequences of the financial liberalization process is the entry of new competitors in the banking system, increasing the risk taking attitude of credit institutions whose aim is to gain a substantial remuneration and to maintain/increase the market share. In this context, an efficient management becomes an essential factor for bank's profitability and reputation.*

*To evaluate the management's ability in conducting efficiently the banking activity, we have developed and tested eight combinations of input-output variables, in order to identify if there exists a variable with a strong impact on bank's aggregate efficiency. The results obtained indicated that only the most complete model, which includes the main variables that must be permanently under watch and control, has a significant influence on the credit institutions' performance.*

**Key words:** management quality; data envelopment analysis DEA; efficiency score; bank's classification; scale efficiency.

**REL:** 11 C, 10 J

## **Introduction**

Management's performance in banking system can be interpreted as a key-factor for the development of a sound and stable banking activity, because it reflects the top management's ability to identify, quantify and monitor the inherent risks, as well as to manage efficiently the assets and liabilities. Finally, it makes the difference between an insolvable credit institution and another one that goes on his activity, both of them facing the same disturbance factors.

The literature proposes three main methods for quantifying the efficiency:

- The ratio method, which consists in evaluating some indicators, without giving a general view concerning the efficiency of an economic entity. It is specific to single-input single-output approaches.
- Parametric methods, as Stochastic Frontier Approach (SFA), Thick Frontier Approach (TFA) and Distribution Free Approach (DFA), which quantify the economic efficiency. All of them assume an optimal choice of the level and structure of input/output variables, based on the reactions at a change of market prices. The main objective of economic efficiency consists of minimizing costs or maximizing profit. It assumes the coexistence of technical and allocative efficiency.
- Non-parametric methods, such as Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH), which give a quantitative dimension to technical

efficiency. Their purpose is to minimize inputs for a given level of outputs, or to maximize outputs, maintaining at the same level the inputs.

The aim of this study was to quantify the management 's efficiency for five romanian credit institutions, with private foreign and autochthonous equity, by means of DEA<sup>(1)</sup>. First part consists of a concise presentation of Data Envelopment Analysis. In the second one, we proposed 8 multi-input multi-output models, which had been analysed comparatively, from the perspective of both constant and variable returns of scale, in order to identify the optimal mix of input-output variables that have the greatest impact on banking activity's efficiency. In the third part, using the estimates obtained for technical and scale efficiency, we included the institutions analysed into six types of efficiency. The last part of the study presents our conclusions and offers a suggestion for the future research.

### 1. Data envelopment analysis – general approach

Data Envelopment Analysis is a linear programming technique that don't requires the specification of a functional relationship between input and output variables. Unlike statistical methods, characterised by a central tendency, that evaluates each entity according to a mean value, DEA<sup>(2)</sup> is an extreme point method that compares each entity only with the best representatives. Consequently, it offers a measure of relative efficiency for each production unity. The term of relative efficiency has an important significance. In this way, an entity identified as being efficient for a certain data set or peer group, can become inefficient if we change the data set or the group composition.

In DEA words, the entity analysed is called *decision making unit* (DMU). A DMU will be considered efficient if it is situated on the efficient frontier, namely the efficiency score generated by the model is equal to 1. In order to obtain an individual efficiency score, we must solve a linear programming problem for each DMU. Thus, the efficiency of a DMU using  $n$  input variables to produce  $m$  outputs is quantified as the ratio between the weighted sum of outputs and the weighted sum of inputs.

$$\text{Efficiency of DMU } j = \frac{u_1 y_{1j} + u_2 y_{2j} + \dots + u_m y_{mj}}{z_1 x_{1j} + z_2 x_{2j} + \dots + z_n x_{nj}} \quad \text{where}$$

$u_1$  = the weight of output 1

$y_{ij}$  = value of output 1, for DMU<sub>j</sub>

$z_1$  = the weight of input 1

$x_{ij}$  = value of input 1, for DMU<sub>j</sub>.

The weights set, specific to each DMU, is the optimal solution of a linear optimization problem and is selected in a manner that assures the efficiency maximization of a unit. This flexibility<sup>(3)</sup> in establishing the weights allows each DMU to hold his own weights set, in order to appear in the best possible light.

DEA models can be classified according two criterion:

- Returns of scale (constant, increasing, decreasing)

It is said that a DMU faces ascending returns of scale if, increasing all inputs with an arbitrary value  $x$  will generate an increase of all outputs with a value bigger than  $x$ . In the case of descending returns of scale, the increase of outputs will be smaller than  $x$ , while constant returns of scale assume that doubling the value of inputs will be followed by a doubling in outputs.

The first DEA model was created by Charnes, Cooper and Rhodes in 1978 (CCR model) based on constant returns of scale (CRS). Later on, the model had been developed by Banker, Charnes, Cooper in 1984 (BCC model), which employed variable returns of scale (VRS). CCR model is indicated when all DMU function at optimal scale, meanwhile BCC model is indicated in case of imperfect competition, asymmetric information, or legal and financial constraints.

- Model's orientation (input oriented, output oriented, non oriented)

An input oriented model reflects the measure in which input value can be diminished, without changing output, while an output oriented model maximizes output, maintaining inputs at the same level.

Concerning the process of selecting the input and output variables, the literature developed two approaches. In the intermediation approach, liabilities (deposits, borrowed funds, labour) are considered inputs and assets (credits, bonds) are outputs. The second approach starts from the premise that the entity analysed is a producer. Therefore, inputs are represented by capital and labour, and outputs by deposits and credits.

## 2. Methodology

In this study, the selection of input and output variables had been realised according to the intermediation approach. The analysis focuses on five credit institutions, representatives for the Romanian banking system, with private foreign or autochthonous equity. To ensure the data set's homogeneity and not distort the results, we selected only those banks between which there aren't significant differences regarding the volume of resources used and services supplied.

The study was conducted for the period December 2003-December 2006, the data set being taken from the annual reports of credit institutions. The model is output oriented because the analysis' purpose is to emphasize the measure in which results can be optimised, by maintaining inputs at a given level. The structural excess of liquidity that had characterised our banking system in the last ten-year period, and also the increasing competition constituted the main arguments in choosing this orientation.

Keeping in mind the characteristics of banking intermediation, the initial model is composed of two inputs: *customers' deposits* and *other financing sources*, meanwhile the outputs are represented by *total volume of credits* and *net income from other activities*. To examine the impact of credit risk, off-balance sheet activities, operational expenditures and net interest income on banking activity's efficiency, we included in the original model some additional variables.

Model 2 includes, as an additional input, the operational expenditures. Model 3 consists of model 1 plus an additional output: net interest income. Model 4 consists of both operational expenditures and net interest income, to analyse the simultaneous influence of the two variables.

Model 5 is a reestimation of model 1, introducing as additional input loan loss provisions. To emphasize the measure in which off-balance sheet activities bring an increase of the overall efficiency, we have constructed model 6, which includes them as output variable. Model 7 is a reestimation of model 4, introducing the loan loss provisions. Model 8 completes model 7 with the value of off-balance sheet activities.

For each model we estimated the individual efficiency scores under the assumption of both constant and variable returns of scale. Finally, we computed the annual mean score (each year consisted of five observations) and a total score for each model. The results obtained are presented in tables 1 and 2.

Annual mean score CRS

Table 1

Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
2003	1.13	1.103	1.050	1.026	1.032	1.074	1.027	1.02
2004	1.32	1.154	1.170	1.037	1.227	1.219	1.008	1.005
2005	1.3	1.124	1.186	1.034	1.167	1.224	1.017	1.007
2006	1.132	1	1.113	1	1.067	1.075	1	1
Total score	1.220	1.095	1.129	1.024	1.123	1.147	1.013	1.008

Annual mean score VRS

<i>Table 2</i>								
Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
2003	1.011	1.004	1.011	1.004	1.011	1.011	1.004	1.004
2004	1.1	1.041	1.044	1.008	1.093	1.080	1	1
2005	1.117	1.063	1.066	1.021	1.128	1.097	1.003	1.010
2006	1.028	1	1.028	1	1.028	1	1	1
Total score	1.064	1.027	1.037	1.008	1.065	1.047	1.002	1.003

Keeping in mind that the objective is to maximize outputs, we considered that the most efficient model, namely the input-output mix that allows the reaching of a performance standard governed by the best practices, is that whose efficiency score is the closest from 1. An efficiency score of 1 implies a good management quality, the credit institution being on the efficient frontier. The scores that exceed value 1 indicate an inefficiency in the process of output maximization.

Analysing the values of total scores, we observed that, for constant returns of scale, model 8 registered the smallest value (1.008), being the closest model to the efficient frontier. For variable returns of scale we identified two models with approximately the same score: model 7 with a total score of 1.002 and model 8 with 1.003. As model 8 is a reestimation of model 7, having as additional variable the off-balance sheet activities, we can conclude that the above mentioned variable doesn't have a significant impact over individual efficiency. At the same conclusion reached F. Pasiouras (Pasiouras, 2006, p.22), in a study investigating the efficiency of 12 greek credit institutions, between years 2000-2004.

According the scores obtained through the two approaches, we considered that model 8 is the most efficient of all the models analysed. Moreover, the input-output mix reflects the main coordinates of banking activity. It can be observed that, in 2006 both approaches estimated for model 8 a mean efficiency score of 100%, all credit institutions being on the efficient frontier.

In the constant returns of scale approach, model 1 obtained the highest score (1.220), being therefore the most inefficient. The result suggests that, in evaluating the banking activity's efficiency, we should consider a larger variety of factors, in order to emphasize the main expenditures and incomes generated, and also the new sources of risk (credit risk associated to off-balance sheet activities). Variable returns of scale approach, considered by economic literature as being the most realist, includes in the category of the most inefficient model the model 1 with a general score of 1.064 and model 5 with 1.065.

The high scores obtained by models 5 and 6 indicate that the inclusion of loan loss provisions and off-balance sheet activities in the initial model don't improve substantially the efficiency of the model in the period analysed. The results suggest that, for being considered efficient, banking management must monitor a large range of factors. A good and cautious administration of operational expenditures, in which wages expenditures detain an increased share, alongside with an increase in net interest income, allows the diminuation of the gap from efficient frontier, so that credit institutions operate closest to best practices.

### 3. An analyse of individual credit institutions efficiency

Once identified the model that offers an accurate estimate of management's performance, we proceeded to a classification of banks, on the individual technical efficiency scores, and respectively on scale efficiency. We obtained three measures of technical efficiency, by estimating model 8 under three hypothesis: constant, variable and nonincreasing returns of scale.

Notations are:



ECRS = value of technical efficiency under assumption of constant returns of scale  
 EVRS = value of technical efficiency under assumption of variable returns of scale  
 ENIRS = value of technical efficiency under assumption of nonincreasing returns of scale  
 ESVRS = scale efficiency with variable returns  
 ESNIRS = scale efficiency with nonincreasing returns.

If there is a significant difference between ECRS and EVRS estimated, then we can examine the potential scale economies. As scale efficiency ESVRS doesn't allow a distinction between increasing and decreasing scale economies, we introduced a new measure of scale efficiency, named ESNIRS, where:

$$ESVRS = \frac{ECRS}{EVRS} \quad \text{and} \quad ESNIRS = \frac{ECRS}{ENIRS}$$

Comparing the three measures of technical efficiency (ECRS, EVRS, ENIRS) with the two measures of scale efficiency (ESVRS, ESNIRS), we classified each credit institution in one of the six types presented in table 3.

**Types of efficiency**

Table 3

Category of efficiency	Measures of efficiency	Description
1	ECRS=1, EVRS=1, ESVRS=1, ESNIRS=1	Banks are efficient under all aspects.
2	ECRS>1, EVRS=1, ESVRS>1, ESNIRS=1	Banks are efficient under variable returns of scale and inefficient for constant returns of scale; they operate in an increasing returns area.
3	ECRS>1, EVRS=1, ESVRS>1, ESNIRS>1	Banks are efficient under variable returns of scale and inefficient for constant returns of scale; they operate in a decreasing returns area.
4	ECRS>1, EVRS>1, ESVRS>1, ESNIRS=1	Banks are inefficient in both constant and variable returns of scale; they operate in an increasing returns area.
5	ECRS>1, EVRS>1, ESVRS=1, ESNIRS=1	Banks are scale efficient, but technological inefficient. they operate in a constant returns area.
6	ECRS>1, EVRS>1, ESVRS>1, ESNIRS>1	Banks are inefficient in both constant and variable returns of scale; they operate in a decreasing returns area.

In table 4 are presented the results of estimating the two measures of efficiency, meanwhile table 5 presents the centralised situation for each year.

Table 4

DMU	Technical efficiency			Scale efficiency		Category of efficiency
	Score CRS	Score VRS	Score NIRS	ESVRS	ESNIRS	
DMU 1 2003	1	1	1	1	1	1
DMU 2 2003	1	1	1	1	1	1
DMU 3 2003	1	1	1	1	1	1
MU 4 2003	1.1348	1.021	1.1348	1.1115	1	4
DMU 5 2003	1	1	1	1	1	1
DMU 1 2004	1	1	1	1	1	1
DMU 2 2004	1	1	1	1	1	1
DMU 3 2004	1.0234	1	1.0234	1.0234	1	2
DMU 4 2004	1	1	1	1	1	1

DMU 5 2004	1	1	1	1	1	1
DMU 1 2005	1.0158	1.035	1	0.9814	1.0158	6
DMU 2 2005	1	1	1	1	1	1
DMU 3 2005	1	1	1	1	1	1
DMU 4 2005	1.0185	1.0156	1.0156	1.0029	1.00286	6
DMU 5 2005	1	1	1	1	1	1
DMU 1 2006	1	1	1	1	1	1
DMU 2 2006	1	1	1	1	1	1
DMU 3 2006	1	1	1	1	1	1
DMU 4 2006	1	1	1	1	1	1
DMU 5 2006	1	1	1	1	1	1

#### Annual classification of efficiency

Table 5

Category of efficiency	No. banks 2003	No. banks 2004	No. banks 2005	No. banks 2006
1	4	4	3	5
2	0	1	0	0
3	0	0	0	0
4	1	0	0	0
5	0	0	0	0
6	0	0	2	0

In 2006 all banks were included in category 1, from both technical and scale efficiency point of view. We can conclude that resources allocation is optimal, the assets and off-balance sheet activities are well managed, according to the principle of risk dispersion, and banks are on the efficient frontier.

In the second type of efficiency was included only one credit institution, which is efficient only under technical terms. It operates in the area of increasing returns of scale, therefore an increase of inputs will generate a larger increase in outputs. It is said that banks included in this category have the greatest potential of evolution towards the efficient frontier.

Categories 3 and 5 don't comprise any institution, meanwhile category 4 includes one. The peer group for this one is considered to be that in category 2. In 2005 two credit institutions were included in category 6, which means not only that the given resources weren't allocated in an appropriate way, so as to maximize outputs, but also that an increase on inputs level wasn't followed by a similar increase in outputs.

For those banks that don't belong to category 1, the estimated value of technical and scale efficiency must be seen as a signal of improvement of the efficiency in organizing banking activity, and must be followed by a deep analyse of individual characteristics and of potential sources of vulnerability.

#### Conclusions

The application of DEA method in the purpose of evaluating management's performance and, in a broader sense, the efficiency in organizing the banking activity, isn't a substitute for on-site inspections because these allow the interaction with employees and staff, a direct evaluation of operational procedures, of the exposures to inherent risks, the existence of a strategic planning on long term. Although on-site exams offer a general, accurate and real view concerning the activity and risk exposure of a bank, are time consuming, involving important human and financial resources, therefore their frequency is limited.

In this context, DEA must be perceived as a method in the completion of on-site inspections, which is able to give early signals concerning a possible deterioration of

management's quality. Moreover, DEA generates for each inefficient bank a peer group comprising those efficient entities that have a similar pattern of input and output variables with the bank analysed.

Thus, the supervision authorities will take advantage of both a quantitative objective dimension, and of judgements of their own specialists. In the purpose of improving the accuracy of efficiency scores, an important direction in the future research consists in investigating the way in which weights flexibility affects the results obtained, and the inclusion in the model of an additional restriction on weights, in order to allow a more realistic evaluation of entities analysed.

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#### Notes

- <sup>(1)</sup> DEA has a wide area of application: credit institutions, hospitals, schools and university departments, non-profit organizations
- <sup>(2)</sup> Represents a generalisation of single-input single-output model, created by Farrell (1957), being recommended for evaluating the efficiency in multiple-input multiple output situations.
- <sup>(3)</sup> Charnes A., Cooper W.W. and Rhodes E., the founders of DEA (1978) justify in their study "Measuring the efficiency of decision making units" their option for the system of flexible weights.

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## THE IMPACT OF MERGERS AND ACQUISITIONS ON THE ECONOMIC PERFORMANCES

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***Abstract.** This paper aims to measure the extent to which banking systems from Central and Eastern Europe have been characterized by banking consolidation through mergers and acquisitions and the extent to which this process led to the concentration of the banking activity. Also, we measure the impact of mergers and acquisitions on the economic performance of the targeted banks. The conclusions show that the banking system from Central and Eastern Europe was subject to numerous acquisitions from Western banks that chose to enter aggressively into these markets with high growth potential. The effect of the acquisitions on the economic indicators is not obvious in the first years because of the strategy aiming larger market shares.*

**Key words:** mergers; acquisitions; consolidation; financial repression; economic performances.

### REL 11C

#### **Introduction**

The reorganization of the banking systems from Central and Eastern Europe is a complex process started in the early 90 with special features and different evolution within countries as a consequence of many factors like: the quality of the credit portfolio, the elaboration and the implementation of reorganization strategies and legal system stability or flexibility.

If we consider the three components: institutional, financial and operational, the reorganization has generated effects to the banking systems like: quality improvement of the assets, capital adequacy, the rise of financial intermediation and the extension of banking efficiency measured through the net interest margin and the level of banking profitability.

Starting from late '90 the ways of reorganization become more diverse and materialize into mergers and acquisitions or privatizations, as a result of numerous factors who claimed the improvement of the performances, costs reduction, technological innovation, globalization and proper regulations.

The international character of mergers and acquisitions, the birth of large financial institutions through the strategy of „banc assurance” and the diversification of the distribution channels of banking products and services are bench-marks of the banking consolidation process which was present both in developed countries and emerging markets.

The commercial banks represent, in the majority of the emerging markets, the main component of the financial system and the main channel for financing the real economy. As a consequence, the reorganization of the banking systems is the subject of

numerous studies and research papers. Thus, the issue of banking systems reorganization is linked with the estimation of the degree of financial repression that designates government interventions in the financial market control. Authors, like Bein and Calomiris (2001) have distinguished financial repression characteristics through more aspects: government control over interest rates, the constraint of large reserve rates who were not interest bearers, the direction of credits toward certain sectors where the state was the only shareholder, interventions in the daily management of the banking activity, limits imposed to new banks entering the market. In this context, the reorganization appears like a method of reducing financial repression and of opening banking systems towards competition, profitability and efficiency.

### 1. Characteristics of banking consolidation in Central and South-Eastern Europe

The emerging European countries experienced a vast process of banking consolidation due to regional expansion started by large banks from Austria, Germany and Italy who have been involved in 89 regional transactions for which they spent 27 billions of euros.

In the next tables, we have presented elements that argue the previous statement:

#### The first 5 investors within banks from emerging economies between 1996-2005

Table 1

Investor name	Investor nationality	Nationality of targeted bank	Total value of consolidation (billions Euro)
Erste Bank	Austria	Croatia, Czech Republic, Hungary, Romania, Slovakia, Serbia	6.3
Unicredit	Italy	Bulgaria, Croatia, Czech Republic, Poland, Turkey	2.5
KBC / Almanji	Belgium / The Netherlands	Czech Republic, Hungary, Poland, Slovakia	2.4
Swedbank	Sweden	Estonia	1.7
Société Générale	France	Czech Republic, Romania, Russia, Slovenia	1.6

Source: Shamshad, Ali, Keel, Brent – European banking Consolidation, 2006.

Also, the total amount of international mergers and acquisitions that took place during 1996-2005 can be seen in the next table, which reflects the preoccupation of foreign investors for banks from Poland, Czech Republic and Romania.

Table 2

Country	Poland	Czech Republic	Romania	Estonia	Hungary	Turkey	Croatia	Slovakia	Bulgaria	Other countries CEE	Other countries CIS
Total value of operations (billions EURO)	6	5	4,4	2	1,6	1,6	1,4	1,3	1	1,5	1,5

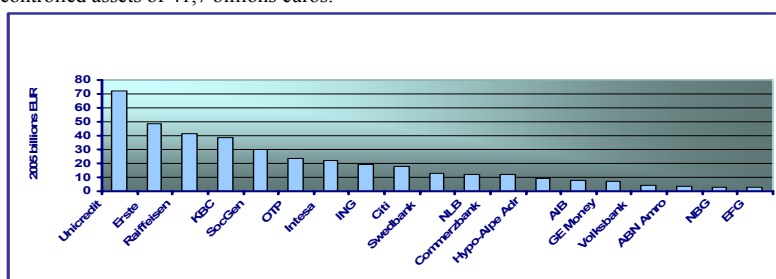
Source: Shamshad, Ali, Keel, Brent – European banking Consolidation, 2006.

As it can be seen from these tables, banks from Central and Eastern Europe, as well as banks from the ex Community of Independent States (Belarus, Russia, Ukraine)

have become important targets for international banking community because of the extended activities developed by foreign investors in this countries.

In some authors opinion (Rosenthal, Oschreiber), although the interest for banking assets from Russia experienced high growth, the banks from this country are away of the consolidation process that begun in the region.

A classification of banking groups considering the total value of assets owned by the main shareholder situates in the first position the Unicredit Group with a total amount of assets in the region of 72,4 billions euros from a total amount of 846 billions. In the second position, we find Erste Group with 50 billions and the total exposure of the first two competitors reaches 43%. In the third place is Raiffeisen International who, following recent acquisitions in Ukraine, Russia and The Czech Republic, reached a total value of controlled assets of 41,7 billions euros.



**Figure 1.** The total consolidated assets of international banks from CEE

Source: CEE Banking Sector Report – Raiffeisen Research – september 2006.

Besides Unicredit and Erste Bank, other groups like OTP, Société Générale and the Greek banks have increased their presence in the region.

As a result of important increases of banking assets, the demands of domestic banking supervision authorities became more severe, which involved bankers concern about capital adequacy, in all cases the solvability ratio being larger than 12%. Another criterion to evaluate the presence of foreign groups is the number of branches who is important because it represents the main modality of offering banking services and products oriented versus retail and small and medium enterprises.

Considering this criterions, Raiffeisen International owns the largest distribution network from Central and Eastern Europe – 1,300 branches; Unicredit owns the largest distribution network – 1,100 branches from a total of 8,700 followed by Erste Bank who is concentrate more over retail activity – approximately 1,100 branches.

If we consider the market share, a study concerning Central and Eastern Europe and the Community of Independent States shows that banks from Ukraine and Russia have witnessed an increase in the market share in detriment to international banks present in the region. The results are summarized in the chart below:

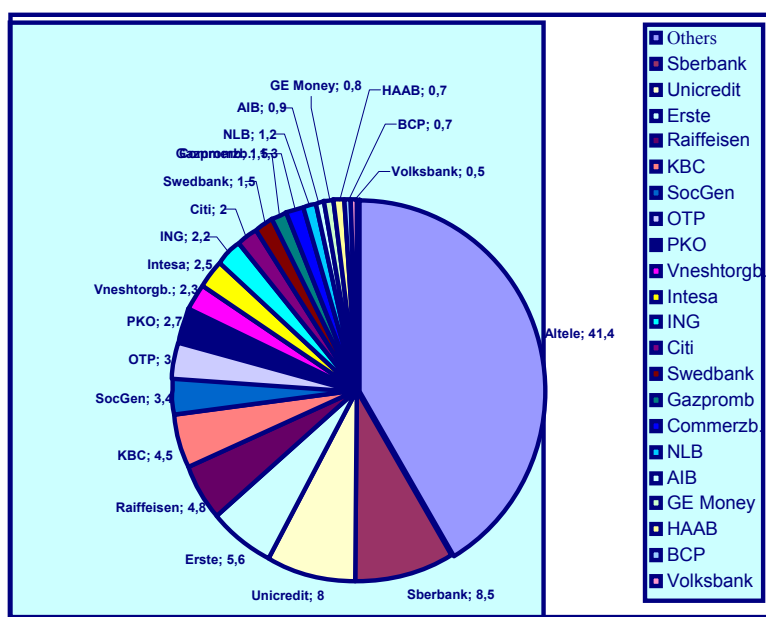


Figure 2. Market share in CEE (% total assets)

Source: CEE Banking Sector Report – Raiffeisen Research – september 2006.

Generally speaking, in The community of Independent States area, the period 2005-2006 was characterized by the increase of local banks market share who has extended from 31.5% to 38%, due to organic growth of banks and local currency appreciation and because of the difficulties encountered by foreign banks who can maintain their market share only through mergers and acquisitions.

In Central and Eastern Europe and CSI the main competitors are Unicredit and Sberbank from Russia, if we consider the market share and the number of branches (Sberbank owns 8.5% of the region's assets and 20000 branches while Unicredit owns 8% of the total assets and 1500 branches)

Although, in Ukraine and Russia the acquisition activity is intense (with OTP buying Raiffeisen Ukraine and Investserbank, BNP Parisbas taking over UkrSibbank, Société Générale taking over Rusfinance, Promek and Delta Credit, Crédit Agricole buying Index Bank) the market share of groups, others than Raiffeisen and Unicredit is still below 1% with the regional market dominated by local competitors.

From the countries of central Europe, Poland is the most competitive market because of the international activities located in this country. Allied Irish owns 71% of BzWdc, Comerrzbank owns 72% of Brebank, Banco Comercial Portugues owns 50% of Millennium Bank.

The most important event that influenced competition in Central Europe was the merger of Unicredit and HVB, and as a result a new leader emerged in the region with a market share of 11.2% followed by KBC (9%), Erste (8.1%), Pko (5.55), OTP (4.6%) and Société Générale (4.5%).

In South-Eastern Europe, the merger activity contributed to a new definition of the competitive structure. The Unicredit Group extended its dominant position in the region following the merger with HVB but, in Croatia (as in Poland) the merger was not approved by the Competition Authority because of the large market share of the banks involved in the transaction. As a consequence, HVB Spliska Banka was sold to Société Générale which reduced the Unicredit market share at 15%.

The most important regional transaction is represented by the privatization of the Romanian Commercial Bank, which led to the consolidation of Erste Bank presence, who owns 26% of the Romanian market and 9% of the regional market. Other countries from South-Eastern Europe were not marked by events having a direct effect of market shares in the region, with the exception of the acquisition of Delta Bank from Serbia by Intesa Bank.

## **2. Case study – the impact of BCR and BRD acquisition over their economic performances**

The expansion of Western banks toward the east by numerous acquisitions is based on two main strategies. A first strategy hints the take-over of inefficient banks, who will benefit from the technological transfer and modern management methods used in developed countries. As a consequence of this transfer, the operational efficiency and the profits will rise, while the market share will consolidate. A second strategy considers an aggressive entry of the domestic market by taking-over an important local bank, regardless of its efficiency. Because the main reason is obtaining a larger market share, the Western banks will adopt a strategy of extensive growth by opening many new branches. The immediate efficiency comes second, with important profits expected on the medium and long term.

If we take into consideration banking performances, the changes caused by the mergers and acquisitions generate effects on costs, profits or both, before and after the merger. A study conducted by Cornett and Tehranian (1992) proves the high level of ROE – after the merger, but it cannot explain the level of ROA or the efficiency related to costs.

Another author, Focarelli (2002) has included in his model mergers and acquisitions that took place in Italy in the 1985-1996 period, but splits the model into two analysis: the full integration of the two banks and the situation in which the targeting bank controls the assets of the two banks who are not fully integrated in order to form a new entity.

The analysis following the merger, based on calculating many financial ratios shows that at a group level, larger incomes are obtained; the operation costs and labor costs rise in the first year and stay up because of the Italian market specific nature. ROA before taxes increases in the merger year and continues in the next 4 years. In exchange, ROE is not changing in the first years but it will, on the long term because of larger incomes from commissions. For acquisitions operations, the author shows changes in costs structure, a decreasing level of total incomes and an increase of the credit portfolio's quality.

In Romania, foreign banks who entered the market have adopted, generally speaking, the second strategy, who consists in the acquisition of important local competitors who have proven their efficiency and were obtaining large profits. The first two commercial banks in the Romanian market, respectively the Romanian Commercial Bank (BCR) and the Romanian Bank for Development (BRD) were bought by Erste Bank and Société Générale who has pursued a policy of sustained extension by opening many branches. The privatization of BRD started in 1998 by the acquisition of 42% of the shares by Société Générale and was finalized in 2004 when, follow the sell of about 8% of the shares by the state, the French group obtained the control. The privatization of BCR ended at the beginning of 2006 when Erste Bank paid a record 3,75 billion euros for 62% of the shares.



Next, we shall analyze the evolution of the main financial indicators for the two banks, market leaders in Romania in order to determine the impact of their acquisition over their economic performance.

The evolution of the main financial indicators for the Romanian Bank of Development is shown in the table below:

**The main financial indicators for BRD**

Table 3  
-% -

Indicators	2001	2002	2003	2004	2005	2006
ROA	3.21	2.50	2.89	3.65	2.93	2.77
ROE	17.73	14.05	18.85	29.15	31.55	34.40
Net interest margin	7.71	7.66	7.84	6.89	5.43	4.44
The weight of operational costs in assets	6.53	7.23	7.07	5.00	3.68	3.40
The weight of total costs in total incomes.	78.08	82.51	95.89	83.16	61.65	64.66
Deposits/Assets	77.31	76.16	78.44	74.55	77.74	73.82
Gross Profit/Total incomes	16.44	14.61	24.93	31.98	27.90	28.36
Total incomes/ Assets	19.56	17.10	11.60	11.41	10.50	9.77

Source: own calculation.

The indicators have been obtained while the market share of the bank has permanently increased from 13.3% in 2003 to 15% in 2005 and 16.3% in 2006.

Also it must be stated that, in the calculation of financial ratios, we used gross profit rather than net profit in order to remove the influence of the fiscal environment over the bank's performances.

The return on equity had at a high level, which reflects the manager's attention for the maximization of the shares' market value. These results can be due, partially to the bank's acquisition by Société Générale who introduced efficient banking practices and granted the bank's access to international financial markets at a low interest rate. Another explanation for the very good results can be the bank's presence at the stock market which increased its transparency and forced managers to act according to the shareholders' expectances.

The return on assets has experienced a descending evolution in spite of the good evolution of the bank's profit that has risen more than 4 times in the past 6 years. This is due to the assets' dynamics who outrun the profit's dynamics as a consequence of fast development of the Romanian banking industry and the aggressive expansion strategy adopted by Société Générale.

The net interest margin has had a decreasing trend, which is normal if we consider the lowering of the interest spread due to fall in the inflation rate and the acceleration of the competition between banks. The weight of the operational costs regarding to assets and total incomes decreased every year as a result of a risen efficiency, the bank managing to increase its assets and incomes faster than its costs. The weight of total deposits regarding to assets has maintained to a high level even with the passive interest reduced so the bank is continuing to beneficiate from cheap financing resources which will result in important profits.

The aggressive strategy adopted by the bank is also proven by asset utilization ratio who shows that the assets' dynamic outrun the incomes dynamics which can be explained by the banks' pursuit of the market share rather than immediate profit.

As a conclusion, the effect of BRD's acquisition was obvious after a couple of years from the merger which is demonstrated by the growing financial results and the increased market share of the bank.

The Romanian Commercial Bank is the Romanian market leader with a market share of 26,2% in 2006, which is a little lower than the previous years (26,3% in 2005, 26,1% in 2004, 29,3% in 2003). BCR has been bought in 2006 by Erste Bank who has adopted a strategy of aggressive expansion by opening a large number of branches.

Next we shall analyze the financial indicators of the bank in the 2001-2006 periods. It has to be stated that, as shown by BRD results, the effect of a merger becomes observable at the level of economic indicators after a couple of years from the merger.

The financial indicators of BCR are shown in the table below:

**The main financial indicators for BCR**

Table 4

- % -

Indicators	2001	2002	2003	2004	2005	2006
ROA	4.34	3.20	2.07	3.40	2.16	1.77
ROE	22.87	17.67	11.62	22.21	19.54	19.93
Net interest margin	9.77	7.87	6.54	5.93	5.59	5.41
The weight of operational costs in assets	6.79	5.76	6.83	5.57	4.10	3.42
The weight of total costs in total incomes.	77.54	76.04	80.61	75.64	75.33	75.16
Deposits/Assets	79.02	80.18	76.25	73.94	58.53	54.57
Gross Profit/Total incomes	19.14	16.95	14.09	25.45	21.78	20.53
Total incomes/ Assets	22.65	18.85	14.69	13.34	9.94	8.60

Source: own calculation.

Also in the BCR case, the return on assets has had a decreasing trend because the assets had grown faster than the profits, which is explainable by the expansion strategy continued by Erste. Unlike BRD, the return on equity is at a low level which can be explained by the delay of privatization and the larger dimension of BCR. The net interest margin is decreasing because the drop of the inflation rate and increased banking competition but stays at a superior level compared to BRD because of the market leader position.

The intensification of the concurrence leads in the past years to the consolidation of the Romanian banking system. The local competitors are bought one by one by stronger banks that have the ability to invest massively in order to increase the market share.

After a transition period in which banking systems from Central and Eastern Europe were restructured and privatized, nowadays they are in a new stage characterized by a greater integration with the banking systems from developed European countries. In spite of the integration process, the banking systems from Central and South-Eastern Europe are considerably less developed compared to Western Europe although the financial systems in these countries are more dependent to the banking system than developed countries.

In candidate countries to the European Union the foreign capital represented on the average 65% of the total bank capital, a rate that has a tendency to grow if we consider the end of the privatization process. By contrast, in the European Union the foreign capital represents on the average only 20% of the total capital. The low degree of market integration and the desire of the authorities not to lose the control over the banking system are among the main reasons that led to the low share of foreign capital. As a consequence the EU expansion led to the modification of the European banking system structure with higher shares of total capital owned by foreign investors.

The Austrian, Italian and Belgium's banks are among the most active foreign banks in the region. The activity developed by foreign banks in Central and Eastern Europe includes a large range of banking products and services like: credits for domestic firms that have invested abroad, credits for multinational firms and best local customers, investment banking, retail activities.

Even if the attitude toward foreign banks is different from one country to another or from one stage to another, nevertheless the general opinion is that the capital and know-how imported play an important role in the modernization of banking systems from Central and Eastern Europe, in raising the competition and the efficiency. Besides the advantages of foreign implication in the banking industry there are some concerns about losing control of the national banking system, the possibility of a destabilization by increasing local banks dependence towards their foreign owners, difficulties in banking supervision, increased competition with more inexperienced local banks.

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## **BANKING CRISES AND THEIR IMPLICATIONS ON THE FINANCIAL SYSTEM**

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**Abstract.** *Banking crisis are harm as they generate a interruption in the economic activity. The collapse of the payment systems causes the interruption of the large scale transactions and may lead to the collapse of out-put. The episodes of crises are typically associated with a deterioration of the banks balance sheets and the debtors status. Due to the fact that banks are important source of finance, the reduction of credit may lead to a reduction of investments and consume.*

*Another characteristic of banking crisis is that they lead to the insolvency of a great part of the banking system. However, the banking crisis do not affect only the banking system but they also have deep implications on the whole economic activity.*

**Key words:** banking crisis; reorganization; bankruptcy; non refunded loans; emergent countries.

**REL Classification Numbers:** 10I, 11B, 11C, 11G

According to Mishkin there are five categories of factors which lead to unfavourable events which can provoke the banking crisis: increase of interest rates, increase of uncertainty, companies assets and balance sheet status, problems of banking systems and fiscal disequilibrium.

Increase of interest rate: it is noticed that companies which make the riskiest investments are those eager to pay the highest interest rates.

In case the interest rates increase high enough, because of the high request for loans or the decline of money offer, then a good risk manager would not be very willing to borrow, while those who have tendency for risk would be willing to borrow. Thus, the substantial decline of loans shall lead to a decline of investments and the aggregate economic activity.

Companies assets and balance sheet status has significant implications on the asymmetry of information in the financial system. A simple decline of capital market can cause a serious deterioration of the companies balance sheet which can determine the increase of adverse selection and moral hazard on the financial markets. This situation can provoke, furthermore, a financial crisis.

A decrease of the capital market means a reduction of the net earning of the company. This fact determines the creditors not to accept to lend this company since, as it is known, the net earning of the company is strongly tied to interest rate. In case the interest rate decreases, then the creditors shall be less protected against adverse selection, they shall reduce the loans level and this shall determine a reduction of investments and aggregate output.

Problems of the banking system: banks play a major role on the financial markets since they promote the investments in economy. And, furthermore, the banks balance sheet status is a very important factor for the loans level of the respective bank.

Fiscal disequilibrium: in emergent countries the fiscal disequilibrium may create the threat of non-payment of governmental debt. Thus, the government may have problems in convincing the population to buy the issued bonds. In such situation, the banks might be obliged to buy such bonds. In case the debt value decreases, which is quite possible in case of governmental debt, then the banks would have problems with the balance sheet, and this would determine a reduction of credit caused by the reasons shown above.

The threat of non-payment of debt may cause also a crises of the exchange rate when the local currency constantly decreases in value because the investors retrieve their funds out of the respective country. The depreciation of the local currency shall determine the deterioration of the companies balance sheet.

These issues determine a decline of credit and a reduction of economic activity.

A factor that can determine the appearance of banking crisis is represented by non refunded loans. The non refunded loans are a common characteristic of the banks since no bank can have enough information about its customers and the process of granting loans may be founded on wrong estimation on the capacity of the debtors to reimburse their loans. In a normal economic environment, the non-refunded loans represent no more than 1-2% from the total granted loans.

The researchers noticed that the financial liberalization process may be a factor of initiating the banking crises since the liberalization determines a boom of credits, followed in may cases by bankruptcies.

Similarly, the macroeconomic shock are called the factors of crises. Certainly, some small countries are dependent on one or two resources which fluctuations of prices determine serious problems of the economy. During 90's the ex-communist countries suffered serious institutional problems and important reduction of GDP which would affect even the most stable banking systems. It is not surprising that almost all the countries in transition have suffered banking crises.

The macroeconomic shocks were quite frequent in the past. During the XIX century, USA was a developing country. The local banks often suffered because of decrease of prices of various merchandises and the depreciation of prices on real estate market. However, the number of banks which bankrupted was small. Therefore, the researchers reached the conclusion that it should be another reason in order to destroy a banking system.

Among other factors that determine the banking crises it can be the banking supervision – there is a perception that a banking bankruptcy can be a result of an non-adequate supervision, but this factor cannot be the unique determining cause of the crisis. And furthermore, in case the supervision would be tight enough to eliminate completely the probability of a bankruptcy, the banking activity would become an uncompetitive activity and would fail in accomplishing its primordial function, namely the financial intermediation. Therefore, the monetary authorities have the possibility to chose the tightness and intensity of the supervision system.

When the authorities face banking crises, they have to take measures to recover the situation and, in the same time they have to take into account also the way their intervention would affect the future behavior of the private companies.

One of the aims of solving the crises is to reduce the problems of payment system and to stop the loss of confidence in the whole financial system. Authorities should also be careful with the effects of the loans offer on the private sector. The potential systemic threat of the banks bankruptcies would affect the economy in accordance with the level of

the financial intermediation and the possibility for the lenders to have other source of credit.

The countries affected by the banking crises try to reduce as much as possible the net cost of solving the crises and to lessen the probability to appear another crises in the future. We have to stress that each country has different financial and legal environment. That is why the methods to maintain a financial stability are usually distinct. However, the following elements seem to have general applicability.

Solutions for the private sector: they are preferred instead of the public ones since they do not involve any direct cost for the contributors. In case a bank is insolvent, the liquidator could ask the shareholders or the creditors to contribute with new share capital.

Imposing the losses: even in case the public sector is involved, the cost of solving the banking crises can be limited if the shareholders, managers and other creditors would pay the losses.

The schemes to protect the deposits may have impact on the deponents behavior. Thus, by adopting the scheme of deposits protection with limited coverage, the deponents might confront with the loss risk. It is very important to impose the losses to important deponents, such as other banks and non-banking companies since they would be more careful to monitor the banks behavior.

The studies demonstrate that specific features of the protection schemes of deposits affect the financial stability. Demirgüç-Kunt and Detragiache showed in a study effected on 61 countries (between 1980-1997) that in the absence of an efficient supervision system, the probability to appear crises increases with the coverage rate and decreases in case of co-insurance.

Among the methods used in order to solve the banking crises, we can mention the assisted solving and non-assisted solving methods.

Non-assisted solving methods may be as follows:

- Non-changing the bank by-laws – when the bank supervisor ascertains that the banks is insolvent, the first trial to solve the crises is to rehabilitate the banks without governmental assistance. The banks could reduce the level of loans or could ask to the shareholders or to the interested parties to bring supplementary capital or the management to be changed or operations changes to be done.

- Changing the bank by-laws – merger with a private institution. In case no increase of capital from the shareholders or other interested parties can be done, the next step would be the non-assisted merger with a healthy financial institution. This can be done if the level of losses is transparent for the potential buyer. This is the reason why have to determine the level of losses in order to assure that the buying institution owns sufficient capital in order to cover all the losses.

- Liquidation – in this case, the bank is declared insolvent, is closed and the deponents are refunded. The restructuring authority liquidates the bank assets. Most of the times, the non-insured deponents and other creditors are paid only in case there are sufficient funds after the liquidation.

Assisted solving methods may be:

- Non-changing the bank by-laws – central banks offer emergency assistance in potential systemic situations and only for limited period of time.

- Changing the bank by-laws – solving the bank failure can be done by an assisted merger of acquisition. The transaction can be done with another bank or, if the law allows, with another type of institution. A merger assures the continuity of the business both for the debtors and deponents.

- Bridge banks – a bank in difficult situation is temporary hold by the government. Industrialized countries, such as Finland and Sweden used this method in case

of big banks in difficulties in order to help the restructuring and selling of these banks to private institutions.

A study of OECD reveals the methods used by the member countries in order to face bank failures. It was ascertained that central banks and governmental agencies intervened immediately after the crises appeared in order to provide liquidities. In most of the cases, this helps to prevent the panic among the creditors.

When important banks confronted with difficulties, these problems were solved by mergers or government injection of capital or strict supervision of the whole banking system. In most of the countries, government holding of banks last for a short period of time, until the bank was bought by a private buyer.

In most of the crises of 90's, the central banks offered liquidities to banks in difficulties. There were many cases when central banks suffered losses because the banks they helped were insolvent.

In order to see the impact that banking crises have on long term, Dziobek and Pazarbasioglu assert that solving measures rather improved the banks balance sheet than the profit.

Demirgüç-Kunt, Detragiache and Gupta assert that the confidence in banks decreases dramatically in the first three years of crises. In many cases, it was necessary to increase the liquidity for the whole banking system in order to stop the cash massive withdrawals of the foreign deponents, while the governmental bonds helped the banks to increase the capital.

During the last decades, banking crises were present both in the developed and developing countries.

All the emergent countries confronted with banking crises during the transition period. The key factors which contributed to the appearance of crises in these countries were the huge debts inherited from the previous socialist regimes and the lack of experience of the banks and companies.

In order to study the banking crises in emergent countries during the period 1990-1998, we have chosen 12 countries: 5 countries from Central and Eastern Europe (Bulgaria, Czech Republic, Hungary, Macedonia, Poland), 3 Baltic countries (Estonia, Latvia, Lithuania) as well as Georgia, Kazakhstan, Kyrgyzstan and Ukraine.

The various strategies adopted by the authorities of these countries for solving the crises seem depend on two key factors in the first years of transition. The first refers to the macroeconomic conditions existent at the beginning of the transition, especially the inflation, and the second refers to the banking system.

Most of the countries taken into consideration suffered more than one crises during 90s and the problems experimented by them had different causes. Although we cannot reach obvious conclusions, we can identify two types of episodes of banking crises.

The first type of episodes was determined by the solvency of the banks held or initially held by the state which faced the bad loans inherited from the socialist system.

In other cases the bad loans were not inherited from a centralized system but they were the result of inefficient practices during the transition process. These episodes were associated with insolvency of the banking system on a large scale (Bulgaria 1996-1997, Hungary 1995-1997, Poland 1993-1994, Estonia 1992-1994, Latvia 1995, Czech Republic 1996-1997, Georgia 1995-1997 or with the non-accomplishment of the new regulations (Georgia 1994, Ukraine 1995-1998).

As to the magnitude of crises, there are significant differences. The crises generated by the bad loans inherited from the centralized systems represent 21% from the total credits in Hungary and 50-66% in Czech Republic. The crises not generated by the bad loans, they represent 40% (Georgia 1995) and more than 90% in Kyrgyzstan 1994).

From the shareholding structure perspective, both banks held by the state and the private ones faced insolvency and liquidity problems, although the banks held by the state were the most involved in the governmental programs for restructuring initiated for the purpose of cleaning up the bad loans portfolios inherited from the socialist regime.

The most important factors that determined the banking crises in the emergent countries were:

- Macroeconomic conditions

The transition process and the external shock lead to severe contractions in these countries which hurried the banking crises in many analyzed countries.

- Deficiencies of the banking supervision and the legal provisions

At the beginning of 90s the regulations for the banking system were almost inexistent in these countries and the supervision of the banking system and prudential norms did not function very efficient.

- Inefficient internal management

Fraud, corruption practices, loans granted to insiders and inadequate exposure contributed to the deterioration of the banking system in many emergent countries.

In order to overpass the banking crises, the authorities took a lot of measures which aimed to the institutional, operational and financial restructuring of the banks with problems.

- Institutional restructuring

It refers to the banking environment. The key elements are: legal framework, prudential regulations, accounting standards and banking supervision.

- Operations restructuring

It refers to the banks flows problems caused by bad loans and high cost of operating. Operational restructuring has two forms: closing and liquidating the banks and the restructuring by changing the management or privatization.

The strategies followed by the authorities in order to solve the banking crises depended on two factors: level of development of the banking system and the macroeconomic conditions.

- Financial restructuring

This involves one or more of the following actions: capital increase, reduction of banks debts, transfer of bad assets to a special agency, improvement of bad assets management.

Conclusions: the banking crises in emergent countries are different from banking crises in other countries because of the initial conditions of these countries.

The solving strategies followed by these countries can be divided in three categories: the central and eastern European countries used the restructuring and capital injections, Georgia, Kazakhstan, Kyrgyzstan and Ukraine followed the liquidation of banks and the Baltic countries combined the liquidation, restructuring and capital injections.

Initial conditions and crises solving strategies had a huge impact on the fiscal costs. These costs depended also on the involvement of shareholders and deponents in paying a part of them. In Georgia, Kazakhstan, Kyrgyzstan, Ukraine and Baltic countries the fiscal costs were in general low since these countries used the method of recapitalization through private shareholders. Also, in these countries the deponents were not refunded in case of banks liquidation.

Countries from eastern and central Europe faced very high fiscal costs. Taking into account the costs of banking restructuring and refunding of deponents, these countries registered the highest level of fiscal costs amounting between 7% and 40% of GDP, in comparison with 0.1-18% or 2-3% of GDP in the other two categories of countries.



It was noticed that after solving the crises, all the three categories of countries registered positive results, the best figures being registered in central and eastern European countries.

At present, it is considered that the attempt to prevent the banking crises has to take into consideration the rules related to corporative governance, transparency requirements, prudential regulations, deposits insurance. As to the prudential regulations, the Principles for efficient banking supervision had a very important role in emergent economies. Basel II aims to the continuance of development of risk management culture.

The recent crises have refreshed the idea that the authorities have to be able to act immediately in order to face the incipient problems before a crises would appear.

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# MONETARY POLICY TRANSMISSION MECHANISM IN ROMANIA - A VAR APPROACH

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*Abstract.* From the central bank's point of view, the transmission of monetary policy to the economy is of distinguished interest among various topics of macroeconomics. Without being aware of the monetary transmission mechanism it is not possible to conduct good policy. This paper applies the identified VAR methodology to synthetic national data from 2000 till Q2 2007 to study the macro-economic effects of an unexpected change in monetary policy in Romania.

**Key words:** monetary transmission mechanism; vector autoregression.

**Clasificare REL:** 11C, 3B, 9H

## 1. Introduction

Monetary policy represents one of the most powerful instruments of economic policy, via which economy is acted upon. The transmission mechanism is precisely the process via which monetary policy decisions move economy as a whole. In a simplistic approach, we could say that an increase in the currency offer ultimately determines an increase in the aggregated demand and thus, via various channels, an increase in GDP. One aspect on which most economists agree is the fact that movement is produced at certain time lags that are, regularly, long and variable. In order to fulfil monetary policy objectives, it is very important to know well the monetary policy transmission channels and mechanisms, so that the monetary authority could make the best decisions.

Starting from these premises, the current article tries to analyse the monetary policy transmission mechanism in the Romanian economy by using the VAR model (Vector Autoregressions). The VAR methodology is very often used in estimating the effects of the monetary policy on production and prices, and of the monetary policy transmission mechanisms, in the '90s. The use of VAR models started with Sims' work (1980). Recently, Leeper, Sims and Zha (1998) and Christiano, Eichenbaum and Evans (1999) created a synthesis of the numerous reference works on monetary policy transmission mechanisms in the United States of America. In Europe, the VAR methodology was frequently used to analyse the differences at the level of the Euro zone member states regarding monetary policy transmission mechanisms. The results of these analyses are summarised in Angeloni, Kashyap and Mojon (2003).

At the level of the Romanian economy, the problematics of the monetary policy transmission mechanisms was approached by Antohi, Udrea and Braun (2003) who attempted to identify the main characteristics of the monetary policy transmission mechanisms in Romania. The analysis of the two segments of the monetary transmission mechanism, namely the transmission of monetary policy impulses on financial variables and, respectively, the connexion between the financial sector and the real economy, is done by distinct methods. For the first segment of the monetary transmission mechanism, they resorted to an empirical evaluation based on the use of a Vector Error Correction methodology. Its results, however, were not very relevant due to a short series of available

data. The results of the empirical analysis show that the National Bank of Romania (NBR) directly influences interest rates practiced by banks for term deposits, via the interest rate of the sterilisation operations. Instead, the interest rate of bank credits does not seem to be directly sensitive to the NBR interest rate but to the interest rate of bank deposits.

In the case of the second major connexion, due to the incipient stage in the formation of NBR's monetary transmission mechanism, the authors designed a theoretical and intuitive approach that highlights the fact that the formation of traditional monetary impulses transmission channels is at an incipient stage due to the long process of eliminating financial intermediaries that the Romanian economy has been familiar with. Under these circumstances, the exchange rate channel, together with the NBR foreign currency purchase channel, continue to represent significant ways via which the operations of the monetary authority impact macroeconomic behaviours. Beginning with the year 2000, the authors noticed the reactivation of the credit channel and especially of the interest rate channel. However, the good operation of the credit channel continues to be undermined by the existence of liquidity excess in the system, by the phenomenon of national currency credit substitution with foreign currency credits, as well as by manifestations of moral hazard.

Although the VAR methodology is very often used in empirical analyses, its results are not generally accepted. This is so because the evolution of prices has featured the highest volatility among model variables while, as *Christiano, Eichenbaum and Evans (1999)* argue, the answer function to shock monetary policy whose variables, such as total production, was insignificant. In addition, it is useful to mention here that all VAR analyses contribute to the identification of monetary policy shocks (shocks regarded as unexpected deviations from the natural flow of the monetary policy, innovations) and to the quantification of their consequences; yet, they do not refer to the impact of the systematic component of the monetary policy on production or price level.

On the other hand, the effort to identify monetary policy shocks and the quantification of the effects of these shocks via the VAR analysis represents one of the few methods to understand the dynamics of the economy.

## **2. Monetary policy transmission channels**

Over the last years most central banks in the emergent countries or countries in transition have developed or are developing structural models of the monetary policy transmission mechanism. An important element that must be considered in the case of these countries is the modification, sometimes even radical, of the monetary policy transmission channels as a result of the quick evolution of financial markets and of their integration in international markets. The construction of models can prove hard to achieve and even inefficient if there are no studies that have researched in advance the various monetary transmission channels, not only from a theoretical point of view, but also empirically.

Any decision at the level of monetary policy is transmitted in economy via several transmission channels, but their relative importance, as well as the system's general behaviour, depend very much on the specific features of the respective national economy, as well as on the structure of the financial system (market-based or bank-based) and the existing legal framework.

The importance of the financial structure is supported by an ample series of studies (for instance *Cecchetti, 1999*). Variations in the structure of the financial system lead to different responses to decisions and monetary policy modifications, both from the point of view of how ample the response is, as well as from the point of view of the time interval needed for the emergence of this response. It is obvious that not all companies feature the same sensitivity to interest rate changes, and there are differences both in the

same industrial sector and from one sector to another. Also, not all companies depend, to the same extent, on bank credit. A proof of these differences is the Euro zone. Numberless researchers (Cecchetti, 1999, Angeloni et al., 2003) show that there are differences in monetary policy transmission channels from one country to another, although significant steps have been made in order to integrate the goods and services market, to apply levelled financial and monetary policies, and to synchronise economic cycles. These asymmetries among member countries of the monetary union makes the task of the European Central Bank much more difficult. The source of asymmetries that are characteristic to the financial structure is mainly the difference in the legislative framework (Cecchetti, 1999). But this is not all: a significant role is played by the different character of financial markets.

### 3. VAR Analysis of the monetary policy transmission mechanism

There is a large number of studies that use the Autoregressive Vector method in the analysis of macroeconomic effects of unexpected exchanges in the monetary policy interest, by the monetary authority, in the European Union countries. The use of VAR models started with *Sims' works (1980)*. Recently, *Leeper, Sims and Zha (1998)* and *Christiano, Eichenbaum and Evans (1999)* summarised numerous significant works concerning monetary policy transmission mechanisms in the United States of America. In Europe, the VAR methodology was frequently used for the analysis of differences, at the level of the Euro zone member states, regarding the monetary policy transmission mechanisms. The results of these analyses are presented in *Peersman and Smets (2001)* and *Mojon and Peersman (2001)*.

Over the last years several materials on monetary transmission mechanisms in the Central and Eastern European countries, have been written, see *Creel and Levasseur (2004)*, *Egert and MacDonald (2006)* and *Darvas (2005)*. At the level of Romania's economy, the problematics of the monetary policy transmission mechanisms was approached by *Antohei, Udrea and Braun (2003)* who attempt to identify the main characteristics of the monetary transmission mechanisms in Romania.

#### a) Methodology used

The models used in the VAR analysis of the effects of monetary policy shocks, using Romania as a case study, are based on the model developed by *Peersman and Smets (2001)* and *Mojon and Peersman (2001)*.

Considering the position of the Romanian economy among the other European economies, namely that of an open economy, of a relatively independent monetary policy, we have estimated two VAR models described as follows:

$$Y_t = A(L)Y_{t-1} + B(L)X_t + \mu_t \quad (1)$$

where  $Y_t$  – the endogenous variables vector,  $X_t$  – exogenous variables vector.

The exogenous variables vector contains the world commodities index (wpi), the real GDP for the Euro zone ( $y_{eu12}$ ), the consumer price index in the Euro zone ( $cpi_{eu12}$ ) and the domestic nominal short-term interest rate in the Euro zone ( $i_{eu12}$ )

$$X_t = [wpi \ y_{eu12} \ cpi_{eu12} \ i_{eu12}] \quad (2)$$

These variables were included so as to control changes in total demand and inflation at European level. The inclusion of these variables helps us solve the so called "price puzzle". By treating these variables as exogenous, we implicitly consider that national variables do not influence variables at European level and we consider the current impact of exogenous variables on endogenous variables.

In the first model, the national endogenous variables vector ( $Y_t$ ) includes the real gross domestic product (GDP) ( $y$ ), the consumer price index (cpi) at the level of the Romanian economy, the effective short-term interest rate ( $i_{ef}$ ) and the effective exchange

rate (s) of the RON versus EUR and USD, calculated as a weighted average of the USD/RON(30%) and EUR/RON (70%) exchange rates.

$$Y_t = [y \text{ cpi } i_{ef} \text{ s}] \quad (3)$$

In the second model we also include the M2 monetary aggregate in the endogenous variables vector. The inclusion of the M2 monetary aggregate, can help us identify monetary policy shocks. In this case the endogenous variables vector is:

$$Y_t = [y \text{ cpi } i_{ef} \text{ s m2}] \quad (3')$$

In both cases the monetary policy shocks are identified by a standard Choleski decomposition with variables ordered as in (3) and (3').

The VAR model described by the equation (1) represents the reduced form of the system, a form that is derived from the VAR model that allows simultaneous influences among variables. The initial model can be represented as follows:

$$KY_t = AY_{t-1} + BX_t + \varepsilon_t, \text{ where:} \quad (4)$$

the K matrix comprises all coefficients that describe simultaneous relations among variables; the A matrix comprises all coefficients that describe relations of certain lags among variables; matrix B comprises all coefficients that describe relations among endogenous and exogenous variables;  $\varepsilon$  comprises errors.

By multiplying the ARV system with the inverse of the matrix  $K^{(-1)}$  we obtain:

$$Y_t = K^{(-1)}AY_{t-1} + K^{(-1)}BX_t + K^{(-1)}\varepsilon_t \quad (5)$$

which can be rewritten under the simplified form in the equation (1).

$$Y_t = A(L)Y_{t-1} + B(L)X_t + \mu_t, \quad (6)$$

where :  $a = K^{(-1)}A$ ;

$$b = K^{(-1)}B;$$

$$\mu = K^{(-1)}\varepsilon.$$

The recursive Choleski type method is an identification of  $\varepsilon_t$  initial shocks by using the  $\mu_t$  error vector. We can identify  $\varepsilon_t$  the initial shocks, via the recursive method only if we suppose that there are precisely  $n^2 - [(n^2 - n)/2]$  simultaneous relations among variables, where n represent the number of endogenous variables. This supposes that the recursive method requires  $(n^2 - n)/2$  supplementary restrictions in our model. This aspect can be solved by imposing a triangular structure to the K matrix with all elements above the main diagonal vector equal to zero. Thus we can choose an order of the endogenous variables that should reflect the situation in the economy.

The basic hypothesis in these models is constituted by the fact that, in a short term perspective, interest, exchange rate and monetary aggregate shocks do not have a contemporary impact on the consumer price index and on total production because of the weak reaction of the real sector to shocks in the monetary and financial sector. The interest rate reacts simultaneously to a total production and prices shock, which can be interpreted as a reaction function of the monetary authorities to shocks that affect the real sector. The exchange rate is immediately influenced by all types of shocks, except for a shock of M2, the monetary aggregate, in the case of the second model.

#### b) Used Data

In the analysis of monetary policies transmission mechanisms in Romania we have used monthly data gathered between January 2000 and June 2007. The data were seasonally adjusted, except for the exchange rate and interest rate, logarithmated and multiplied by 100, except for the effective interest rate variable.

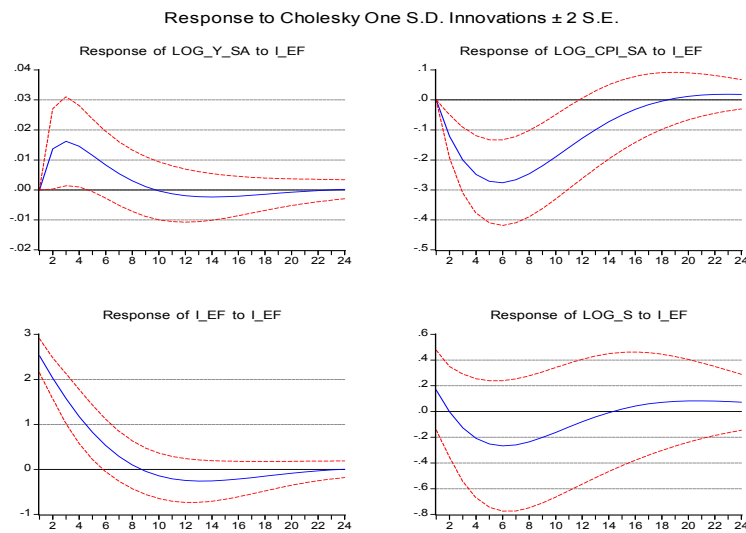
The augmented Dickey-Fuller tests have proved that endogenous variables used in the model are non-stationary. We have chosen the use of the VAR model with variables expressed in levels (of initial specification), and not in differences, because some variables tend to be integrated of order 2 - I(2) - and there is co-integration among variables

expressed in levels. The same methodology was used by *Peersman and Smets (2003)*, *Darvas (2005)*, *Vonnák (2006)* and *Arnoštová and Hurník (2005)*.

The choice of the number of VAR lags was grounded on the results of the error minimisation criterion given by Schwartz. According to this criterion, the chosen number of lags is 1.

*c) Results of the estimation*

Figure 1 shows the effects of a monetary policy shock, of standard deviation, on the real GDP, prices and the exchange rate, with a degree of trust of 95,44%, in the case of the first ARV model used.



**Figure 1.** The response of  $Y$ ,  $CPI$ ,  $I_{EF}$  and  $S$  variables to a monetary policy shock

The main effects of a monetary policy shock are:

- ✓ An unexpected increase of the effective short term interest rate is accompanied by a decrease of the consumption prices index. This decrease reaches the highest amplitude after 6 months;
- ✓ Also, the exchange rate registers a decrease, that is equivalent to the appreciation of the national currency, that reaches the maximum level after 6 months;
- ✓ GDP's response is not significant from a statistical point of view (the trust level includes level 0) and is contrary to intuitive analysis

In the case of the second ARV model (which differs from model 1 by introducing the M2 variable in the endogenous variables vector), we can notice that the results are similarly to those in the first model. An unexpected increase of the effective short term interest rate is accompanied by a simultaneous decrease of the monetary aggregate M2.

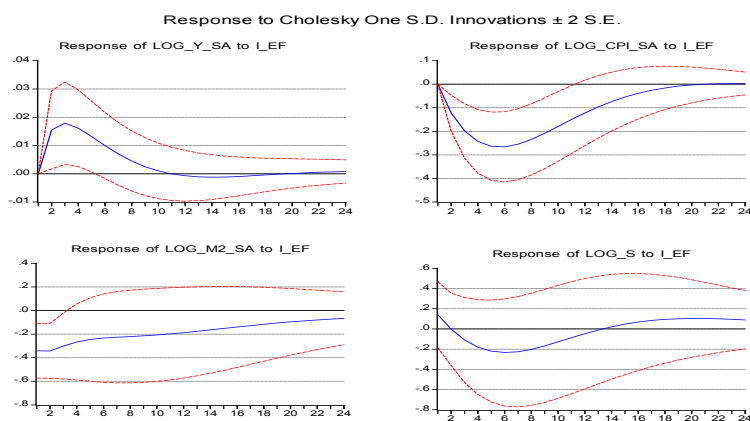


Figure 2. The response of the Y, CPI, M2 and S variables to a monetary policy shock

In figure 3 we can notice that only a small proportion of the GDP variation is determined by an interest rate shock, irrespective of the time frame considered. The largest proportion of the GDP variation is determined by innovation (over 85%, irrespective of the time frame considered). A percentage of 40,48% from the CPI variation, over a 12 months, is explained by monetary policy shocks.

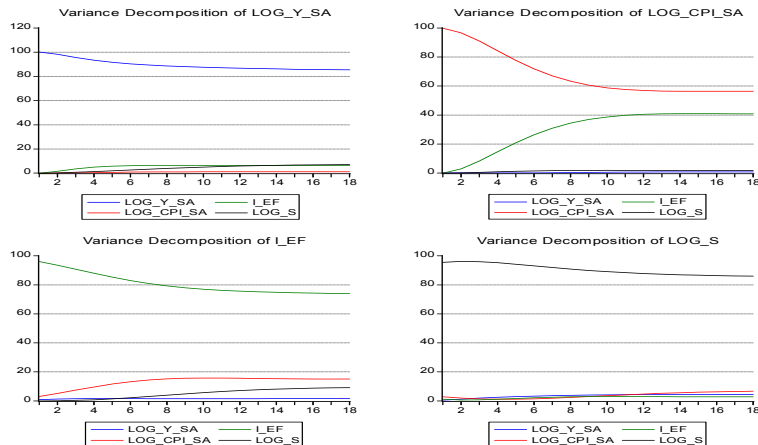


Figure 3. (Variance) dispersion decomposition in model 1

Figure 4 shows the results of the decomposition of the dispersion of the five endogenous variables. One can notice that in this case, just in the previous model, a very large proportion from the CPI variation is determined by monetary policy shocks. The variation of the monetary aggregate is determined to significant proportions by exchange rate shocks. The GDP variation is determined, in this case as well, to very large proportions, irrespective of the time frame considered, by own innovations.

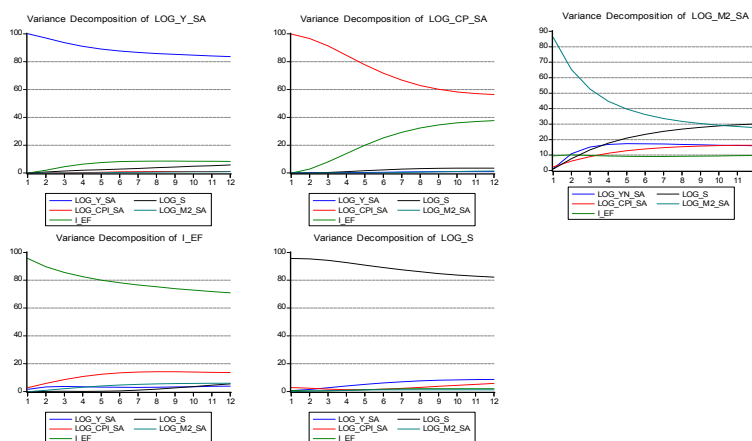


Figure 4. Dispersion (variance) decomposition in model 2

By applying the Granger causality tests it is confirmed that *i ef* does Granger causes *CPI*, but the hypothesis that *i ef* does not causes in the sense of Granger *Y* is not refuted. On the contrary, the hypothesis that *Y* does not Granger causes *i ef* is refuted. According to tests, *CPI* and *M2* does Granger causes *Y*, whereas the effective interest causes in the sense of Granger only *CPI* and the exchange rate.

d) The effects of a monetary policy shock on other macroeconomic variables

In this section we will analyse the effects of a monetary policy shock on several macroeconomic variables, which are not included in the basic models. This effect is quantified by extending the basic VAR model 2, so that  $Y_t$ , the endogenous variables vector, should include the new macroeconomic variables. The method is adapted after Peersman and Smets (2003).

We have checked the impact of a monetary policy shock on the following macroeconomic variables: FGCF = gross fixed capital formation; CHN = private consumption; IMP = import value at the level of the Romanian economy; EXP = export value at the level of the Romanian economy; M1 = monetary aggregate, m1, or the monetary amount in a limited sense; PRIV\_LOANS = non-governmental credit.

These variables are introduced in the basic VAR model and we suppose that the new variables do not influence the variables in the basic model, but are influenced by them. The data are for the period 2000m1- 2007m06 and they were adjusted every season, logarithmated and multiplied by 100.

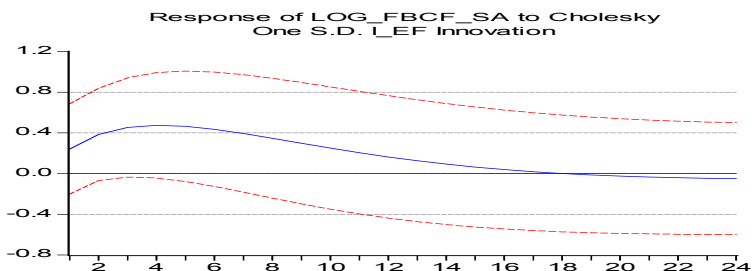


Figure 5. The impact of a monetary policy shock on fix gross fixed capital formation variable (FGCF)



One can notice that the unexpected increase of the effective short term interest rate is accompanied, contrary to an inductive analysis, by the increase of the FGCF level. This increase features reduced amplitude and reaches the maximum level in the fourth month.

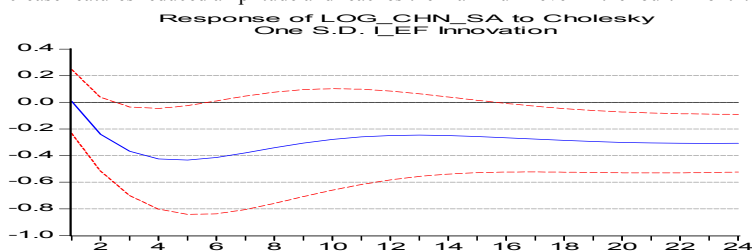


Figure 6. The impact of a monetary policy shock on the private consumption (CHN) variable

A monetary policy shock is accompanied by the decrease of private consumption, which is in agreement with the theoretical and intuitive analysis. This decrease is due to the increase of real interests; thus, the cost of a loan increases for consumers and the population's tendency to save decreases, which leads to the decrease of the sums available for consumption.

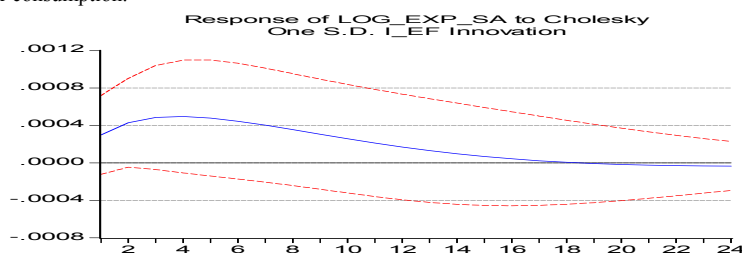


Figure 7. The impact of a monetary policy shock on the exports (EXP) variable

In the case of a monetary policy shock the export levels slightly increase, which is contrary to the theoretical and intuitive analysis. This increase is of a narrow range and it can be due to the fact that the exchange rate reacts after a 1-2 months lag to a monetary policy shock.

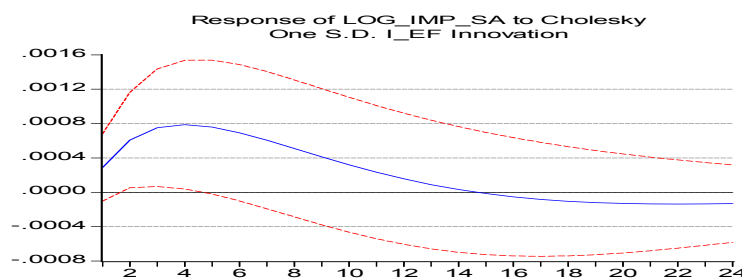


Figure 8. The impact of a monetary policy shock on the imports (IMP) variable

From the chart above, which represents the imports response function to a monetary policy shock, one can notice that in the case of a monetary policy shock imports at the level of the Romanian economy register simultaneous increase. This increase reaches the maximum level during the fourth month after the shock. This import increase can be due to the fact that imported products become cheaper by comparison with local products, due to the strengthening of the national currency.

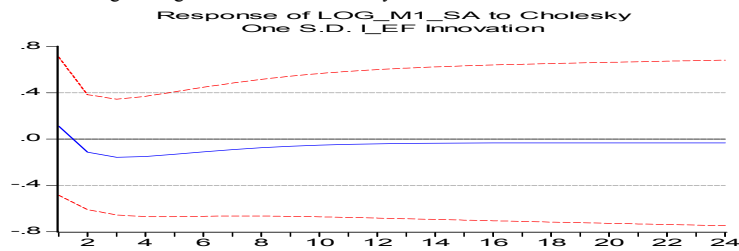


Figure 9. The impact of a monetary policy shock on the M1 Variable

From the chart of M1's response function chart to a monetary policy shock we can notice the negative effect of an unexpected increase of the interest rate caused by the monetary policy on the monetary amount in a limited sense. This negative effect is not very significant and it is similar to the one on M2.

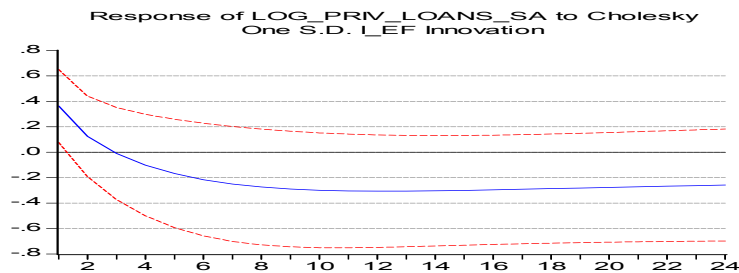


Figure 10. The impact of a monetary policy shock on the non-governmental credit (PRIV\_LOANS) Variable

One can notice that the unexpected increase of the effective short term interest rate is accompanied initially by the increase of non-governmental credit, followed by decrease after 3 months. This phenomenon can be due to the lag between the monetary policy interest increase and the decrease of interest for credits.

#### 4. Conclusions

In this study we have aimed to analyse the monetary policy transmission mechanisms as a whole. The role and analysis of each transmission channel can constitute the topic of further research.

In the analysis of monetary policy transmission mechanisms we used the ARV methodology on the basis of two models that were identified. By using the Cholesky type recursive method to identify the response functions to a monetary policy shock, on the basis of data on the Romanian economy between January 2000 and June 2007, we have quantified the effects of an unexpected harshness of the monetary policy on the main macroeconomic variables.

On the basis of the analysis done we can conclude that the main effects of a monetary policy shock are:

- ✓ An unexpected increase of the effective short term interest rate is accompanied by a decrease of the consumption prices index. This decrease reaches the highest level after 6 months;
- ✓ Also, the exchange rate registers a decrease, that is equivalent with an appreciation of the national currency, that reaches the minimum level after 6 months;
- ✓ GDP's response is not significant from a statistical point of view and contrary to the intuitive analysis, it registers a slight increase after a monetary policy shock;
- ✓ An unexpected increase of the effective short term interest rate is accompanied, contrary to the inductive analysis, by an increase of the FBCF level;
- ✓ A monetary policy shock is accompanied by the decrease of private consumption;
- ✓ In the case of a monetary policy shock, imports at the level of the Romanian economy register simultaneous growth;
- ✓ An unexpected increase of the effective short term interest rate is accompanied by an initial increase of the non-governmental credit, followed by decrease after 3 months.

The results of the VAR analysis show, to a large extent, how monetary policies affect economy in general and how they must be interpreted in the context in which the Romanian economy was in the period analysed, namely an economy in transition, with a high inflation at the beginning of the period analysed and with major changes in the monetary policy. We referred to the passage to the direct targeting of inflation.

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# PRICE AND WAGE INFLATION

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***Abstract.** This paper estimates equations for price and wage inflation based on a model of imperfect competition, using quarterly data for Romania for a 10 years sample from 1997:1 to 2007:1. From the estimation we can conclude:*

- *the output gap has a low impact on inflation;*
- *a growth in the labour productivity level reduces unit labour costs and inflation and increases real wages;*
- *inflation imposes substantial costs on workers due to the negative relation between inflation and real wage;*
- *the level of inflation depends positively on previous period exchange rate;*
- *unemployment rate has a substantial impact on wages in Romania.*

*This paper follows a different approach: instead of estimating a reduced-form relation between the change in inflation and the unemployment rate, I will estimate separate price and wage equations based on a model of imperfectly competitive firms.*

**Key words:** price inflation; wage inflation; output gap; exchange rate pass-through; markup.

**Classification JEL:** F3, F4

## **1. Theoretical considerations**

An intense discussed, analysed and always challenging theoretical and practical economic issue is about inflation and the cause-effect relationship with other macroeconomic variables.

Present in any economy in long term, inflation is a phenomenon that cannot be completely controlled, but only influenced.

Due to the fact that people expectations cannot be made accurately in an inflationist environment, the implementation of economic growth policy is difficult, determining a waste of means and distrust in those policies.

The causes of inflation are multiple and important; identifying for Romania: salarial costs growth, fiscality, depreciation of the national currency, financial indiscipline, prices and tariffs trend for public utilities offered in monopol conditions.

## **2. Determinants of inflation**

Even though the changes in the exchange rate have an impact on the price in national currency for the imported goods, this impact is not immediately transferred to the final consumer. There are many important factors that determine the moment and the degree of influence of this transfer.

The effect of any movements in the exchange rate depend on the shocks within the economy that induced the exchange rate to move; the mechanisms within the model that lead to a relationship between shocks, the exchange rate and import prices; and the time frame of interest for understanding the relationship between exchange rates and import prices.

The initial research on this topic(Dornbusch, 1987) focused on the modelling of partial-equilibrium setups arising from the problem of a single exporter/importer or from the industrial organization of one industry. The approach ignores the view that exchange

rates are endogenous economic variables and looks at the impact that an exogenous exchange rate movement has on the resulting equilibrium price in the industry.

Another approach follows a more general-equilibrium setup. Prices are determined in the exporter's currency (producer currency pricing or PCP) or they are set in the importer's currency (local currency pricing or LCP). When prices are determined in PCP exchange rate pass-through tends to be much larger than when prices are set in LCP.

Recent research in this area experiments with integrated production activities and the interplay between producers and distributors in the supply chain. Imperfect competition in the intermediate goods sector and the local component value added of the final price reflect the pass-through of exchange rates into consumer prices.

The impact of changes in the exchange rate on domestic inflation is known as the "pass-through coefficient".

The direct short-term effect of the exchange rate on inflation is related to the imported part of the basket of goods that make up the CPI. The larger the share of imported goods within the CPI basket, the greater the exchange rate effect on prices.

The exchange rate directly affects the cost structure of companies that are using imported inputs in the production process. Thus, the greater the proportion of imported inputs making up the costs, the more depreciation will affect these companies' prices.

In an economic environment based on inflation targets, pass-through depends on monetary policy and agents' expectations. Although in the short term inflation may rise due to depreciation, in the medium- and long-term inflation should fall back to the target level or range defined by the central bank.

The behaviour of demand determines whether or not companies can transfer to final prices any changes in their costs resulting from fluctuations in the exchange rate. For example, if the economy is in the midst of a recession, companies will find it difficult to pass on higher costs due to depreciation.

Movements in the exchange rate can influence the level of aggregate demand, the composition of demand and wages.

A depreciation in the exchange rate that tends to produce a contraction in aggregate demand could also end up reducing prices by an amount equivalent to the upward pressures generated by the same depreciation.

Currency devaluation brings with it a change in relative prices. Assuming that income is constant, when the prices of imported goods rise, consumers' real income falls. If demand for these imported goods is inelastic, the purchase of other goods and services will have to fall and, as a result, so will the prices of the latter, assuming that prices are perfectly flexible.

Due to market imperfections prices are often rigid and in the case of currency depreciation, CPI inflation will rise. This is why many pass-through studies are based on aspects related to industrial organisation, market structure in terms of concentration, the degree of import penetration and the degree of substitution between domestic and imported products.

A greater concentration in a productive sector increases the producing company's control over price and therefore over markups. The same occurs if there is a small degree of substitution between the domestic and imported products.

This degree of control over the price could vary with the cycle (Small, 1997). In these situations, producers evaluate the costs of modifying their prices and when these are higher than the benefits, they accept transitory fluctuations in their profit margins, causing prices to react less to shifts in the exchange rate.

In the presence of imperfect competition, aggregate demand movements, combined with fluctuations in the exchange rate, affect importers' markups. More volatile aggregate demand would be associated with a reduced pass-through of exchange rate

fluctuations to final prices. In this case, the importers will be less willing to raise their prices for fear of losing market share.

The entry of new firms could have an impact similar to a demand reduction. Superstores and supermarkets distributing a wide variety of products are usually able to reduce costs because of their ability to negotiate with suppliers, to apply different marketing strategies, including markups reduction, particularly when demand is weak.

The volatility of the exchange rate is another factor influencing inflation. The more volatile the exchange rate, the less its impact on domestic prices should be, because importers will be more cautious when it comes to changing prices, especially when the costs of price adjustments are high.

Also, expectations about the duration of currency depreciation affect the speed and size of pass-through to prices.

### 3. A price setting model

#### 3.1. Optimal price in the long run

In order to estimate the price in the long run I derive a Phillips curve from the quadratic price adjustment cost model, developed by Rotemberg (1982).

Assume that the firms are identical and obtain an output „y” by using the labour factor „l” and the imported input factor „z”:

$$y_t = a_1 + a_2 \times l_t + (1-a_2) \times z_t \quad (2)$$

The demand curve faced by each firm would be:

$$y_{dt} = -\eta \times (\tilde{p}_t - p) + y_d - f \quad (3)$$

where  $y_d - f$  is each firm's demand,  $f$  is the logarithm of the number of identical firms,  $\eta$  is the elasticity of demand.

Therefore, the price that maximises benefits in the long run is fixed by charging a margin „m” over the marginal cost „MC”. The price equation:

$$\tilde{p}_{dt} = -\log\left(\frac{n}{n-1}\right) + MC = m + MC = m + a_1 + a_2 \times w_t + (1-a_2) \times p_t^* \quad (4)$$

where:

$w$  = nominal wage, that can be separated into nominal private wage (wpr) and nominal public wage (wpu);  $p^*$  = foreign price.

Let's assume that in the long term firms desire to maintain a constant markup,  $m$ , but in the short run firms could postpone price adjustments and accept deviations from their desired markup level, being motivated by both market share and the actual cost of price changes.

The markup equation may be written as a function of labour productivity( $q_t$ ), the output gap( $y_t - \bar{y}_t$ ) and inflation( $\Delta p_t$ ):

$$m = c_1 + c_2 \times q_t + c_3 \times (y_t - \bar{y}_t) + c_4 \times \Delta p_t \quad (5)$$

Substituting equation (5) into expression (4) we obtain the following relation:

$$\tilde{p}_{dt} = (a_1 + c_1) + a_2 \times w_t + c_2 \times q_t + (1-a_2) \times p_t^* + c_3 \times (y_t - \bar{y}_t) + c_4 \times \Delta p_t$$

The restriction imposed here is:  $c_2 = -a_2$ , which implies that income shares are independent of the level of productivity in the long run. The equation becomes:

$$\tilde{p}_{dt} = (a_1 + c_1) + a_2 \times (w_t - q_t) + (1-a_2) \times p_t^* + c_3 \times (y_t - \bar{y}_t) + c_4 \times \Delta p_t \quad (6)$$

#### 3.2. Optimal price in the short run

The structural equation for inflation is in the spirit of the new Phillips curve literature (Taylor, 1980, Calvo, 1983), derived explicitly from a setting of imperfectly competitive firms where nominal prices are rigid.

The costs of price adjustments are assumed to be quadratic in the percentage change of prices. The firms are assumed to maximize the expected discounted value of the difference between revenues from sales and the sum of production costs and costs of changing prices. The maximisation problem of the expected discounted value is equivalent to the minimization of the loss of charging for its product a different price from the optimal one weighted against the cost of changing its price:

$$\min_{\{p_{t+i}\}} E_t \sum_{i=0}^{\infty} \beta^i [\theta \times (p_{t+i} - \tilde{p}_{t+i})^2 + (p_{t+i} - p_{t+i-1})^2] \quad (7)$$

where:  $E_t$  = the expectations operator conditional;  $\beta$  = the subjective discount rate;  $\theta$  = the relative cost parameter;  $\tilde{p}_t$  = the optimal price of  $p_t$ .

The solution after the minimization problem can be written as follows:

$$\Delta p_{t+i} = \beta \times \Delta p_{t+i+1}^e - \theta \times (p_{t+i} - \tilde{p}_{t+i}) \quad (8)$$

where:  $\Delta p_{t+i+1}^e$  = the expected inflation =  $E_{t+i} \Delta p_{t+i+1}$ .

This equation relates the rate of inflation to the gap between the equilibrium and actual price levels. The optimal price level needs to be defined as in (6). In order to carry out the I(2) analysis on equation (8), following Haldrup(1995), the optimal price can be parameterised as:

$$\tilde{p}_t = \gamma_1 X_{1,t-1} + \gamma_1 \Delta X_{1,t} + \gamma_2 X_{2,t-1} + \gamma_2 \Delta X_{2,t-1} + \gamma_2 \Delta^2 X_{2,t} \quad (9)$$

where  $X_1$  are the I(1) variables:  $\{q_t, \Delta p_t\}$  and  $X_2$  are the I(2) ones:  $\{w_t\}$ .

The optimal price level from relation (6) becomes:

$$\begin{aligned} \tilde{p}_t &= (1 - a_2) \times p_{t-1}^* + c_4 \times \Delta p_{t-1} + a_2 \times (-q_{t-1}) + (1 - a_2) \times \Delta p_t^* + c_4 \times \Delta^2 p_t + \\ &+ a_2 \times (-\Delta q_t) + a_2 \times w_{t-1} + a_2 \times \Delta w_{t-1} + a_2 \times \Delta^2 w_t \Rightarrow \\ \tilde{p}_t &= (1 - a_2) \times p_{t-1}^* + c_4 \times \Delta p_{t-1} + a_2 \times (w_{t-1} - q_{t-1}) + (1 - a_2) \times \Delta p_t^* + c_4 \times \Delta^2 p_t + \\ &+ a_2 \times (\Delta^2 w_t - \Delta q_t) + a_2 \times \Delta w_{t-1} \end{aligned} \quad (10)$$

In order to transform the term  $\theta \times (p_t - \tilde{p}_t)$  we add and subtract  $\Delta p_{t-1}$  and we also use other two identities:

$$\begin{aligned} p_t &= p_{t-1} + \Delta p_t \\ \Delta p_{t-1} &= \phi \times \Delta p_{t-1} + (1 - \phi) \times \Delta p_{t-1}, \quad \text{unde: } \phi = \frac{\beta}{1 + \phi} \end{aligned} \quad (11)$$

The equation (8) can be written now in acceleration form(in second difference):

$$\begin{aligned} \Delta^2 p_t &= k_1 \times (\Delta p_{t+1}^e - \Delta p_{t-1}) + k_2 \times (1 - a_2) \times \Delta p_t^* + k_2 \times a_2 \times (\Delta^2 w_t - \Delta q_t) + \\ &+ \varphi \times (y_{t-1} - \bar{y}_{t-1}) - k_2 \times \{p_{t-1} - [(1 - a_2) \times p_{t-1}^* + a_2 \times (w_{t-1} - q_{t-1}) + \\ &+ a_2 \times \Delta w_{t-1} + (c_4 + \frac{(1 - \phi) \times (1 + \theta)}{\theta}) \times \Delta p_{t-1}]\} + \varepsilon_t \end{aligned}$$

Equation (12) relates inflation to expected inflation, wage growth, productivity growth, the output gap. The error correction term ensures that in steady state the price level is set by adding a markup on the unit labour cost and imported-input prices.

#### 4. Private wage equation

In order to study the wage behaviour is assumed that indexation is complete and there is uniform staggering, in which a proportion of all firms change their prices every period.

Whether all firms review prices simultaneously (“synchronisation”) or only a fraction of firms adjusts prices each period (“staggering”) has important macroeconomic consequences. If all firms change their prices simultaneously with a lag of one period, then the aggregate price level will have adjusted fully to the new equilibrium level by the end of



this period and exogenous nominal shocks will not have persistent real consequences. Let's assume that  $\alpha$  is the proportion in which wages are negotiated, while  $(1-\alpha-\delta)$  are adjusted according to past inflation. The remainders,  $\delta$ , cannot adjust their wages with past inflation and suffer a loss with it.

$$\Delta wpr_t = (1-\alpha-\delta) \times \Delta p_{t-1} + \alpha \times \Delta X_t \quad (13)$$

where:  $\alpha$  = the proportion in which wages are negotiated;

$\delta$  = the proportion of non-adjusting wages with past inflation;

$1-\alpha-\delta$  = the proportion of adjusting non-negotiated wages with past inflation;

wpr = private wage; X = negotiated wage.

The equation for the negotiated wages is set as in Blanchard și Katz(2001):

$$X_t - p_{t+1}^e = \mu \times x_t + (1-\mu) \times q_t - \beta \times u_t + \varepsilon_t \quad (14)$$

The expected real wage ( $X_t - p_{t+1}^e$ ) depends on:

b = the reservation wage; q = the labour productivity; u = unemployment rate, where:  $0 \leq \mu \leq 1$ .

A minimum wage which expects a potential employee is not fixed at some level, it can change over time, depending on a number of factors which include the increase/decrease of that individual's wealth, change in marital status, living arrangements, length of unemployment, health & disability issues.

$$b_t = a + \sigma \times (wpr_{t-1} - p_{t-1}) + (1-\sigma) \times q_t \quad (15)$$

Substituting equation (15) into (14) and calculating then  $\Delta X_t$ , we obtain:

$$X_t = p_{t+1}^e + \mu \times a + \sigma \mu \times (wpr_{t-1} - p_{t-1}) + (1-\sigma \mu) \times q_t - \beta \times u_t + \varepsilon_t \Rightarrow$$

$$\Rightarrow \Delta X_t = (p_{t+1}^e - p_{t-1}) + \mu \times a - (1-\sigma \mu) \times (wpr_{t-1} - p_{t-1} - q_{t-1}) + (1-\sigma \mu) \times \Delta q_t - \beta \times u_t \quad (16)$$

where: p = the consumer price index (CPI), which includes all goods.

Substituting equation (16) into (13) and then writing it in acceleration form, we obtain:

$$\Delta wpr_t = (1-\alpha-\delta) \times \Delta p_{t-1} + \alpha \times (p_{t+1}^e - p_{t-1}) + \alpha \mu a - \alpha \times (1-\sigma \mu) \times (wpr_{t-1} - p_{t-1} - q_{t-1}) + \alpha \times (1-\sigma \mu) \times \Delta q_t - \alpha \beta \times u_t \Rightarrow$$

$$\Delta^2 wpr_t = \alpha \times (\Delta p_{t+1}^e - \Delta p_{t-1}) + (\Delta p_{t-1} - \Delta wpr_{t-1}) + \alpha \mu a - \alpha \times (1-\sigma \mu) \times (wpr_{t-1} - p_{t-1} - q_{t-1}) + \alpha \times (1-\sigma \mu) \times \Delta q_t - \alpha \beta \times u_t - \delta \times \Delta p_{t-1} + D_t + Z_t + \varepsilon_t \quad (17)$$

where:  $\alpha, \beta, \delta, \mu, \sigma$  are all greater than zero; D = variables such as seasonal dummies; Z = variables such as public wages.

### 5. The models' analysis

For the econometric analysis I've used quarterly data series for Romania from 1997:1 to 2007:1, having as data sources the data bases from BNR(National Bank of Romania), INS(National Institute of Statistics), AMECO-Eurostat, IMF(International Monetary Fund), ECB(European Central Bank).

The list of variables contains:

➤ price (p): the consumer price index(CPI) and CORE 2.

Using BNR methodology of calculation for CORE 2:

CORE 1 = CPI – regulated services

CORE 2 = CORE 1 – volatile prices(perishable food, gas, fuels)

- foreign price ( $p^*$ )
- nominal exchange rate (e)

- nominal wage (w): which can be separated into nominal private wage (wpr) and nominal public wage (wpu)
- unit labour cost (ulc): calculated using BNR methodology as follows:

$$\frac{\text{Wages fund}}{\text{Volume of production}} = \frac{\text{Number of employees} \times \text{Gross average wage}}{\text{Volume of production}} = \frac{\text{Gross average wage}}{\text{Labour productivity}}$$

- labour productivity (q):  $\frac{\text{real GDP}}{\text{Person employed}}$
- unemployment rate (u)
- output gap ( $y - \bar{y}$ ): calculated as difference between real effective GDP and potential GDP. I've used the Hodrick-Prescott(HP) filter in order to estimate the unobservable variable of potential GDP.

I've used the HP filter for a prolonged at both sides sample in order to be able to exclude later the overestimated values of the extremities. The initial series of real effective GDP was seasonally adjusted with Tramo/Seats procedure.

The data series were made in logarithm, tested for unit root, seasonally adjusted for the econometric analysis. In order to test the presence of unit roots I've used ADF(Augmented Dickey-Fuller) test, the Akaike criterion; the integrability order was confirmed using ADF test – the Schwarz criterion, too.

I've estimated a version of equation (12) in model 1 for the price acceleration:

$$\Delta^2 p_t = \beta_1 \times (\Delta p_{t+1}^e - \Delta p_{t-1}) + \beta_2 \times (y_{t-1} - \bar{y}_{t-1}) + \beta_3 \times p_{t-1} + \beta_4 \times (wpr_{t-1} - q_{t-1}) + \beta_5 \times wpu_{t-1} + \beta_6 \times p_{t-1} + \beta_7 \times \Delta p_{t-1} + \beta_8 \times \Delta^2 w_{t-1} + \beta_9 \times \Delta q_t + \beta_{10} \times e_{t-1} + \beta_{11} \times e_{t-2} + \beta_{12} \times e_{t-3} + \beta_{13} \times o_t$$

Model 2 estimates another form for the equation (12) without any other restrictions, but with the equality of  $wpr_{t-1}$  and  $q_{t-1}$  coefficients:

$$\Delta^2 p_t = \beta_1 \times (\Delta p_{t+1}^e - \Delta p_{t-1}) + 1/2 \times \beta_2 \times [(y_{t-1} - \bar{y}_{t-1}) + (y_{t-2} - \bar{y}_{t-2})] + \beta_3 \times p_{t-1} + \beta_4 \times (wpr_{t-1} - q_{t-1}) + \beta_5 \times wpu_{t-1} + \beta_6 \times p_{t-1} + \beta_7 \times \Delta p_{t-1} + \beta_8 \times \Delta^2 wpr_{t-1} + \beta_9 \times \Delta^2 wpu_{t-1} + \beta_{10} \times \Delta q_t + \beta_{11} \times e_{t-1} + \beta_{12} \times \Delta e_t \times \Delta p_t + \beta_{13} \times o_t + \beta_{14} \times D042$$

Model 3 estimates a form of equation (17):

$$\Delta^2 wpr_t = \beta_1 \times (\Delta p_{t+1}^e - \Delta p_{t-1}) + \beta_2 \times \Delta q_t + \beta_3 \times (\Delta p_{t-1} - \Delta wpr_{t-1}) + \beta_4 \times wpr_{t-1} + \beta_5 \times p_{t-1} + \beta_6 \times q_{t-1} + \beta_7 \times \Delta p_{t-1} + \beta_8 \times u_t$$

## 6. Conclusions

From the estimation we can conclude:

- the output gap has a low impact on inflation;
- a growth in the labour productivity level reduces unit labour costs and inflation and increases real wages;
- inflation imposes substantial costs on workers due to the negative relation between inflation and real wage;
- the level of inflation depends positively on previous period exchange rate;
- unemployment rate has a substantial impact on wages in Romania.

The results should be regarded with caution due to the lack or to the reduced presence of statistical available data, changes in the calculation methodology or due to the unobservable nature of some variables used.

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## **NBR MONETARY POLICY INTEREST RATE: DETERMINANTS AND OPTIMUM LEVEL**

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***Abstract.** In this paper, we analysed the possibility to establish the optimum level of NBR monetary policy interest rate. We specified the economic determinants of the monetary policy interest rate, and then we realised an empiric estimation of the NBR reaction function. There are some economic indicators (speculative capital inflows, for example) for which it is difficult to make an empirical analysis. Other central bank interest rate determinants may be used as exogenous variables to estimate a central bank interest rate equation. The result of our empiric analysis is that NBR monetary policy rate is a function having the following arguments: inflation target +3.5 percentage points and 1.3\*GDP gap.*

**Key words:** monetary policy rules; central bank interest rate; inflation target; reaction function, GDP gap.

### **REL 8J**

#### **NBR interest rate**

By comparison with others central banks which are net creditors of the banking system<sup>(1)</sup>, National Bank of Romania (NBR) is, at present, net debtor of the banking system. This means that, in Romania, commercial banks place deposits at NBR. So, NBR representative interest rate<sup>(2)</sup> is an interest rate at deposits placed by commercial banks to NBR and this rate is a maximum ceiling. In this sense, we say that NBR sterilize the liquidity from Romanian banking system.

#### **Establishing NBR monetary policy interest rate<sup>(3)</sup> (fundamental determinants)**

The decisions to establish the NBR monetary policy interest rate rely on careful analysis of monetary and financial evolutions, domestic and international. There are some economic and monetary factors<sup>(4)</sup> which it may use empirical models (quantitative models) for establish an optimum level of central bank interest rate.

But there are some elements (determinants) for which it is difficult to make an empirical analysis; these ones are, in principle, elements that have influence at macroeconomic level in short run. One of these is speculative capital inflows, specific for emergent economies. The capital inflows may produce speculations at domestic currency exchange rate (especially in the case when the respective economy is completely open to capital operations – capital account is fully liberalised). The foreign capital inflows in Romania determined NBR to use a prudent monetary policy during 2004-2007 period.

Short run foreign capital entrances in Romania were due to positive differential between interest rate in Romania (higher) and international interest rate (lower). The fear that these foreign capital inflows should be speculative determined NBR to reduce interest rate and to flexibilize leu exchange rate.

Other factors (determinants) that may be taken in consideration to establishing NBR monetary policy interest rate are:

- inflation rate. A higher inflation rate means a higher interest rate. In an inflation targeting strategy, the inflation rate is the most important fundamental determinant to establishing central bank interest rate.
- economic growth pace (real GDP pace growth) and the comparison of these economic growth with potential real GDP growth; the excess of effective real GDP over potential real GDP generate inflation pressures and the necessity to grow interest rate.
- domestic demand (domestic absorption = private consumption + private investments + governmental expenditures) and growth pace of domestic demand, a demand excess implying inflation pressure and higher growth rhythm of the domestic demand above the economy production capacity generate a trade deficit. For example, in 2006, the increase of domestic absorption induce a higher trade deficit in Romania, but this situation has no effect to domestic currency depreciation because of foreign capital entrances (in essence foreign direct investments) in Romania, moreover the leu appreciate nominal and real.
- fiscal policy. For example, single quota taxation starting from 2005 induce the increase of consumption at the end of 2005 and during 2006.
- international financial markets evolutions. For example, in 2006 FED monetary policy interest rate reached 5.25% (a maximum level of the last years), this fact determined some orientations of the investors from emergent markets to USA market, the Romanian leu depreciating in the middle of 2006.
- nongovernment credit evolution, a higher pace of credit growth and the utilisation of credit especially for consumption being possible to generate inflation pressures. In Romania, in 2006, annual rhythm of nominal nongovernment credit growth placed above his trend (approximately 50%). After an annual 57.08% pace of nominal credit growth registered in July 2006, nongovernment credit growth decelerated to 53.75 (yoy) in December 2006.
- necessity of saving stimulation. For example, at the beginning of 2006, real interest rate for clients deposits at commercial banks was negative, but the increase by NBR of monetary policy interest rate to 8.75% in June 2006 generated, after two-three months and because of the reduction of inflation rate, positive real interest rates which stimulated saving.
- agents inflation anticipations (increasing anticipations put pressures to interest rate increase).
- international markets oil price evolution. (a higher oil price generate an increase of the domestic fuels, and, in consequence, an increase of the inflation rate).
- necessity of adjustments of the administered prices and the adjustment calendar for these prices after Romanian joining to European Union.
- other macroeconomic domestic and international factors for which it is necessary a watching with maximum vigilance by central bank.

From the above determinants of interest rate, there are some that determine the others. For example, the increase of nongovernment credit may induce an increase of domestic demand and, hence, a growth of GDP. A real GDP growth is the effect of a high consumption of households or/and of an advanced investment volume. In this way, in an empirical analysis of the central bank interest rate determination, the use of GDP growth may replace other economic indicators like credit growth, households consumption, investments, net export.

**Taylor monetary policy rules. Technical aspects**

To establish central bank interest rate using empirical analysis means to find a reaction function for interest rate of central bank (an equation for nominal central bank interest rate).

In economic literature, a reaction function for central bank interest rate is named monetary policy rule. The first one who find a monetary policy rule was Taylor<sup>(5)</sup>. Taylor (1993) a arătat ca rata nominală de dobândă a unei bănci centrale poate fi descrisă de următoarea regulă de politică monetară (ecuație):

$$i_t = (i^* + \pi^*) + a(\pi_t - \pi^*) + b\tilde{y}_t \quad (1)$$

unde:

$i_t$  = nominal central bank interest rate (year on year percents),

$\pi_t$  = annual inflation rate (year on year percents),

$\tilde{y}_t$  represent output gap (real GDP gap) defined in this way:  $\tilde{y}_t = y_t - \bar{y}_t$ , where  $y_t$  = natural logarithm of real GDP (effective level of real GDP), iar  $\bar{y}_t$  = potential level of the natural logarithm of real GDP<sup>(6)</sup>,

$\pi^*$  = annual inflation target,

$i^*$  = long run equilibrium level of the central bank real interest rate (neutral real interest rate),

$\pi^* + i^*$  = equilibrium nominal central bank interest rate (long run real interest rate + inflation target). Econometrically speaking, the value  $(\pi^* + i^*)$  is a constant in the estimated equation (1).

$a$  = estimated coefficient representing a parameter of the reaction of monetary policy to inflation rate deviation from inflation target,  $a = \frac{\partial i_t}{\partial (\pi_t - \pi^*)}$ .

$b$  = estimated coefficient representing a parameter of the reaction of monetary policy to effective real GDP deviation from equilibrium real GDP,  $b = \frac{\partial i_t}{\partial \tilde{y}_t}$ .

From empirical point of view, the rule (1) may be seen like an approximation of central bank monetary policy interest rate, using a relative reduce number of parameters.

In practice, there are time discrepancies referring to the communication of statistical data (GDP<sup>(7)</sup> and consumer price index used for calculating the inflation rate) by the National Institute of Statistics and the moment of the establishing and communication of monetary policy interest rate by the central bank. In these conditions, for the determination of central bank interest rate, we consider that it may use either near term forecast for GDP and inflation, or the data for these indicators with 1 lag, or it may try to determine the optimum interest rate only with the last data available at the estimation moment. This last possibility may be enough efficient in the case when we add judgement elements to empirical analysis.

**NBR interest rate equations estimation**

For empirical estimation, we used time series data with quarter frequency. We utilised NBR interest rate and inflation rate as annual percents from the last month of the quarter, the inflation rate and real GDP as annual percentage change.

The notations of used time series are the following:

I\_NBR= nominal NBR interest rate at main operations (weighted average with outstandings of the interest rates at the operations of deposits placed by commercial banks to NBR and of the deposits certificate issued by NBR); this data series and monetary policy interest rate series (I\_NBR\_MP: interest rate at deposits placed by commercial bank to NBR, a maximum ceiling) have a high correlation coefficient (0.9605).

GAP\_RGDPHP = real GDP gap (the difference between effective real GDP registered in economy and potential real GDP).

INFLATION = inflation rate.

RGDP = real GDP annual percentage growth.

I = interest rate at deposits placed by bank to NBR.

We determined potential real GDP with Hodrick-Prescot filter, using the value of  $\lambda = 1600$  (because of quarter frequency of real GDP data).

In Table 1, we presented a comparative evolution of real GDP growth, inflation rate and monetary policy rate in Romania. Monetary policy interest rate was reduced following the reduction of the inflation rate. In June 2006, although the inflation rate registered a reduction to 7.11% (from 8.41%), central bank increased monetary policy interest rate to 8.75% because of fear to possible inflation pressure resulted from the real GDP growth (in fact, inflationary pressure from demand side).

**Annual change of real GDP, annual inflation rate,  
monetary policy interest rate**

Table 1

	RGDP	INFLATION	I_NBR_MP
2004Q1	6.2	13.1	21.25
2004Q2	7	12	20.75
2004Q3	9.7	11.1	18.75
2004Q4	9.5	9.3	17
2005Q1	6	8.7	14.5
2005Q2	4.5	9.7	12.5
2005Q3	2.4	8.5	7.5
2005Q4	4.3	8.6	7.5
2006Q1	6.9	8.41	8.5
2006Q2	7.8	7.11	8.75
2006Q3	8.3	5.48	8.75
2006Q4	7.7	4.87	8.75

Source: National Bank of Romania, National Institute of Statistics.

In Figure 1, we presented the time series data which we used in our empirical analysis.

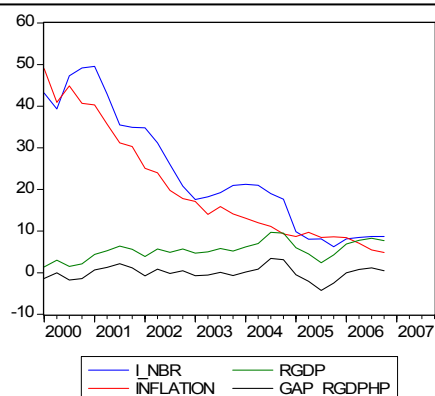


Figure 1. Graphical presentations of time series used

Using a quarter data sample 2000: 2006, we calculated a correlation coefficient<sup>(8)</sup> between inflation rate and NBR interest rate of 0.95, meaning that NBR interest rate had a descendant tendency like inflation development.

In the following sections, we will present the results of a lot of estimations that we realised to determine an empirical equation for NBR interest rate and an equilibrium level for NBR interest rate, and at the end of paper, we will synthetize some conclusions.

An important element to know in respect of the estimation of a monetary policy rule (central bank reaction function) is the inflation target. In 2006, NBR inflation target was 5% (annual percents), and in 2007 NBR inflation target is 4%. We use these inflation targets in this way:

- if the last observation of the estimation sample was the one of the first quarter or second quarter of 2006 year, then we introduced in equation 5% as inflation target,
- if the last observation of the sample is for the four quarter of 2006, then we introduced in equation 4% (inflation target for 2007).

We proceeded in this way because we watch first where it shall be necessary to be situated the interest rate in present and in the future.

Using data sample 2000q1 – 2006q2, for NBR interest rate we determined the next Taylor monetary policy rule:

$$I\_NBR = 8.65 + 1.32GAP\_RGDPHP + 1.01(INFLATION-5) \quad (2)$$

Descriptive statistics of the equation (2) are:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.65	1.22	7.08	0.00
GAP_RGDPHP	1.32	0.47	2.81	0.01
INFLATION-5	1.01	0.06	17.39	0.00
R-squared	0.93	Mean dependent var		25.33
Adjusted R-squared	0.92	S.D. dependent var		13.98
S.E. of regression	3.86	Akaike info criterion		5.65
Sum squared resid	342.77	Schwarz criterion		5.79
Log likelihood	-70.42	F-statistic		152.35
Durbin-Watson stat	0.90	Prob(F-statistic)		0.00



Equation (2) have three estimated coefficients (the first is “a constant” and the last two are reaction parameters of monetary policy in respect of the inflation deviation from the inflation target and in respect of economic growth deviation from real GDP trend). Monetary policy reaction parameter<sup>(9)</sup> to real GDP deviation from the GDP trend (1.32) is a little higher than monetary policy reaction parameter to inflation deviation from inflation target (1.01). However, this thing means not that at establishing monetary policy interest rate real GDP growth should be more important than inflation development. The inflation is the center of monetary policy analysis into an inflation targeting strategy. In the case of our central bank, this thing is stipulate in the NBR statute law no. 312 /2004.

An important coefficient into a monetary policy rule is the constant. This constant may be used to forecast central bank interest rate. For example, the value 8.65 from the estimated equation (2) mean the level of NBR interest rate for wich real GDP tend to approach real GDP trend, and annual inflation target tend to approach inflation target.

Using quarter data sample 2000q1: 2006q1, we find the following estimations:

$$I\_NBR = 8.85 + 1.36GAP\_RGDPHP + 1.01(INFLATION - 5) \quad (3)$$

$$I\_NBR = 8.85 + 1.40(RGDP - 6.5) + 1.12(INFLATION - 5) \quad (4)$$

Thus, it can observe that when the inflation rate approach to 5% during 2006 (in the last month of the quarter 2 of 2006 year, annual inflation rate was 7.11% in Romania and in the last month of the quarter 1 of 2006, inflation rate was 8.41%; this means that the inflation deviation from target of 5% reduced from 3.41% to 2.11% in quarter 2-) and GDP gap increased with an amplitude lower than infalction deviation from target (the GDP gap in the first quarter of 2006 was 0.33% and in the second quarter reached 1.33%); the constant representing NBR equilibrium interest rate reduced to 8.65%.

Using quarter data sample between the first quarter of 2000 and the last quarter of 2006, we estimated another equation for NBR interest rate ( $I\_NBR$ ):

$$I\_NBR = 7.65 + 1.31 \times GAP\_RGDPHP + 1.01 \times (INFLATION - 4) \quad (5)$$

[6.94] [3.02] [19.27]

Adjusted R squared = 0.93

Where the values from square brackets represents the coefficients t-statistics.

NBR interest rate is a little higher than setrilization interest rate ( $I\_NBR$ )<sup>(10)</sup> because the NBR interest rate to deposits certificate is lower than monetary policy interest rate.

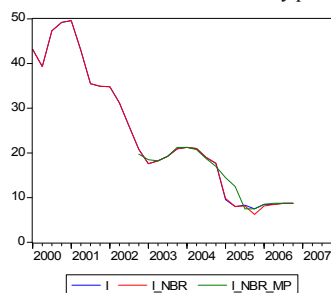


Figure 2. NBR interest rate at deposits placed by banks to NBR ( $I$ ), NBR interest rate at deposits placed by banks to NBR+CD issued by NBR ( $I\_NBR$ ), monetary policy interest rate ( $I\_NBR\_MP$ )

With quarter data sample 2000q1: 2006q4, we estimated the following equation for NBR interest rate at deposits placed by commercial banks to NBR:

$$I = 7.77 + 1.26 \times \text{GAP\_RGDP\_HP} + 1.01 \times (\text{INFLATION} - 4) \quad (6)$$

[7,12] [2,91] [19,38]

Adjusted R squared = 0.93

On the basis of the above estimations, we propose the following empiric monetary policy rule for NBR interest rate:

$$I\_NBR_t = (\text{INFLATION}^* + 3.5) + 13\text{GAP\_RGDPHP}_t + (\text{INFLATION}_t - \text{INFLATION}^*) \quad (7)$$

In Table 2, we synthesize the coefficients of the relationships (2), (3), (4), (5) and (6):

#### Coefficients synthesis

Table 2

Rules	Central bank interest rate	Data sample	Inflation target	Equilibrium NBR interest rate	GDP gap coefficient	Inflation deviation from target coefficient
1	I_NBR	2000q1-2006q1	5	8.85	1.36	1.01
2	I_NBR	2000q1-2006q2	5	8.65	1.32	1.01
3	I_NBR	2000q1-2006q4	4	7.65	1.31	1.01
4	I	2000q1-2006q4	4	7.77	1.26	1.01
Proposed rule	Monetary policy interest rate			Inflation target + 3.5	1.3	1

In equation (7), we considered that the number 3.5 represent the central bank equilibrium real interest rate. For 2006 and 2007, we consider that NBR equilibrium real interest rate is 3.5%. When the inflation rate shall reduce to 2% in the following years in Romania, this plus of 3.5% added to inflation rate to have equilibrium real interest rate shall decrease.

We consider that are two main utilities of a monetary policy rule from Table 2 viewing establishing central bank interest rate by monetary authority:

1. utilisation of the equation in establishing monetary policy interest rate;
2. utilisation of the nominal equilibrium interest rate looking to settle monetary policy interest rate. For example, if we fix annual inflation rate target to 4%, we may add 3.5 percents and it result 7.5% = optimum monetary policy interest rate.

#### Notes

- (1) This thing implies that monetary policy interest rate of the central bank is a representative interest rate for loans taken by banks from central bank. For example, monetary policy interest rate at loans from central bank is: in United States of America - "US Federal funds rate", in Great Britain - "UK repo rate" and in European Union - "EU minimum Bid Rate".
- (2) This is monetary policy rate.
- (3) In practice, a lot of monetary policy decisions have as support the judgement.
- (4) Inflation rate, real GDP growth, GDP gap.
- (5) John Taylor find the relationship  $i_t = (i^* + \pi^*) + 1.5(\pi_t - \pi^*) + 0.5\tilde{y}_t$  for nominal interest rate of USA FED. He named his relationship monetary policy rule. This relationship was specified in a paper appeared in 1993: "Discretion versus Policy Rules in Practice".

- (6) Another possibility to determine GDP gap is the one in percents: we consider annual real variation change of GDP ( $y_t$ ), and the real GDP trend (potential GDP) -  $\bar{y}_t$  is calculated on the base of  $Y_t$ .
- (7) National Institute of Statistics communicate GDP (quarter frequency) with a two – three lags because of data collection and processing.
- (8) The correlation coefficient (CC) between two economic variables show the relationship between these two variables; if CC is positive, the two variables have the same evolution. Determination:  

$$CC = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$
, where x and y are the two variables and  $\bar{x}$  and  $\bar{y}$  are x and y means.
- (9) When we estimate a reaction function of central bank, we consider that the monetary policy have as principal instrument the interest rate.
- (10) See Figure 2.

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# THE RELATIONSHIP BETWEEN THE EXCHANGE RATE AND THE INFLATION: EMPIRICAL SURVEY FOR ROMANIA

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***Abstract.** The influence on price level of changes in exchange rate comeback in the last period in the attention of economists and policy makers. The price level movement due to the changes in the exchange rate is named exchange rate pass-through and is important for the monetary policy and for the exchange rate choice. A reduced pass-through makes the monetary policy more independent and more easily implementation of inflation targeting. This working paper analyzed this phenomenon through a recursive equation system which is estimated by an unrestricted VAR.*

**Key words:** foreign exchange; inflation; price level; transitional economies; monetary policy.

**REL Classification: 19I:** Romanian transition macroeconomics

There are many debates regarding the monetary regime suitable for transition economies; these debates are mainly oriented towards the volatility of the exchange rate in the external and internal socks. The monetary fluctuation determines variation in the performance of an economy through demand and offer. While the traditional approaches state that the currency's underestimation is expansionist, the new researches emphasize on some contraction effects. If the Marshall-Lerner's condition is not respected, undervaluation can produce economical contractions due to reduction of the real national income.

The degree of exchange rate pass through into inflation is important for choosing the monetary policy and the exchange rate. If the passing rate is lower, then the independence in conducting the monetary policy is bigger and also implementing the direct strategy of inflation targeting.

## 1. Literature review

The problem of the exchange rate's changes influences the prices came into researcher's focus lately. In theory, there are two opinion trends: one is Obstfeld and Rogoff's (1995, pp. 622-626), who analyze the influence of the exchange rate over the inflation, in a economical environment with fixed prices and monopolistic competition, taking into account the ratio between local prices and the partnership's currency, which takes part at commercial transactions; the other approach developed by McCarthy (1999, pp. 4-5) uses a simplified form of the „distribution chain” model, where the influence of the exchange rate is conditioned by the different socks at the level of demand and offer, which is reflected in the imported goods, at the production prices and at the consuming goods.

Empirical studies show that beginning with 1990, the degree of the exchange rate pass through inflation is more reduced than expected. At the combined level, this may be due to lower proportion of imported goods in the basket used for determining the

consuming goods' prices and the lower quantity of imported breeding material. The first person who disputed the passing at the inflation level was Taylor (2000, pp. 1389-1401). This person proved that the decline owns to the economical environment with reduced inflation. The explanation is made with a model made on the companies' development. The companies establish the prices for a couple of months in advance and the prices react to the costs' rise, only if the cost's alteration is perceived as being persistent. The inflationary economical environment will tend to head to a higher passing level for the exchange rate.

Changing the exchange rate and the impact over the production prices, consuming goods' prices and well as the imported goods are analyzed using a recursive VAR, by McCarthy (1999, pp. 8-18). The survey is made for six industrialized countries from OECD and this survey shows that there is a reduced effect for the exchange rate over the consuming goods. It is also emphasized the fact that the passing of the exchange rate at the prices' level is linked with the economy's degree of openness.

Lowering of passing the exchange rate into inflation is linked with the inflation's lowering, which may conduct the conclusion that this lowering is linked with the credibility degree for the adopted monetary policy. The studies are based on the hypothesis that inflation expectations are linked by the low level of inflation and the monetary policy credibility. Choudhri și Hakura (2001, pp. 12-20) show that the inflation's level dominate the inflation volatility and the exchange rate, which explains the differences from one country to another between the levels of putting the prices out in inflation.

## **2. The methods of exchange rate pass through and influence factors**

The changes at the prices' level due to the modification at the exchange rate's level are called in fact „exchange rate pass through”. The countries with a high degree of imports are more possible to have a higher flow of the exchange rate into inflation. Because the imports have a higher degree in the consumer's basket, that might explain the inflation's evolution. Moreover, if there is another passing of the exchange rate into inflation, then changes in the imported goods level may have as a result a higher change in the consumer price index.

Partial exchange rate pass through is generated by the partial adjustment at the prices' level, made by the trading companies, when these are not sure that the price alteration are cyclical or permanent. The companies will delay the adjustment for a part or for all the prices until they can somehow determine the sock's period. The adjustment is made by affecting the profit's back – up, thus, the companies will accept lower profits or even temporary losses in order to maintain the market level. Another factor that influences the passing of the exchange rate in inflation is the volatility of the exchange rate: as higher volatility, as the careful the importers will be in modifying their prices.

The process of passing the exchange rate into inflation has two stages: during the first step, the changes of the exchange rate is reflected in the imported goods' prices, and in the second stage the prices for the imported goods are transmitted to the consuming goods according to the coefficient of imported goods in the basket of consuming goods. The prices for the consuming goods will be affected through a secondary channel: a monetary underestimation will have as side-effect higher prices for imported goods, which will conduct to a higher demand for national goods; the effect of this higher demand changing will have a pressure over the prices for the national goods. As a result, the nominal salaries will tend to rise, which will head to a new prices' rise.

Svensson (2000) shows, that the regime of inflation targeting in a low dimension and open economy is also influenced by transmission channels of the monetary policy. This policy transmission is determined by the exchange rate. He identifies three

such channels: the growth of combined demand determined by the business's sensibility to the exchange rate's change; direct channel of the exchange rate is determined by the existence of the imported goods used in determining consumer price index; the link between the consumer price index and the exchange rate due to imports of secondary goods.

### 3. Romanian macroeconomic conditions

During the transition period to market economy, the inflation was very high, reaching at the beginning of the period at maximum limits of 200-300%. At the beginning of 1997, due to the freedom of prices from agriculture, the inflation phenomenon was renewed, reaching a limit of 180%. As a consequence of restrictive monetary policies, the prices started to become lower reaching a level of 33 percent on February 1999. This descend was part of a background of fiscal losses and rapid growth of salaries. The consequence was the estimation of the exchange rate and lowering the external competition.

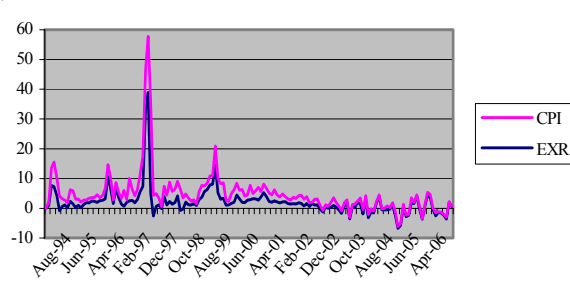


Figure 1. Inflation and USD/ROL exchange rate evolution (monthly change) January 1994–July 2006

According to IMF, the econometrical proofs indicate the price of the working force and are presented as the most important cause of the inflation. The inflation component of the cost for the working force derives from financial indiscipline at the companies' level, that pay higher salaries than imposed by the work's productivity, and even more than they could afford. Another important role in explaining the inflation evolution was due to growing the monetary mass and the credit.

The liberalization of the prices in Romania was uneven and highly drags, the last important turn being at the beginning of 1997. Moreover, the prices stayed over control, only in some case they became higher (for consuming goods), just that the prices for the breeding material remained the same or included subventions.

Starting with 2001, Romania adopted a good combination of macro economical policies, which show the internal and external stability, the descend of the inflation and growing the international reserves. A consequence of deflation policies was the descend up to 6% of the inflation measured by CPI, in June 2006.

On August, 2005, BNR adopted another monetary political strategy: inflation targeting. During 2006, deflation process continues, the annual rate of the inflation was substantial reduced until the desired percent, at the end of the year, although in May and June as at a higher level. The main sustaining level of deflation was the evolution of volatile prices, whose annual rhythm knew an important lowering.

#### 4. The analysis of the link between the exchange rate and inflation in Romania

##### 4.1. The model

Because BNR adopted in 2005 the strategy of inflation targeting, then the factors that influence this macro-economical indicator is highly important and interesting in the same time. The changes in the exchange rate level are reflected in the prices for the imported goods and are transmitted to the prices for the consuming goods.

In order to determine the effect of variation of the exchange rate over the prices, we used the distribution chain developed by McCarthy in 1999. In order to estimate the sock for the offer's level, we used the harmonized prices index for the European Union; this index was chosen because our country is a goods' importer, especially of products designed for intermediary and final use for the people.

$$\Delta P^{HPI} = E_{t-1}(\Delta P_t^{HPI}) + \varepsilon_t^{HPI}$$

$$\tilde{y} = E_{t-1}(\tilde{y}_t) + \alpha_1 \varepsilon_t^{HPI} + \varepsilon_t^{\tilde{y}}$$

$$\Delta e_t = E_{t-1}(\Delta e_t) + \beta_1 \varepsilon_t^{HPI} + \beta_2 \varepsilon_t^{\tilde{y}} + \varepsilon_t^e$$

$$\Delta P^{PPI} = E(\Delta P^{PPI}) + \gamma_1 \varepsilon_t^{HPI} + \gamma_2 \varepsilon_t^{\tilde{y}} + \gamma_3 \varepsilon_t^e + \varepsilon_t^{PPI}$$

$$\Delta P^{CPI} = E(\Delta P^{CPI}) + \delta_1 \varepsilon_t^{HPI} + \delta_2 \varepsilon_t^{\tilde{y}} + \delta_3 \varepsilon_t^e + \delta_4 \varepsilon_t^{PPI} + \varepsilon_t^{CPI}$$

##### 4.2. The data

In order to make the estimation, monthly data series were used for the index regarding the consuming goods (CPI), the index for the industrial (PPI), the exchange rate USD/ROL (*USDROL*) and the industrial production for the time period beginning with January 1994 - July 2006. In order to assure the data compatibility the estimation was done in ROL. In order to determine the exogenous sock at the demand's level, was used the harmonized consumer goods prices index of European Union (HCPI), and the source for this being the Central European Bank. The gap of the output (used as proxy for a sock at the demand level) is defined as the difference between the actual and potential output, where the potential output reflects the maximum output without generating inflation. The output's gap (*OUTPUTGAP*) is determined by using the Hodrick-Prescott filter:  $Y_{GAP} = Y - Y_{HP}$

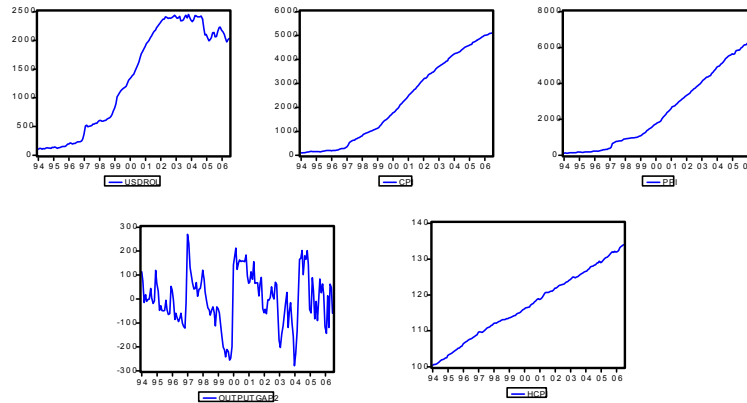


Figure 2. The data used

In order to dampen the disturbance created by the liberalization of money market, in January 1997, or the Euro rise in 2002, a dummy variable was introduced.

#### 4.3. The results of the econometrical estimation

##### 4.3.1. Granger causality tests

The first part of the analyze consists in making the Granger causality tests. The Granger's causality indicates the measure in which the value of one Y variable is explained through the past values of another variable X. The existent link between the two variables does not necessarily imply the causality relationship between the two variables. Also, the cause-effect relationship resulted in the econometrical calculation does not imply the real link between the two variables.

##### Granger causality tests

Table 1

Null Hypothesis:	Obs	F-Statistic	Probability
PPI does not Granger Cause CPI	145	2.33786	0.03535
CPI does not Granger Cause PPI		3.28608	0.00480
HCPI does not Granger Cause CPI	145	3.29282	0.00473
CPI does not Granger Cause HCPI		1.75151	0.11400
OUTPUTGAP does not Granger Cause CPI	145	5.11508	0.00009
CPI does not Granger Cause OUTPUTGAP		0.87342	0.51637
RERUSDROL does not Granger Cause CPI	145	6.60734	0.00000
CPI does not Granger Cause RERUSDROL		1.26683	0.27698
HCPI does not Granger Cause PPI	145	4.26114	0.00059
PPI does not Granger Cause HCPI		1.59050	0.15473
OUTPUTGAP does not Granger Cause PPI	145	6.74285	0.00000
PPI does not Granger Cause OUTPUTGAP		0.59491	0.73396
RERUSDROL does not Granger Cause PPI	145	4.36492	0.00047
PPI does not Granger Cause RERUSDROL		2.84148	0.01236



The model of the distribution chain suggested by McCarthy and modified to the condition of Romanian economy is validated by statistical tests of causality. The chain of emission for the inflation wave is:

$$\Delta P^{PPI} = E(\Delta P^{PPI}) + \gamma_1 \varepsilon_t^{HPI} + \gamma_2 \varepsilon_t^{\tilde{y}} + \gamma_3 \varepsilon_t^e + \varepsilon_t^{PPI}$$

$$\Delta P^{CPI} = E(\Delta P^{CPI}) + \delta_1 \varepsilon_t^{HPI} + \delta_2 \varepsilon_t^{\tilde{y}} + \delta_3 \varepsilon_t^e + \delta_4 \varepsilon_t^{PPI} + \varepsilon_t^{CPI}$$

The consumer price index is influenced by the prices for industrial production, by the output's gap, by the harmonized price index for the European Union and by the exchange rate; also the prices' coefficient for the industrial production are influenced by the consumer price index, by the output's gap, by the harmonized price index in the European Union and also the exchange rate. It is to be observed the double way relationship between CPI and PPI: both the coefficient for the industrial production's prices influence the consuming goods index and vice-versa.

#### 4.3.2. VAR analysis

The autoregressive vector (VAR) is used to determine the systems formed from time series interconnected and also for the analyze of socks chosen at random over the system variables. The number of lags chosen for estimating the VAR was determined in such a way that the AIC was diminished: thus, a number of three lags were chosen. This number of lags is consistent with the observation regarding Romanian economy, according to which the alteration at the level of one variable from the transmittance chain is fast transmitted to another variable. The resulted VAR after the estimation has the following form. The lags with a low importance are taken out of the equation:

$$\begin{aligned} DCPI = & 0.309138 \times DCPI(-1) + 0.190293 \times DCPI(-2) + 0.117730 \times DCPI(-3) + 0.82607 \times PPI(-3) + \\ [3.01] & \quad [1.73] \quad [1.11] \quad [1.42] \\ & + 11.837362 \times DHCP(-1) - 17.991012 \times DHCP(-3) + 0.019112 \times DOUTPUTGAP(-1) + \\ & [1.25] \quad [0.84] \\ & + 0.030594 \times DOUTPUTGAP(-2) + 0.03680238 \times DOUTPUTGAP(-3) + 0.123580 \times DUSDROL(-1) + \\ & [1.36] \quad [1.65] \quad [2.74] \\ & + 0.07536 \times DUSDROL(-3) + 10.009841 + 15.24353 \times DUMMY \\ & [1.60] \quad [2.09] \quad [1.14] \end{aligned}$$

There must be observed the inertia of inflation phenomenon in Romania, the level of the coefficient for the consumer price, being highly influenced by the previous values; also, the biggest influence is compressed in the inflation for the consuming goods on previous month. The influences decrease while the number of lags increases.

Regarding the prices' for industrial production, there can be seen a three month delay in extending the inflation wave. This is due to commercial contracts established beforehand with fixed prices, which are still developing (the previous months have also an influence due to the new contracts but very low).

The effect to the harmonized prices index for the European Union is the biggest, has the widest intensity, and spreads the fastest. Romania is a country which has imported goods as final consuming goods and the inflation degree spread through prices' coefficient is a big component for the total amount of inflation. It is to be observed the negative coefficient associated to the third lag of index of harmonized price. The explanation for this negative coefficient is linked by the customer's reaction to give up buying imported goods because of their high prices.

The output's gap, used as a proxy for a sock at the demand's level has significance for all the three lags taken into focus when making the equation. As higher a demand for a

certain category of things or for all consuming goods has as effect bigger prices and inflation acceleration.

It is puzzling the positive relationship, which exists between the exchange rate USD/ROL and the coefficient for consuming goods prices. The reason is the appreciation of our national currency regarding the dollar is not equivalent with an appreciation regarding the euro (since the dollar has devaluated for euro). Taking into consideration that the majority for consuming goods are determined by euro, the link is not at all surprising. Another explanation is given by putting the exchange rate into inflation, which started to expand in Romania as well. The producers and importers wanted to put the blame on the exchange rate's volatility.

The conclusion for the consumer goods index can be generalized for industrial production index, as shown in the following formula:

$$\begin{aligned} \text{DPPI} = & 0.308381 * \text{DCPI}(-1) + 0.090042 * \text{DCPI}(-2) + 0.153621 * \text{DCPI}(-3) + 0.14461 * \text{DPPI}(-1) + \\ & + 0.065162 * \text{DPPI}(-2) + 0.169421 * \text{DPPI}(-3) + 34.145582 * \text{DHCPI}(-1) + 7.494678 * \text{DHCPI}(-2) - \\ & - 26.937441 * \text{DHCPI}(-3) + 0.007287 * \text{DOUTPUTGAP}(-1) + 0.094445 * \text{DOUTPUTGAP}(-2) - \\ & - 0.042857 * \text{DOUTPUTGAP}(-3) - 0.068748 * \text{DUSDROL}(-1) - 0.042657 * \text{DUSDROL}(-2) + \\ & + 0.060904 * \text{DUSDROL}(-3) + 5.449103 + 3.458598 * \text{DUMMY} \end{aligned}$$

The difference is represented the degree of passing of the exchange rate into inflation, which is bigger if it is used this quantification method. The negative relationship may be explained by the influence of fuels and oil reflected more at the level of industry, prices mainly expressed in USD.

#### 4.3.3. Variance decomposition and shock reaction

Decomposing the variance has the following effects: permits to examine the importance of socks of the exchange rate in order to explain the prices for consuming goods and industrial production on the whole analyzed period of time, also it indicates the degree in which the foreseen inflation variation can be assigned to the sock. Decomposing the price coefficient was made for a two- years period of time. As shown in figure 4, the two variables are influenced by their own past values. It is interesting how an important part (almost 30%) out of the prices for industrial production is explained through the evolution of the prices for consuming goods. The explanation for this unusual observation is given by the lowering the degree of exchange rate pass through into prices, which started to function in our country as well. The producers became very careful with the retail market and because they want to maintain the market level, prefer to bear a part of the rise of prices and diminishing the profit level.

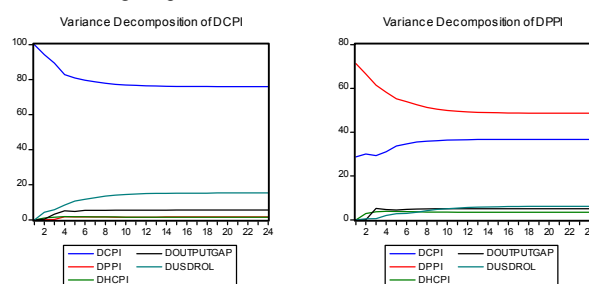


Figure 3. Variance decomposition for CPI and PPI

The following step in making the estimation is by studying the effect over producing a sock at the level of the exchange rate. As the other test foresee, this sock will have reduced side-effects over the inflation in Romania, which proves a lower pass through of the exchange rate into inflation. A depreciation of the rate has as an effect the rise of inflation, being the forth month form the sock and the percentage of 3.9 % CPI and 4.18% for PPI. The first reaction for the prices' coefficient is one of descending; having in mind that the producers tend to bear some of the negative effects of changing the exchange rate, but hoping that these effects will be transitory and this way the market level will be maintained.

The effects of the sock are quite persistent, even though the amplitude is not that big, descending under 1% after one year (CPI), respectively 16 months (PPI). After two years, the inflation's reaction tends to be zero, but not inexistent. Thus, it is proved once again, how important is the previous inflation, the people couldn't be able to forget so easily the inflation periods after the revolution.

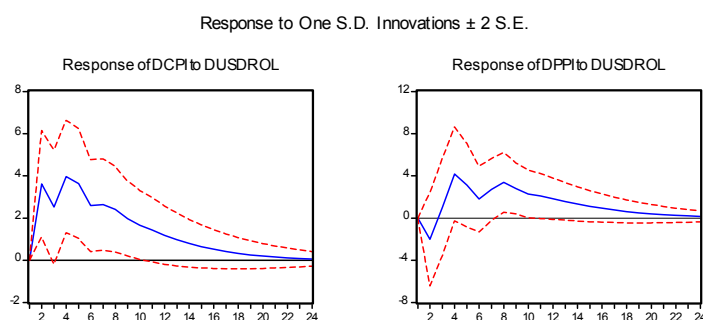


Figure 4. Response of CPI and PPI to an exchange rate shock

##### 5. Concluding remarks

The economical stability form the last period and raising the transparency in the NBR's monetary policy conducted to rising the credibility of central bank, regarding the deflation and lowering the volatility of the exchange rate. Also, the rise of competition on the consuming goods' market, included the imported goods resulted in a low profit margin of producers, which had as side-effect the lowering the exchange rate pass through.

The lowering of the degree of putting the exchange rate into inflation doesn't only have a theoretical importance but a practical one, due to NBR's decision of adopting inflation targeting. Once this strategy is adopted, the attention on the exchange rate was highly reduced. In the last years, BNR's intervention on the money market in order to influence the exchange rate for accomplishing the Bank's objectives was reduced quantitatively. In this circumstances, the descend of the degree of exchange rate pass through into inflation is good because the high volatility of the exchange rate can not express in short time periods and won't influence the inflation objective established by BNR.

In the last years, the degree of passing the exchange rate into inflation has decreased at maximum 15% for CPI and 6% for PPI. These levels of the passing stage have a dual character: are, on one hand, influenced by higher previous values. The lowering of the influence of exchange rate over the prices is good because it reflects the economical situation in our country and monetary credibility. Thus, the future steps of inflation can be input at a lower level. On the other hand, choosing the USD/ROL,

according to which the estimation was made, can not be the best choice, being need of some estimation using the EUR/RON rate. The tentative to make the estimation using this rate were prevented by the low dimension of time series EUR/RON.

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## INTEREST RATE RISK QUANTIFICATION MODELS

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**Abstract.** *The acceptance and management of financial risk is inherent to the business of banking and banks' roles as financial intermediaries. To meet the demands of their customers and communities and to execute business strategies, banks make loans, purchase securities, and take deposits with different maturities and interest rates. These activities may leave a bank's earnings and capital exposed to movements in interest rates. This exposure is interest rate risk. Changes in banks' competitive environment, products and services have heightened the importance of prudent interest rate risk management.*

**Key words:** maturity gap; duration gap; immunization; asset sensitive; liability sensitive.

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### **Introductory elements**

In the last period the internal and international monetary market was characterized by a high volatility for the exchange rate and the interest rate, a higher competition, a higher assets volume and a profit margin decrease for the romanian credit institutions. All this things generated a more prudent asstes ans liabilities administration.

According to a questionnaire made by NBR, the interest rate and the exchange rate are the most important risks for the whole romanian banking system. A very important thing to reach a very high banking performance is to create an optimum assets-liabilities report. Moreover another dezideratum is a good risks administration, which has as main objective the banking perennial insurance. This can be made through a risks evaluation.

The identification of the risks factors, the evaluation, the control and the reduction of all the risks factors are the main stages for the risk analysis. They depend on the time period took into consideration, the costs, the benefits, the information credibility, the possible externalities and the interdepends between them.

The interest risk is generated by the variations of the interest rate on financial market and is demonstrated by the reduction of the banking incomes. This reduction is the result of two elements:

- The interest rate position is represented by the different balance sheet lines which are affected by the market movements;
- The uncertainty regarding the interest margin , which increase the risk exposure and the the rate volatility.

The main interest rate indicators are:

- a) The *ecart(gap)*: this is estimated as a difference between the sensible assets and liabilities at the given time. It is considered a classic measure of the risk exposure
- b) The *sensibility index*: is estimated by the same elements.

Taking into consideration this two indexes, the risk strategy created by the bank, can be written like this: at anytime the gap should be zero or the index should be 1. So, the interest margin changes in accordance with this indexes value and the variation effect on the market.

The interest rate risk components are:

- the *exploitation risk* – it is generated by the increase of the expenses or by the reduction of the interest incomes
- the *capital risk* – it is generated by the value of the assets reduction or by the debts increase

The factors which affect the bank sensibility at the interest rate variation on the market have different types:

- *endogenous*, here we can mention: the assets and liabilities structure, the quality and the echelon of the creditand deposit expiration
- *exogenous* – this factors are determined by the evolution of the general economic conditions which are reflected in the levels of the interest rate on the market.

A bank can establish its own interest policy through an identification process. The measure of the assets and liabilities portfolios which are going to be contracted and evaluated is identified for a period of time. In this way it is made a change of the interests incomes and expenses. The changes that appear in comparison with the previous equilibrium determine the appearance of a difference, a GAP.

The attempt of the institution to adjust the assets with the liabilities, by the maturity and interests point of view can generate a very low profitability level, which can cause questions regarding the management quality and the organisation stability on medium term. Such a durable development of the institution activity it is created in a medium which suppose assuming the interest rate risk and a structure of the balance sheet capable to absorb the exogenous shocks.

The specialty literature mention more management instruments for monitoring the interest risk, having as main objective the maximization of the net interest margin. The maximization process can be reach in accordance to an acceptable risk level. The conditions are:

- The *assets management strategy* suppose that the sum, the types of the deposits and the volum of other lendings which the bank can draw depend on the clients, but the main asset of the bank(the credits) can be transformed easily into liquidities especially during a recess economy.
- The *liabilities management strategy* wants a control over the funds sources. This control should be compared with the one for the assets. The main element to control the deposits and the lendings that banks draws is the price, more clear the interest rate.
- The *funds management strategy* appeared due to the development of the assets and liabilities strategy and also to the interests and riks volatility. This approach is the most balanced because the bank management has to have a very high control over the volume, the structure, the revenue and the costs of the assets and the liabilities. This coordination allows the profit margin

maximization and so the banks politics should be developed in such a way to maximize the revenues and to minimize the costs.

Two methods to manage the interest risk rate are known:

- through immunity – the bank recommends to obtain a structure for the assets and liabilities which should generate the independence of the interest margin. This method can be made with an opposite instrument but with the same value and time as the protected one.
- through covering – the bank implements an unbalanced structure for the assets and liabilities with the main purpose to win. In the case the market doesn't perform in the predicted way, the insurance suppose the protection of the sensitives assets and liabilities. This can be done through derivatives.

### Quantification models for the interest rate risk

#### 1. GAP model for the sensitive assets and liabilities

This model suppose to estimate a GAP as a difference between the assets and liabilities on each expiration strip. In this way we can determine the cumulative GAP.

$$GAP_i = A_i - P_i \qquad GAPC_i = GAP_i + GAPC_{i-1}$$

$GAPC_i$  = cumulative gap-ul for the expiration i

$GAP_i$  = gap-ul for the expiration i ;

$GAPC_{i-1}$  = cumulative gap-ul for the expiration i-1;

$A$  = asset for the expiration i ;

$P_i$  = liabilities for the expiration i ;

If we determine the gap on each expiration strip we can estimate which is the bank exposure in terms of interest income if the interest rate changes in this way:

$$\Delta VND_i = GAP_i \times \Delta r = (AS_i - PS_i) \times r$$

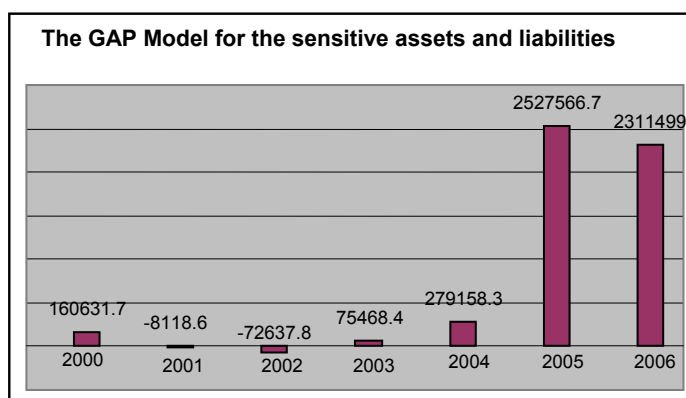
$\Delta VND_i$  = the net income interest change for the expiration strip i

$\Delta r$  = the change of the interest rate which affects the assets and liabilities for the expiration i ;

The GAP analysis for the sensitive assets and liabilities represents the most simple technique to measure the interest rate risk. The main advantage is that the evolution of the net interest income is anticipated very easy for a certain change of the interest rate.

But we have also some disadvantages:

- the extra balance sheet elements are not taken into consideration;
- the effect of the interest rate change is not taken into consideration; the net interest income is estimated at bookkeeper value;
- the interests and the principal of the non sensitive balance sheet elements are not taken into consideration;
- the distribution of the balance sheet elements for a for a expiration strip is not important.



The analysis made for the cumulative GAP shows the risk dimension that a bank can administrate. As we can see in the graphic we have a different situation for the 7 years. In the years 2001 and 2002, the bank has a short position on the interest rate. This means that the assets value with variable interest is smaller than the liabilities value with variable interest. In this situation the bank can have an increase of the net income only if the interest rate decreases for the whole period of time and only if in the portfolio structure and volume we don't have important changes. For the others years: 2000, 2003, 2006, the bank has a long position for the interest rate. This means that the value of the sensitive assets is bigger than the value of the sensitive liabilities. So the bank obtains a positive cumulative gap and an increase of the net interest income only in the situation the interest rate increases equable for the whole period of time and only if the portfolio structure and volume do not change.

Analysing the interest rate risk by using the GAP method for the sensitive assets and liabilities we can observe a different exposure of the bank. And this happens even if the global covering rate for the assets and liabilities was satisfied. So, a financial-banking institution can be:

- active sensitive – the institution records a positive GAP. If the interest rate have an increase of value than this institution will record an increase of the net interest income and viceversa; or
- pasiv sensitive – this is the case in which the net interest incomes decrease if we have an increase of the interest rates.

In the case of a positive GAP we can finance the surplus by using resources with a fix rate. The rate decrease can reduce the liabilities with a fix rate remuneration. The rate decrease involves a net interest margin decrease. In the case of a negative GAP the bank has a plus of liabilities with a variable rate. We can conclude that a rate increase generates a decrease of the margin, while a rate decrease generates an increase of the margin.

To have a nul GAP we can use different strategies as:

- to estimate the periodical GAP on small time periods;
- to correlate the assets with a new interest with the liabilities with a new interest in way that the periodic GAP tends to zero;
- to sustain the assets on long term with liabilities with no interest;

To have such a reorganisation for a bank in Romania is difficult because here we don't have developed the market instruments that allow this. The only possibility is to



change the interest rate and then to change the structure of the balance sheet in accordance with the capital market.

## 2. The maturity GAP Model

Acest model se bazează pe noțiunea de valoare de piață a activelor și datoriilor, ce se determină ca valoare actualizată a fluxurilor viitoare generate de respectivul instrument, actualizarea făcându-se cu o rată de dobândă de piață.

This model is based on the market value of the assets and liabilities theory. This value is determined as an actual value of the future flux generated by the respective instrument. To obtain the actual value it is use a market interest rate.

The maturity influence over the price of a balance sheet element can extend to the whole assets or liabilities. In this case we can estimate the medium maturity of the assets and liabilities:

$$M_A = \sum_{i=1}^n x_{Ai} M_{Ai} \quad \text{and} \quad M_P = \sum_{i=1}^n x_{Pi} M_{Pi}$$

where:

$M_A, M_P$  = the medium maturity for the assets and liabilities;

$M_{Ai}, M_{Pi}$  = the maturity for the asset  $i$  and liability  $i$ ;

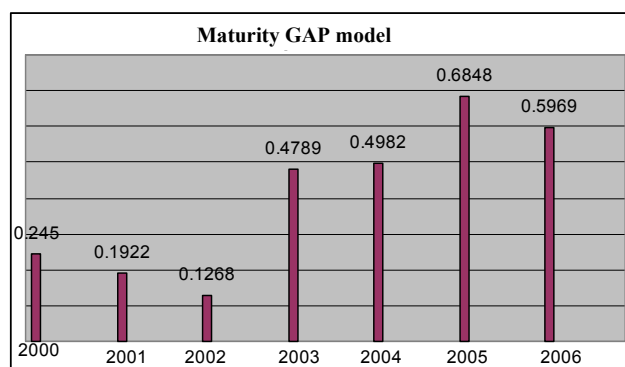
$x_{Ai}, x_{Pi}$  = the weight in the market value of the asset  $i$  or liabilities  $i$

The net effect of the interest rate change on the balance sheet can be estimated with the maturity gap for the assets and liabilities:  $GAPM = M_A - M_P$

The commercial banks are characterized by a positive maturity gap, explained by the fact that the assets medium maturity is higher than the liabilities medium maturity. That is way the clients prefer the credits on long term rather than the deposits on short term

If we estimate the difference between the assets market value and the liabilities market value we obtain the value of the banks capital. This represents the value that the shareholders of the banks would receive if they would sell the assets.

The immunity process at the interest rate risk is accomplished when the maturity gap is zero. But this doesn't protect the bank of the interest rate risk because we have the lever and duration effects.



During the period 2000-2006 we can observe that the bank registers only positive maturity gaps. This means that the assets have a higher maturity than the liabilities. The minimum point is touch in 2002 and the maximum point in touch in 2005, when we have a difference between the assets and liabilities maturity of 0.6848 years.

### 3. Duration GAP Model

This model is known also as the „actualise method” and defines the GAP concept as a duration weight with the actual values of the flows generated by the assets and liabilities. The analysis is concentrated on the concepts of the variation of the capital market value, the assets and the liabilities. In this way the impact is concentrated on the interest rate fluctuations over the whole portfolio.

The duration represents the flows weighted medium of the expiration date of an asset or liabilities, using as weight the present value of each flow in total actualised flows.

$$D = \frac{\sum_{i=1}^N \frac{CF_i}{(1 + \frac{r}{m})^{mi}}}{\sum_{i=1}^N \frac{CF_i}{(1 + \frac{r}{m})^{mi}}}$$

where:

D = duration;

CF<sub>i</sub> = the flow paid at i moment;

N = the last moment when the flow was paid;

m = number of payments during a year;

r = interest rate or ask profitableness.

Also, the duration can be use to immunize a balance sheet element. This can be immunized at the interest rate level if the rate evolution on the market doesn't influence the market value of the capital. So we have to estimate the duration of indebted assets and liabilities in this way:

$$D_A = \sum_{i=1}^n x_{A_i} D_{A_i} \quad \text{și} \quad D_P = \sum_{i=1}^n x_{P_i} D_{P_i}$$

where:

D<sub>A</sub>, D<sub>P</sub> = assets and liabilities portfolios duration;

D<sub>A<sub>i</sub></sub>, D<sub>P<sub>i</sub></sub> = assets/ liabilities duration;

x<sub>A<sub>i</sub></sub>, x<sub>P<sub>i</sub></sub> = the weight of the i asset/liabilities market value in total assets/liabilities market value.

The duration GAP is estimated with the next formula:

$$DGAP = D_A - D_P \times l$$

where:

l = the weight of debts in total assets at market value. ponderea

So, the change of the capital value market is estimated after the next formula:

$$\Delta CPR = \Delta A - \Delta P = -DGAP \times A \times \frac{\Delta r}{(1+r)}$$

where:

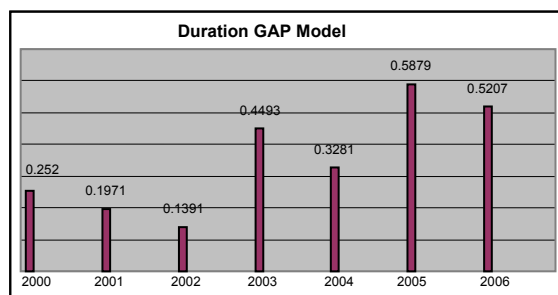
DGAP = duration GAP

A = the asset market value

r = the interest rate or ask profitability.

The immunization at interest rate level suppose to reduce at zero the duration GAP, and this thing can be done either by changing the asset/liabilities duration, or by changing the lever effect. But there are some critics regarding the duration gap:

- The costs with the implementation of the model are very high;
- The immunization is a dynamic problem: it would be great to make the immunization at every change of the interest rate on the market, but this thing involves a lot of work;
- The accuracy of the price change measure: it can be applied only to very small changes because for bigger changes errors happen.



For the seven years period that we analyse, we can observe that the bank state positive duration gaps, which points out the interest rate risk. This means that we don't have a concordance between the assets medium duration and the liabilities medium duration. If the interest rates changes, the assets and liabilities value will change, which means changes for the net interest income in comparison with the initial value. So, if the interest rates increase we will have a decrease of the capital and if the interest rates decrease we will have a capital increase.

The higher risk level is met in 2005, when we can observe a difference of 0.5879 years, with an increase of 79.183% in comparison with the last year and we have the lowest level in 2002, 0.1391 years, with a decrease of 29.427%, in comparison with 2001.

#### 4. Models based on simulations

These are complex models which suppose the evaluation of the possible effects of the interest rate change over the results. The simulations quality depends on the hypothesis validity made on the evolution of the interest rate and the bank and clients behavior.

The models based on simulations are used by the banks which use complex financial instruments or have a complex risk profile. These models suppose identification of all risk sources and involves a very detailed presentation of the balance sheet and extra balance sheet elements, generating different scenarios for the interest rate. The most used simulations are: historical simulations, Monte Carlo simulations or the bootstrapping method. So we have slope changes, structure curve changes, but also scenarios of the derived interest rate evolution.

So are take into consideration different hypotesis regarding the evolution of the exchange rate on the clients behavior and also some changes that can interfere in the bank portfolio. The evaluation of different simulations is made in accordance with the data validity, the hypotesis made regarding the interest rate evolution, the bank and clients behavior and the capacity of the model to evaluate complex instruments.

If we see the exemple we can observe that we don't have a correlation between the assets and liabilities and we have bank dependence on sensitive liabilities. Also, the interest rate appears because of the high inflation, a higher minimum reserve rate, a lower banking margin, competition, difficulties regarding the guarantees and a higher protection for the debtors.

To decrease the interest rate risk the bank management shoul apply different measures, as:

- For the assets:
  - To reduce the maturity period for the credits and for the investment portfolios;
  - To recence very often the credits in order to track down the potential bankruptcy;
  - To adjust the interest active rate in order to reduce the net interest margin;
  - To use varible interest rates;
    - For the liabilities:
      - To attract funds with fixed interest rates;
      - To create a high funds diversification;
      - To create reserves for different crisis.

### Conclusions

After the analysis made, we can conclude that the interest rate remains the main vulnerability source from the category of market risk to which deals the romanian banking system. And the identification of the risk factors, the evaluation, the control and the diminuation of this are the main stages in the risks analysis.

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# THE INFLUENCE OF R&D POLICY ON PERFORMANCE OF THE COMPANIES LISTED WITH BUCHAREST STOCK EXCHANGE (THROUGH INTANGIBLE ASSETS)

■

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***Abstract.** In the new economy, R&D potential of the companies (reflected by intangible assets) tends to make the difference between competing enterprises. Although investing in tangible assets is still viewed as important, the researchers have discovered that investors on capital market tend to buy stocks of the high-tech companies promoting a policy of increasing R&D expenditures.*

*The results of the present study on the Romanian economy reveals the correlation between the variation of intangible assets of the chemicals and pharmaceuticals companies (high-tech) and their performance – reflected by EPS and PER coefficients.*

**Key words:** financial markets; investing policy of the firm; firm's assets evaluation; statistic and econometric methods: assessments, tests; simple linear regression.

**REL classification (are)** - [www.asociatieaeconomistilor.ro](http://www.asociatieaeconomistilor.ro): financial markets (11B); investing policy of the firm (11D); firm's assets evaluation (11F); statistic and econometric methods: assessments, tests (9B); simple linear regression (9C).

## **1. Defining performance**

Measuring company's performance is considered to be a very attractive research area taking into account the results acquired by investing shareholders' or creditors' equity into companies assets.

Performance is viewed three different ways:

- first, it is given by return on invested capitals in firm's assets;
- secondly, it is a reflection of the risks undertaken by shareholders;
- thirdly, performance is given by the value of the whole business vs. the advantage/disadvantage of placing the capital in other market opportunities.

Recent international studies (Jensen, 2001, pp. 8-21) revealed that firm's management should proceed according to a basic criterion which stands for the major objective in finance: maximizing the value of the invested capital.

The above mentioned research concluded that companies that didn't succeed in adding value for their shareholders also failed in accomplishing the needs of the other stakeholders (Wallace, 2003, pp. 120-127).

In his paper published in 2001, Jensen states that a company maximizes its value provided that it takes into account the needs of all stakeholders (stakeholder theory). Therefore, reconciliation between shareholders and other stakeholders is required and

companies' managers should adopt a more responsible behavior in order to increase the welfare of all stakeholders.

In relation to firm's performance a range of indexes have been promoted recently measuring the value created for shareholders (Stern, 1999, pp. 1-8). It's all about the value of capital the shareholders have invested, represented by the return they hope to gain, mandatory covering and exceeding the costs of other opportunities.

Researchers state that value exists when company rewards investors for their choice (also taking into account the supplementary risk) (Christopher; Ryals, 1999, pp. 1-10).

The same theory – the maximization of invested capitals – is developed by other researchers (Simms, 2001, pp. 34-35; Jensen, 2001, pp. 8-21).

They also have adopted the management of value and have considered that the main objective in finance should be represented by a measurement of the value created, as well as the economic value added EVA and cash flow return on investment – CFROI.

Economic value added (EVA) is given by the surplus value created by an investment of an investment portfolio: (return on capital minus cost of capital) multiplied to the capital invested.

Cash flow return on investment (CFROI) represents the internal rate of return (IRR) on an investment, meaning the discount rate making the future cash flows discounted back to the present, including the residual value, equal to the value of investment.

Romanian researchers reckon that net present value (NPV) is an adequate measurement of performance. Considering company as an investment placed by firms' shareholders it can be asserted that it is performant provided that usage of assets leads to a maximum NPV (Stancu, 2006, pp. 8-12).

A recent research on a group of Romanian companies using financial and non-financial indexes has revealed that performance of national companies is rather reflected by the standard value of the financial indexes than their absolute value (Ciobanu, 2006, pp. 181-184). Building up a unitary system of management value based on indexes reflecting the enterprise performance in relation to the capital invested by the shareholders has proven to be difficult at this stage of research.

## 2. Creating value through R&D (intangible assets)

At world economy level, one of the most important changes in the past decades is represented by the replacement of equipment with intangible assets. R&D expenditures – viewed through intangible assets have grown quickly in the new knowledge economy. Intangible assets of a company include: development expenditure, claims, patents, licenses, trade marks and other similar values.

Many international studies have brought into light the liaisons between R&D expenditures and market performance of the companies. In the United States the researchers have discovered that capital market rewards companies investing in R&D (Chan; Martin; Kesinger, 1992, pp. 59-66, Narayan, Pinches, Kelm, Lander, 2000, pp. 707-722).

Looking at the UK capital market, an assessment over the London Stock Exchange divided listed companies into three categories: (1) high-tech companies, (2) food manufacturers, building materials, textile, print, paper and packaging and (3) health care and conglomerates (Stern, 1999, pp. 3-14). While for companies in the first category an increase in R&D expenditures determines higher market price for their stocks, for the firms in the second and third categories increase in R&D expenditures apparently causes decrease of the market price.

The few studies carried out for the Romanian capital market reveal the need for continuous investigations on the influence of change in intangible assets/R&D expenditures over companies' performance.

In the present research we've focused upon a group of representative companies listed with Bucharest Stock Exchange (BSE), from various operating areas. In order to assess their performance, we considered: annual average market price (AAMP), coefficients PER (price/earnings ratio) and EPS (earnings per share).

### 3. Assumptions of the model designed for BSE

With the intend of determining the existence/non-existence of the relationship between change in intangible assets and variation of AAMP, EPS and PER, we made usage of econometrics models and a soft of statistic analysis – E-views.

The assumptions of the model are as follows:

- 1) A sample of 18 companies listed at BSE. The inconvenience in selecting these companies was due to the fact that many of companies on BSE have been listed recently and they are inobservant of regulations of the Romanian National Securities Commission;
- 2) Time of analysis: 2005 – 2006;
- 3) Independent variable: variation of intangible assets (IA)/R&D expenditures (2006 opposite 2005);
- 4) Dependant variables (consecutively): variation of AAMP, EPS and PER.

A) The first phase of research included 18 companies from various operating areas listed with BSE.

Using linear regression it has been noticed that the values of the coefficients (R-squared) and (Adjusted R-squared) for each regression using change in IA - as independent variable and AAMP, EPS and PER – as dependant variables for the period 2005-2006 are 0.019897; 0.025829; 0.027864 and, respectively, -0.041359; -0.035057; -0.032894.

The values below 0,6 lead to the conclusion that the models haven't been well specified. Therefore, no correlation between variation of IN and change in AAMP, EPS and PER has been discovered in the case of the 18 companies listed with the BSE.

The same conclusions are reached by using the exponential, logarithm and power regression analysis.

B) Considering these results, at the second phase of research, the 18 companies were divided into:

- equipments sector (7 companies);
- materials (3 companies);
- chemicals and pharmaceuticals (5 companies);
- others (3 companies).

In the equipments and materials sector as well as in the others, the assessment using E-views has revealed that no significant correlation exists between the variation of IA and the subsequent change in AAMP, EPS and PER (2006 opposite 2005).

In the case of the sample consisting in chemicals and pharmaceuticals companies, the results obtained using the linear, exponential, logarithm and power analysis led to three linear regressions (the most significant):

$$\text{AAMP}_i = 0.16332 + 0.657703 \times \text{IA}_i$$

$$\text{EPS}_i = -0.633761 + 0.9418 \times \text{IA}_i$$

$$\text{PER}_i = 2.079332 - 2.32856 \times \text{IA}_i$$

where:

$\text{AAMP}_i$  = annual average market price;

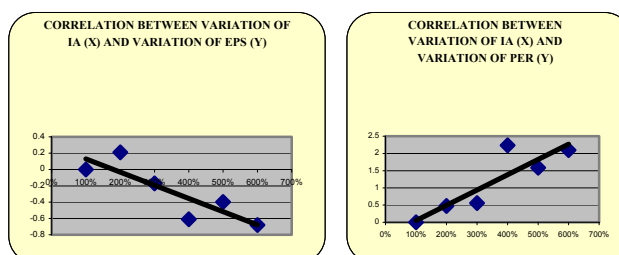
$\text{IA}_i$  = variation of intangible assets (R&D expenditures);

$\text{EPS}_i$  = variation of EPS coefficient/earnings per share;

$PER_i$  = variation of PER coefficient / price – earnings ratio;  
 $i = 2006/2005$ .

In the case of chemicals and pharmaceuticals companies, the analysis hasn't reached any conclusion regarding the specification of the model.

The simple linear regressions regarding variation of AAMP, EPS, PER and IN are plotted as follows:



#### 4. Econometric analysis for the linear regression between of EPS and PER and change of IA for the chemicals and pharmaceuticals companies

Using the least square method incorporated in E-views, we got the following results:

Dependent Variable: EPSI				
Method: Least Squares				
Date: 10/23/07 Time: 12:48				
Sample: 1 5				
Included observations: 5				
Variable	Coef.	Std. Error	t-Statistic	Prob.
C	-0.633761	0.090537	-7.000038	0.0060
INI	0.941800	0.198271	4.750057	0.0177
R-squared	0.882643	Mean dependent var		-0.329398
Adjusted R-squared	0.843524	S.D. dependent var		0.361566
S.E. of regression	0.143025	Akaike info criterion		-0.762421
Sum squared resid	0.061368	Schwarz criterion		-0.918646
Log likelihood	3.906052	F-statistic		22.56304
Durbin-Watson stat	1.639220	Prob(F-statistic)		0.017705

a) R – squared and Adjusted R- squared are 0.882643 and 0.843524 for the first regression and 0.847961 and 0.797281 for the second regression. Those values are above limit of 0.6 and therefore we tend to state that the models are adequate. Yet the values aren't too adjacent to 1 and for a better specification of the models we need to include more observations in the analysis. At the time of research this couldn't be performed as BSE has been established recently (1995) and the listed companies sheet has changed a lot since then.



Dependent Variable: PERI				
Method: Least Squares				
Date: 10/23/07 Time: 12:48				
Sample: 1 5				
Included observations: 5				
Variable	Coef.	Std. Error	t-Statistic	Prob.
C	2.079332	0.238098	8.733080	0.0032
INI	-2.132856	0.521424	-4.090443	0.0264
R-squared	0.847961	Mean dependent var		1.390054
Adjusted R-squared	0.797281	S.D. dependent var		0.835403
S.E. of regression	0.376135	Akaike info criterion		1.171435
Sum squared resid	0.424432	Schwarz criterion		1.015210
Log likelihood	-0.928588	F-statistic		16.73172
Durbin-Watson stat	1.753233	Prob(F-statistic)		0.026412

b) *t*-statistic and the related probability

Using *t*-Student test for each coefficient of the models it came out that the probability is of no great size (0.0060 and 0.0177 for the first regression) and 0.0032 and 0.0032 for the second regression) which led to the rejection of the hypothesis regarding the zero value of the coefficients of the models. Their values are -0.633761 and 2.079332 (for the intercept – for the first and respectively second regression - and 0.941800 and -2.132856 for the slope for the first and respectively second regression).

c) *F*-statistic and Prob (*F*-statistic) provide essential information regarding the validation of the models as a whole. Important pieces of information are acquired related to *F*-statistic and the error of rejecting the models.

The validation rule for *F*-statistic and Prob (*F*-statistic) led to the conclusion of accepting the models.

### 5. Economic analysis of the two regressions

In the past decades growth, development and survival of the enterprises as well as human welfare are increasingly depending on technology an innovation. Investments in R&D, including human capital, are the prime sources of innovation, leading to progress.

The results of the studies on BSE stress the selectiveness of the stock exchange when it comes to R&D.

Using regression analysis for the sample of the 18 companies, no significant correlation between the variation of AAMP, EPS and PER (reflecting the companies' performance) and the change in IA (representing R&D policy of the companies) was discovered.

Taking the assessment to a deeper level, in the second phase the 18 companies were divided into operating areas/sectors.

The econometric tests have revealed that there is no significant correlation between the variables of the models.

For the chemicals and pharmaceuticals companies, the results of the investigation suggest that R&D led to a profit and market prestige (reflected by increase of the market price).

## 6. Conclusions and recommendations

By carrying out this study, we've tried to answer some questions related to the way the variation of IA (reflected by R&D) in the case of companies listed with BSE influences companies' performance.

The conclusions haven't put things straight when it came to the Romanian capital market.

Nevertheless, for some operating areas – such as chemicals and pharmaceuticals, considered high-tech industries, the analysis on a 2-year horizon identified the relation between the variation of IA and the subsequent change in EPS and PER – integrated in 2 linear regressions.

It can be asserted that the Romanian capital market tends to grow towards the market with semi-strong efficiency judging by the way the investors bought stocks of the companies investing in R&D and therefore concurring to an increase of the market price. This is reflected by PER coefficient.

On the other hand, it's worth of note that an increase in IA for these companies led to an increase of earnings per share.

We can make use of these results when it comes to estimating the future evolution for a range of economic indexes – essential both to companies' managers as well as to investors.

The importance of the scientific results according to the real economic perspective is given by the fact that Romanian capital market is still developing and the need for information is sustained by the few national researches in this area, far from answering the questions related to the determination and validation of the companies' performance.

In future, we need to improve the analysis by including more observations for a better specification of the models.

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# CORPORATE COMPETITIVENESS IN THE CONTEXT OF CONSOLIDATING THE COMMON TAX BASE REGARDING PROFIT TAXATION IN THE EUROPEAN UNION

■

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***Abstract.** European integration, with new opportunities in business, brings in the attention of expert groups from member states the problem of direct tax harmonization by creating a common framework regarding corporate tax, which would determine, the advantages for the transactions within the group. In this sense, there are presented, chronologically ordered, actions taken in the creation of an European directive regarding the Common Consolidated Corporate Tax Base, which would significantly contribute to the success of new cross border activities, reaching a superior rate of economic growth as well as the increase in corporate competitiveness of the EU corporations in the world.*

**Key words:** competitiveness; consolidation; fiscal harmonization; common consolidated corporate tax base; corporate tax.

**REL Classifications:** H32

The harmonization of taxation in the Community, an omnipresent issue within the European Commission, specifically provisioned in the European Community Treaty (TCE) is frequently brought in the attention of expert groups in the member states, in the context of the permanent enlargement of the community space, through the adherence of new states. If regarding indirect tax, the harmonization is the competence of the EU, being imposed by the necessity of reducing disparities at the level of free circulation of goods and services, thus easing the functioning of the internal market, direct taxation is, in principle, the competence of the member states. Generally, states are reluctant regarding harmonization, but the European Community Court of Justice (CJCE) admits that the community law maker intervenes in the issue of direct taxation on the juridical base of Article 94 TCE, when there is a direct incidence on the functioning of the common market.

The European Commission has announced in 2006, in the communication *Co-ordinating Member States' direct tax systems in the Internal Market* (COM(2006)823) a series of initiatives destined to the promoting of a better coordination of direct taxation national systems within the European Union. The Commission's initiatives do not refer to the replacement of national taxation systems, but finding ways to ensure a good functioning of the 27 different national systems within the European market. The initiatives promoted referred to aspects regarding the elimination of double taxation of incomes of natural and juridical persons, the necessity of coordinating fiscal policies of member states (COM(2006)825) as well as compensating the cross-border losses (COM(2006)824).

Despite the principle of the states' competence in the matter of direct taxation, the community law maker has come up with, on one hand, directives in the matter of direct taxation of corporations: the relationship between mother company and branches in different countries<sup>(1)</sup>; mergers, divisions and asset transfers<sup>(2)</sup>; payment of interests and commissions and on the other hand has come up with a convention which regulates an arbitrary procedure with the scope of avoiding double imposing<sup>(3)</sup>. As a consequence, the major issue raised by companies which are in cross-border activities is the risk of double taxation, the place of taxation is considered, in principle, the state where the activity is taking place. This means that, a company that is operating cross-border is taxed in every country where it has its activity, in different ways. Based on the principle of tax territoriality, a state can tax the resident corporations for their global benefits and non-resident corporations just for the benefits that result from their activity on the territory of that state. In these conditions, a resident corporation may be taxed for the benefits realized in the state where it is based, but also for the benefits in other member states, for which its branches are already taxed. That is why the European Commission has taken measures in order to implement a consolidated tax base, meaning a uniform tax base which would allow the adjustment of certain problems related to fiscal competition and implicitly to the avoidance of double taxation.

In order to handle the competition of the American market, the EU aims at building a common framework regarding taxation of corporate income, a first solution being the leveling of the profit taxation base and the creation of the so called "common consolidated corporate tax base". In this sense, the European Commission has announced its intention of presenting a global legislative proposition in 2008 with the aim of *introducing a common consolidated corporate income tax base*, but it seems that this wouldn't be finalized earlier than 2010. This policy of the EU was defined in 2001 (*COM(2001)582*) and confirmed in 2003 (*COM(2003)726*), even if there has been efforts in the field of corporate tax base harmonization, respectively:

- studies of the EU, such as Neumark report (1962) and Tempel report (1970), had initiatives regarding the introducing of a minimal harmonization between different corporate taxation regimes.

- in 1992, "the Ruding committee" has presented a report regarding the necessity of a harmonization regarding corporate taxation. The committee recommended the use of a minimum quota of corporate income taxation, the existence of a common taxation base and treated aspects regarding the fiscal facilities that can be awarded at the calculus of income tax.

Beginning with the year 2001, the EU has frequently approached the issue of leveling the taxation base, proposing the creation of common taxation base, especially for the corporations with cross-border activities. This base would allow companies to compute the taxable income using a common set of rules, thus simplifying procedures and diminishing administrative costs. From the communications of the EU, results that, in the present time, this important aspect is analyzed regarding European taxation<sup>(4)</sup>.

At the level of the European Commission there is a group of experts from all the member states, instituted in 2004 which met 11 times until now, in order to discuss the issue of common taxation base, the next meeting being planned for December 2007. The general work schedule regarding the creation and applying of a common consolidated taxation base for corporations was created in 2004, when the work group was created, and at every meeting important aspects regarding this issue were established, presented and analyzed; the achieved progress was highlighted. At some group meetings there were present experts in the financial field, representatives of the business environments and of the academic community in order to discuss aspects related to the common consolidated

tax base. The work group includes more subgroups which handle aspects such as: assets and depreciation, provisions and reserves, taxable income, international aspects, group taxation, the mechanism for allocating the common consolidated tax base.

The group assists the European Commission in its measures of preparing a legislative proposal regarding the creation of common consolidated tax base for the incomes of companies that operate cross-border. The consolidated base assumes that establishing incomes, expenses and profit that are taxable to be done in the state where the mother company is. The taxable profit thus determined, obtained throughout the entire territory of the European Union, will be allocated to the states where the company undergoes its activity and where it will be taxed with the imposing quota specific to each state. The system will be optional and will be applicable together with the existing calculus methods in the member states. The common base will have to be uniform, to simplify and extend the taxation base for corporations. The point of view of many economists converge to the idea that “an extended taxation base with a small rate of taxation is the most effective from the economical point of view, as the distorting effects are minimal as number and importance”

A study done by KPMG International on a batch of specialists in the financial and fiscal fields from more than 400 companies in the member states and Switzerland, shows that the proposal of the European Community regarding the creation of the common tax base was supported by 78% of the respondents, and in the case of Romania 90% of the respondents agreed with the proposal. Amongst the states that had restraints regarding this European initiative is Great Britain which supported the proposal only 62%, having the following counter-arguments: high costs of implementing the system and the possibility of tax increases. The Czech Republic, Spain and Denmark supported the proposal 100%, Italy 96% and Greece, Luxemburg, Poland, Slovenia and Sweden 90%. From the German respondents only 84% agreed, while Austria, Finland, Hungary and Portugal supported the proposal with 80% and Ireland and Slovakia only had 50% of the answers favorable. The common consolidated corporate tax base does not assume a unique quota of profit income, but 69% of those who responded to the study would desire a unique quota as well.

Besides the meetings of the work group within the EU, other studies were done, regarding the establishing of a common income taxation base, and numerous scientists try to offer solutions regarding this subject. The authors Clemens Fuest, Thomas Hemmelgarn and Fred Ramb analyze in an article the effect of introducing the common consolidated tax base and the ways of distributing it between the member states. The authors use a set of data from Deutsche Bundesbank's Foreign Direct Investment Data (MiDi). The results suggest that small states such as Ireland and Holland (considered as being countries that attract profit) have the tendency to loose a larger part of the taxation base than larger countries such as France, Germany, Great Britain and Italy. However, the conclusions are limited by the fact that in the analysis just the data base from Germany was used.

The economist Santiago Pinto develops in an article, an analytic framework through which national governments determine the structure of the apportionment system, on the basis of a apportionment formula of the taxable profits in the member states. The study presents the way the taxable profits are allocated in the United States of America, using a formula which takes in consideration (in different proportions, depending on the policy of each American state) three apportionment keys: turnover, labor force and the capital of the multi-regional company. Afterwards, the effects of this formula on the economic welfare are analyzed.

Also, in a study, authors Mintz and Smart offer a very good description of the national corporate taxation system in Canada. In this country, the provinces use the same method of apportioning profit between jurisdictions, and the formula takes into

consideration in equal proportions (50% each) labor force and the company's sales in every province.

Anand and Sansing explains why states can choose different methods of profit apportioning, even if social welfare is maximized in the situation where states use the same formula. This subject regarding ways and formulas of taxable profit apportionment between states is treated by other economists such as Pething and Wagener (2007) – *Profit tax competition and formula apportionment* or Wellisch (2004) – *Taxation under formula apportionment – Tax competition, tax incidence and the choice of apportionment factors*.

Within the Work group for the common consolidate tax base, met in September 2007, the basis of a document which presents the principles of tax base creation, starting from the grouping of different structural elements of it in an coherent ensemble of basic rules, as well as the main difficulties and problems which the Commission consider unresolved.

Starting from the basic rules applicable to a fiscally non-consolidated company, rules regarding the groups of companies eligible to be consolidated are established. Certain rules regarding consolidation and the apportionment mechanism can be applied to non-member companies of a group having a permanent headquarters in another member state.

The obligation of consolidating belongs to everyone who opted for the common tax base and have a branch or a permanent headquarters in another member state of the European Union (according to the principle of universality of the perimeter).

Regarding the establishing of the common tax base, we highlight two point of views, respectively:

- according to IAS/IFRS, which is difficult to do;
- the present situation, where the majority of companies use different national accounting principles (GAAP) and for the establishing of a uniform tax base, adjustments of key elements are required.

The concept of consolidated tax base is frequently defined in specialty publications of the Commission but without presenting the methods to serve to the adjustment of the accounts with the aim of determining the common tax base. In other words, even if the legislation does not explicitly provision a uniform accounting treatment, the fiscal tax base would be determined starting with the accounting records done following national rules.

Companies resident in the European Union can choose the community tax base, and the companies that are non-resident can exercise this option in case of permanent headquarters in the Union, option which is viable only at the beginning of the financial exercise. The option will be valid for a period of 5 years and then automatically renewed for periods of 3 years, if the company has nothing against it. Companies that are part of a group where every company has a common participation of at least 50% should choose together for the common tax base or to remain outside the system, submitting to the same validity system.

If a company or a group of companies which apply the common tax base is absorbed by another group that has not opted for consolidation, the option of the first group remains valid until the end of the validity period, after which the new enlarged group may maintain or not the option.

In the opinion of the experts belonging to the work group, the common tax base represents the difference between total income less the non-taxable incomes on one hand and the deductible expenses and other deductible elements on the other hand. The incomes considered without VAT or other taxes and rights owed to the public organisms and the deductible expenses will be held without VAT, even if the VAT is not deductible partially

or completely. The common tax base will be computed (Vintila, 2006, pp. 388-429) annually, the fiscal exercise being equal to the accounting one of 12 months.

The incomes will be defined globally, comprising all the types of incomes, monetary or non-monetary and including exploitation incomes, asset selling incomes, dividends and other benefits distributions, interests, subsidies and other donations, incomes without juridical warranty. In consolidating the common tax base, 4 types of income must be highlighted: income of the permanent headquarters; income from important financial participations; income from treasury placements; other passive income (patents, interests). The income does not comprise the own capital brought in by tax payers and the loans subscribed by the latter. The non-taxable income mainly include: subsidies directly tied to the acquisition, building or improving a depreciating asset owned for the exploiting needs; income from selling assets, as well as some dividends.

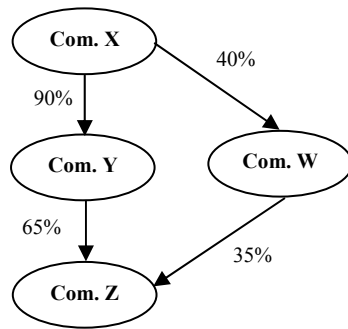
Through the deductible expenses one might understand all the expenses incurred by the company for operating needs which otherwise subscribe to the activities of production, income conservation which include research costs and development or those related to capital collection or the subscribing of loans if they are for the operating needs. The work group suggests that defining expenses should come together with a list of non-deductible expenses.

Revenues and expenses could be computed depending on:

- monetary counterpart of the operation, as well as the prices of merchandise or services;
- the market price in case the transaction's counterpart is integrally or partially non-monetary;
- the established party in conditions of full competition, in case of transactions between tied parties (affiliated persons).

The consolidation spreads over the entire common tax base of all the entities in a group, more specifically it submits completely to the common tax base, even if a company owns a branch in proportion between 75% and 100%. In this sense, we bring into discussion a situation that singles out the notion of group of companies, in view of consolidation. A group includes a mother company resident in the European Union and its branches resident in the European Union (a branch and a permanent headquarters), company which in turn may or may not be controlled by a mother company non-resident in the European Union. In this case, the mother company non-resident in the European Union could control the group of resident companies. The tax payer, having a permanent headquarters in the European Union is, in equal measure, considered as a group from the consolidating fiscal regulations point of view. The fact that the ownership chain of a group of companies in the European Union comprises a link outside the European Union (situation called sandwich) does not interrupt the chain of ownership. Consolidating may also be done on the permanent headquarters of a company or non-resident group in 2 member states of the European Union.

In order for a branch to be accepted in the consolidation, its voting rights should be owned directly or indirectly (through a chain of participation) in a proportion of at least 75%. With the aim of establishing the indirect participation level of the mother company, the respective participation percentages will be multiplied. Direct participations of the mother companies larger than 75% are considered 100%, and those smaller than 50% are excluded (are considered 0), with the aim of avoiding the situation presented in figure 1:



- without excluding participations smaller than 50%, Z is part of the group:  
 X's participation in Z through Y will be  $100\% \times 65\% = 65\%$   
 X's participation in Z through W will be  $40\% \times 35\% = 14\%$   
 X's total participation in Z is  $79\% > 75\%$  would mean consolidation, although X's participation in W is a minority participation. W could belong to another group (with a participation of 60%) in view of consolidating the common tax base.

- respecting the minimum rule of participation of 50%, Z is not a part of the group:  
 X's participation in Z through Y will be  $100\% \times 65\% = 65\%$   
 X's participation in Z through W will be  $0\% \times 35\% = 0\%$   
 X's total participation in Z is  $65\% < 75\%$ .

**Figure 1.** Fiscal consolidation within a chain of participation

As a principle, consolidation is done within the same fiscal exercise for all the companies in the group, respecting rules regarding the altering of the level of participation during the year. Thus, it is suggested that a tax payer may be considered as being owned 75% and thus included in the consolidated group if he passes the 75% test at the beginning and end of the fiscal exercise and if this participation never drops below the threshold of 50% during the entire fiscal exercise. The tax payer could adhere to the group at the date when the 75% threshold is reached. The same thing could be applied to the branches of a tax payer which fulfills the requirements mentioned above. Considering these, a tax payer could not be included in a group as long as he has not fulfilled the participation requirements on a period of at least 6 months. The tax payer will be excluded from the group in the day when voting rights he owns: drop under 50% threshold at a time being or drop under the 75% threshold, with the condition they stay under 75% till the end of the fiscal exercise. The same will happen in case of branches of a tax payer.

Within the consolidation, a special attention should be paid to the way of covering fiscal losses within the group. Thus, losses registered by a tax payer before the integration in a group subject to the common tax base won't be taken into consideration at consolidation, these being incurred to the part of future fiscal profits attributed to the respective tax payer. In this case, the covering of the losses will be done according to the national rules (Vintila, 2006, pp. 430-431). If after consolidation the result is a global loss at the level of the group, this will be reported at the level of the group and recovered from future consolidated fiscal profits, before the apportionment of consolidated net profits (net of losses reported by the consolidated group).

The following example illustrates the way in which a group of companies resident in the European Union have besides taxable incomes from the member states, passive incomes (from dividends and residuals) coming from third states, as well as the way in which they have fiscal credit for incomes obtained in third states.

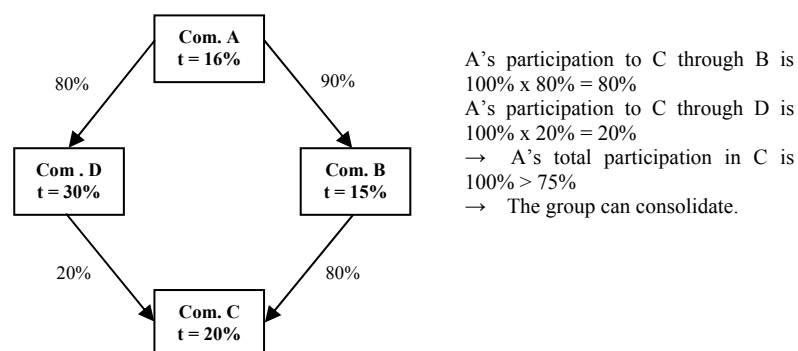
We consider a group including a mother company resident in the European Union (company A in member state SM1) and the branches resident in the European Union (companies B and D in member states SM2 and SM3). Company B also owns a branch (company C) in another member state (SM4). The percentages of participation of the



companies and profit tax quotas ( $t$ ) are presented in figure 2, and the common tax base is allocated equally between the four states.

With the aim of determining the maximum limit of the fiscal credit for the tax paid in third states, we will consider additional expenses of 2% of the gross value of dividends/residuals taken into consideration when computing the common tax base. The limit of the additional expenses is recommended by the work group of the European Commission. The taken into consideration of the additional expenses is imposed by the fact that the common tax base on the global income is based on a net basis, while the tax on passive income (dividends and residuals) is computed on the gross income. The income in dividends and residuals subjected to taxation is equally allocated between the four member states where the companies that make up the group are from.

In this situation, the deduction for the paid taxes in third states cannot exceed the profit tax computed in member states, only if the legal dispositions between the states do not state otherwise. In the hypothetical situation that the legal dispositions of the treaties between third states are applied, the surplus income tax paid in third states as compared to the income tax owned in the member state could be compensated.



**Figure 2.** The consolidation of the common tax base within the group

We assume the following information referring to the group of companies:

Taxable income from EU member states	1,200
Deductible expense	(1,320)
Gross dividends from a third state	400
Tax on dividends held at source in third state	(80)
Gross residuals obtained from another third state	200
Tax on residuals held at source in the third state	(20)
Common tax base	480

**The profit tax owed by the member states***Table 1*

<b>Explanations</b>	<b>SM1</b>	<b>SM2</b>	<b>SM3</b>	<b>SM4</b>
Common tax base	120	120	120	120
Taxation quota	0.16	0.15	0.20	0.3
Fiscal credit for tax paid in third states	19.2	18	24	25
Tax on profit of the companies owed after deducting the fiscal credit	0	0	0	11
Supplementary credit if there are agreements which provision the total deduction of tax paid in the third state	5.8	7	1	0

One can notice (table 1) that the mechanism of apportionment of the common tax base impacts the external credit awarded to member states and implicitly the financial performances of the companies within the group. In fact this represents a strong point in the attention of the experts within the work Group, yet unsolved, although suggestions were formulated regarding the apportionment keys of the common tax base, represented by: turnover, labor or capital of the multinational company. Even the apparently simple factor of labor brings up issues regarding the way of treating externalized activities or the member state where labor costs should be recognized as factor, in case of the employees who work in more member states.

Of course in order to come up with a consolidated common tax base the present agreements between member states and in the case of conflicting dispositions, the directive will have priority over all the existing agreements between states.

The consolidation of the fiscal common tax base determines, without doubt, advantages for the transactions done inside the groups. We keep in mind in this sense: simplifying and making more effective the corporate taxation systems; reducing costs of corporate taxation, supported by them and fiscal administrations; facilitating new activities cross borders, especially by the small and medium enterprises; avoiding problems regarding the establishing of transfer prices intra-group, as well as the consolidation of losses in a manner similar to numerous national regimes.

According to a communication<sup>(5)</sup> of the European Commission it is shown that "applying the common consolidated tax base could significantly contribute to the success of the internal market, reaching a superior rate of economic growth and occupying labor force and increasing competitiveness of the enterprises in the European Union globally, in the spirit of new directions of the Lisbon Strategy". The creation of the common tax base could also lead to the investment growth inside the Union, but also to the direct foreign ones, through the promotion of fiscal neutrality between internal investments and those done at the level of the European Union and reducing to a minimum the distortions caused by the differences between countries regarding investment distribution and taxation basis. A common consolidated tax base would contribute to the transformation of Europe in a very attractive region for the business environment and ensuring a common tax base established in a competitive global environment.

**Notes**

<sup>(1)</sup> Council Directive of 23 July 1990 on the common system of taxation applicable in the case of parent companies and subsidiaries of different Member States (90/435/EEC), transposed in Romania through the law no. 571/2003 concerning Fiscal Code, modified and completed to date.

- (2) Council Directive 90/434/EEC of 23 July 1990 on the common system of taxation applicable to mergers, divisions, transfers of assets and exchanges of shares concerning companies of different Member States.
- (3) Convention 90/436/EEC on the elimination of double taxation in connection with the adjustment of transfers of profits between associated undertakings.
- (4) COM(2007)223 - Implementing the Community Programme for improved growth and employment and the enhanced competitiveness of EU business: Further Progress during 2006 and next steps towards a proposal on the Common Consolidated Corporate Tax Base (CCCTB).
- (5) COM(2005)532 – Implementation of the Community Lisbon Programme – Communication from the Commission to the Council and the European Parliament – The Contribution of Taxation and Customs Policies to the Lisbon Strategy.

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## CAPITAL EFFECTIVENESS VALUATION DESTINED TO INVESTMENTS IN CONDITIONS OF UNCERTAINTY

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***Abstract.** This article intends to approach some aspects of the nuance regarding the issue of developing one investment decision evaluation in condition of uncertainty. The approach by researching the incertitude sources continues by presenting the use of actualization rate depending on the risk, the certain equivalent method, the implication of statistical distribution model in the cash-flow including the CAPM correlation model. (capital budgeting, risk, NPV, discount rate, incertitude)*

**Key words:** capital budgeting; risk; net present value; actualization rate; incertitudine.

**REL:** 1A, 7J, 10B, 11D

### **Uncertainty sources**

In the majority of debates with regards to the investment decision, in uncertainty conditions, the majority of the necessary information of the decisional process is supposed to be already known. Actually, the necessary information for the investments valuation is not always known for a certainty or represents an estimated dimension. The uncertainties affect variables as the capital cost or *the cash-flow*, and can modify the set of acceptable projects. Consequently, the investment decision procedures need the perfection of the accuracy hypothesis to evaluate the risk investment projects by the insertion of the risk factors.

There are three types of risks affecting the investment decisions and represent at the same time the main uncertainty sources. These are:

- (1) the business risk – the risk inherent to the company's cash-flow independent of the financing mode.
- (2) The financial risk – the additional risk assumed by the shareholders of the company in the conditions of using credits in financing.
- (3) The inflation risk – the risk that appears from the instability of the currency purchasing power.

The business risk represents the uncertainty concerning the dimension of the future result from the commissioning, (EBIT), is inherent to the commissioning activity of a company. This is determined on one hand by the structure of the company's operating costs (variable costs versus fixed), by the performance in management and the costs control, and on the other hand by the type of the realized product and by its absorption mode in the market depending on the economic cycle. Looking at these latter aspects we can usually consider, for example, the industrial firms that get a product included in the one of the following categories:

- (1) Essential goods or for daily consume – goods customers have to acquire as they represent necessities as food, clothing, personal hygiene and minimal comfort that are not missing from the usual consumer basket.
- (2) Inferior goods consumed in small quantities when the incomes grow.
- (3) Luxuries – goods whose consume grows simultaneously with the income increase. The type of goods a company produces is influenced by the way it's affected by the business cycle, meaning the product demand depends on the economic climate.

When a firm decides to be in debt by contracting credits, these add fluctuation to the yield expected by the shareholder. This is the financial risk resulting from the interest payment related to the debts that are deducted from the yields generated by the firm's assets. The present interest rate ( $i_t$ ), paid by a firm for his debts, includes the risk free interest rate ( $R_f$ ) and a risk premium; the fluctuation in the interest rate includes this risk premium. In the inflation and economic instability periods, the risk premium is considerable, to compensate the creditor for the assumed financial and inflationary risks. In small inflation economic stability periods, the risk premium is less.

In the valuation of an indebted and non - inflationary company, it's the business risk that is relevant. Consequently, the financial risk is zero, and the total risk includes only the business risk premium. In case of indebted companies, the total risk premium includes also the business risk premium and the financial risk one.

The third type of risk is the inflation risk. In inflationary times, the funds purchasing power and of the resources is affected by the dimension of the inflation. The incertitude and the inflation fluctuation, as well as the purchasing power are considered risk sources in the investing decisions, and consequently, have to be incorporated into the company's risk estimations.

In the following paragraphs are presented some ways of reflecting these risks in the investment decision.

#### **Risk adjusted actualization rate method**

In case of uncertain future cash-flows, a financial manager confronts the probability of cash-flows distribution for each period. The risk adjusted actualization rate method has been developed to solve of the uncertain cash-flows problem. The risk adjusted actualization rate method extends the model of actualized net value (a method in conditions of certitude) to incertitude situations. It's expressed in the form of equation, as:

$$NPV = \sum_{t=1}^N \frac{\overline{X}_t}{(1+k_t)^t} - I_0 \quad (1)$$

Where VAN = the actualized net value of the investment project;  $\overline{X}_t$  = median or the average of the risk cash-flows distribution expected  $X_t$  in the t period;  $k_t$  = risk adjusted actualization rate method, corresponding to the cash-flows risk  $X_t$ ;  $N$ =life expectancy duration of the project;  $I_0$  = the invested amount.

This model specifically considers the incertitude associated with the future cash-flows. The present cash-flow is supposed to be a range of values with  $X_t$  distribution. In case of 1-1 equation the median or the average is considered as the most representative distribution. The model does not specify ways of measuring the firm's cash-flows risk; this

has been estimated subjectively by the financial analyst. However, the model enables the analyst to study the way the risk influences the relation between variables.

For example, supposing that the investors dislike risk, an increase of the cash-flow risks usually brings to a greater actualization rate, to compensate the risk of the investment project assumption. The use of a greater actualization rate  $k$ , decrease the cash-flow value, and this brings to the increasing chance of a negative VAN and to the project rejection.

Nevertheless, the necessity to estimate an actualization rate is another advantage of the risk adjusted actualization rate method. Because the actualization rate is subjectively estimated by the user, this rate is different from one person to another. Thus, this method doesn't allow the objective determination of the value of a risking investment project, only if  $k$ , may be objectively estimated.

Recent evolutions within the evaluation method of the financial assets (CAPM), integrates the framework for the equilibrium price determination of the capital market. This approach helps to obtain of an objective estimation of the risk adjusted actualization rate. However, this model supposes perfect capital markets, and the fact that all the participants in the capital market have homogeneous expectations, concerning the perspective of all financial titles and investments. These hypothesis may reduce the CAPM utility when is used for the estimation of the actualization rate. To illustrate this method, we present the Example 1 in Appendixes.

In this case, the project will have a negative VAN that would decrease the value of the company, consequently the project has to be rejected.

In numerous practical cases, the necessary information for the determination of the risk adjusted actualization rate is not available or is extremely expensive to be obtained. Historically, some practical approaches distinguished to support the estimation of the risk adjusted actualization rate as *the similitude method*<sup>(\*)</sup> and *the beta calculation method*.

Fuller and Kerr (1981) proposed the similitude method to estimate the risk adjusted actualization rate. They considered that if a similar company or project can be identified, that are similar with the analyzed company or project, then the information of the market on the *similar* project can be used to estimate the risk adjusting actualization rate that can subsequently be used within NVP. In practice, the similitude method may be difficult to implement as a firm or a *similar* project are extremely difficult to find.

Another approach for the estimation of the risk adjusted actualization rate is the beta calculation approach. Normally, the beta risk measures are determined by the historical yields regression of a certain company or of one project, in comparison with yields of the market ratio. Instead of using project market profits, that may not be disposable, the bookkeeping dimension of the yields, for example EBIT /total assets may be used in a regression function in relation with the market ratio.

#### The certain equivalent method

Till now we showed that every time the yields of a project or of one financial asset have a certain risk level adjustments for this risk can be made by modifying the actualization rate, so that a greater rate should reflect a more risking situation. Nevertheless, the numerator too – the cash-flows can be adjusted to reflect the risk

The certain equivalent method corrects rather the estimated value of the risking cash-flow than the actualization rate. This method uses the economic concept of the utility theory, that forms the individual preferences, and it's a useful instrument for analyzing

<sup>(\*)</sup> It's method for capital cost estimation for a newly proposed project or for a product line.

decision making. The utility is defined as the satisfaction an individual obtains from different activities.

The decision making factor values the risking cash-flows liquidities by attaching one probable utility to these risking cash-flows liquidities. When the decision making factor executes this process for any cash-flow, the result is a series of certain equivalents. In this way, the capital valuation in uncertainty conditions is reduced to the capital valuation in certainty conditions and the criteria of decision applied to the "certain" investments can be used. Within this approach, the  $\gamma$  risk coefficient could be measured either for the total risk (profit variation) or for the beta systematic risk. The utility function could come either on the individual manager or for the decision making factor, or could be an equivalent for the utility curve perceived by the company's shareholders.

Considering the indifference curve of a financial project, or of the investors in general, the value of the project can be determined as following:

1. the free risk actualization rate is replaced by the actualization rate depending on risks  $k_i$ , from the numerator of the 1-1 Equation.
2. The certain equivalent equalization factor, ( $\alpha$ ) by dividing the certain equivalent (the certain amount) of a risking profit to the  $C_i$  risking profit,
3. The values ( $\alpha$ ) are calculated for all the categories of cash-flows ( $C_i$ ); this will be ordered from 1( $\gamma=0$ ) to 0( $\gamma$  great) supposing that the investor doesn't agree to the risks.
4. It is calculated the certain equivalent considering the aversion function for the market risk and the risk degree from the risking profit.

The  $C_i$  certain equivalent =  $\alpha_i X_i$

5. Consequently, the evaluation of a project could be the following:

$$NPV = \sum_{t=0}^N \frac{\bar{X}_t}{(1+k_t)^t} - I_0 = \sum_{t=0}^N \frac{\alpha_t \bar{X}_t}{(1+R_f)^t} - I_0 \quad (2)$$

By this model, the effects of different risks are incorporated in the annual cash-flows. The illustration of applicability of this method is presented in the Example 2 in the Annexes.

#### The CAPM approach for the certain equivalent method

We consider the CAPM basic equation than can be defined as:

$$E(R_i) = R_f + [E(R_m) - R_f] \frac{\sigma_{im}}{\sigma_m^2}$$

Where  $R_i$  = project profit rate;

$R_f$  = risk free rate

$R_m$  = market profit rate

$\sigma_{im}$  = covariance between  $R_i$  and  $R_m$

By definition:

$$R_i = \frac{X_i}{V_i}$$

And

$$E(R_i) = \frac{\bar{X}_i}{V_i}$$

Where  $X_i$  = the cash-flow for the  $i$  firm;  $X_i = X_i$  planned; and  $V_i$  = the market value of the  $i$  firm. Consequently:

$$\frac{\bar{X}_i}{V_i} = R_f + [E(R_m) - R_f] \frac{\text{COV}\left(\frac{X_i}{V_i}, R_m\right)}{\sigma_m^2}$$

Multiplying both parts of the equation with  $V_i$  and rearranging them, we shall obtain the market value for the  $i$  company in this way:

$$V_i = \bar{X}_i - [E(R_m) - R_f] \frac{\text{COV}(X_i, R_m)}{R_f \sigma_m^2} \quad (3)$$

To find the market value of a project, we'll redefine the Equation(3) as:

$$V_i^0 = \bar{X}_i^0 - [E(R_m) - R_f] \frac{\text{COV}(X_i^0, R_m)}{R_f \sigma_m^2} \quad (4)$$

Where,  $\text{COV}(X_i^0, R_m) = \beta_i(\sigma_m^2)(I_0)$ ;  $\beta_i = \text{COV}\left(\frac{\bar{X}_i^0}{\sigma_m^2 I_0}, R_m\right)$ ;  $V_i^0$  = the project market value;

$X_i^0$  = the project cash-flow;  $X_i^0 = X_i^0$  planned; and  $I_0$  = the initial investment. By combining the VAN equation with Equation (4) we obtain:

$$\text{VAN}_0 = V_i - I_0$$

In Equation (4), the numerator  $X_i^0 - [E(R_m) - R_f] \frac{\text{COV}(X_i^0, R_m)}{\sigma_m^2}$  is analogous to that of

$\alpha_i X_i$  of certain equivalent method. The major differences between the two numerators are:

- (1)  $\alpha_i$  is uniquely determined by each individual; consequently, any decision making factor can have a different  $\alpha_i$  valuation;
- (2) the item risk premium CAPM  $[E(R_m) - R_f] \frac{\text{COV}(X_i^0, R_m)}{\sigma_m^2}$  is determined by the information on the project and market and there is one value for this expression;
- (3)  $\alpha_i X_i$  is based on the utility theory, and
- (4)  $X_i^0 - I_0[E(R_m) - R_f] \beta_i$  is based on rational behavior in the markets. The method is illustrated in the example 3 from Annexes.

#### The actualization rate depending on risk versus certain equivalent method

The actualization rate method implies the reflection of the investment risks by adjusting the actualization rate. The certain equivalent method implies the reflection of the investments risks by adjusting the cash-flows. However, according to the work published by Robichek and Myers(1966), although the certain equivalent method is a more complicated method, it's categorically superior from a theoretical standpoint, especially if the risk is perceived as an increasing time function.

Since both methods are used to value uncertain future cash-flows, the two models should offer the same value for a given cash-flow rate. Besides, the cash-flow



present value for any period should be the same in these two valuation models, for any t period:

$$PV_t = \frac{\alpha_t \bar{X}_t}{(1 + R_f)^t} = \frac{\bar{X}_t}{(1 + k_t)^t} \quad (5)$$

By rearranging the equation terms, we obtain:

$$\alpha_t = \frac{(1 + R_f)^t}{(1 + k_t)^t} \quad (6)$$

And

$$\alpha_{t+1} = \frac{(1 + R_f)^{t+1}}{(1 + k_{t+1})^{t+1}} \quad (7)$$

We can write the risk actualization rate out of  $\alpha_t$  and  $\alpha_{t+1}$ , based on the  $R_f$  rate and on the certain equivalent, as follows:

$$k_t = \frac{1 + R_f}{\alpha^{1/t}} - 1 \quad k_t = \frac{R_f}{\alpha^{1/t}} + PR \quad PR = \frac{1 - \alpha^{1/t}}{\alpha^{1/t}}$$

PR represent the risk premium and it's a positive number because  $\alpha^{1/t} < 1$ . The equation (6) and (7) implies the fact that  $\alpha_t$  it's a time decreasing function. If the values  $R_f$  and PR are constant in time, a given risk premium has a more and more considerable impact on  $\alpha_t$ , as the time sphere extends. This phenomenon happens because of the fact that it's the risk premium that is composed, and there is a cumulative effect in the actualization factor from the t period,  $1/(1+R_f+RP)$ . By comparing the Equation (6) with the Equation(7) we notice that:

$$\alpha_{t+1} < \alpha_t \quad (8)$$

The Equation 8 suggests the fact that by using a constant actualization rate in the capital evaluation analysis, the risk increases along the time. Consequently, the actualization rate method depending on risks with constant actualization rate is not adequate for the investment evaluation projects with a constant risk.

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## Example 1

**Risk adjusted actualization rate method**

An analysis in the real context of a company evaluating an investment for a new production line has been performed. The company estimates that the properties of this product confers it an existence of almost four years. The real risk-free rate is of 9%. The previsions on inflation and on the economic tendencies indicate the fact that a 6% risk premium is suitable in this case.

The initial investment is of 3.000 thousand RON. In the first year, the estimated cash flow is of 750 thousand RON. In the second year, this amount increases to 820 thousand RON. The company expects that the cash flows within the project to decrease in the third year to 565 thousand RON, then to increase in the fourth year to 780 thousand RON. In this case, the estimated cash flow is a middle cash flow. Considering these amounts, let's appraise if it's desirable that the company should initiate the project, calculating the economic circumstances. We know that  $N=4$  years;  $k$ = risk free rate + the estimated risk premium ( $9\% + 6\%=15\%$ ); and  $I_0 = 3000$  thousand RON. We know the cash flow average too:  $X_1 = 750$ ;  $X_2 = 820$ ;  $X_3 = 565$ ; and  $X_4 = 780$ . Consequently,

$$\begin{aligned} PV &= \frac{750}{(1+.15)^1} + \frac{820}{(1+.15)^2} + \frac{565}{(1+.15)^3} + \frac{780}{(1+.15)^4} \\ &= 750(VPF_{1,15\%}) + 820(VPF_{2,15\%}) + 565(VPF_{3,15\%}) + 780(VPF_{4,15\%}) \\ &= 750(.8696) + 820(.7561) + 565(.6575) + 780(.5718) = 2089.68 \\ VAN &= 2089.68 - 3000 = (910.32) \text{ thousand RON} \end{aligned}$$

## EXAMPLE 2

**Certain equivalent method**

A company wants to perform a project for which the cash flows are uncertain because of the economic climate. The project has a three – year duration ( $N = 3$  years) and a 600,000 thousand RON initial investment. The current yield of the public security market is of 9 per cent ( $R_f = 9\%$ ), and the  $\gamma = 1$  certain profit is of 120,000 thousand RON. That represents the NPV project, considering the cash flows depending on risks and on the following cash flow period:

Year	(X <sub>t</sub> )Cash Flow
0	(600,000)
1	150,000
2	300,000
3	400,000

The certain adjustment factor ( $\alpha_t$ ) is calculated for every period as following:

$$\alpha_t = \frac{\text{Certain profit}}{\text{Risky profit}}$$

$$\alpha_1 = \frac{120,000}{150,000} = .8$$

$$\alpha_2 = \frac{120,000}{300,000} = .4$$

$$\alpha_3 = \frac{120,000}{400,000} = .3$$

The  $X_t$  certain equivalent for every period is calculated by multiplying the estimated profit by the certain equivalence factor obtained above:

$$C_t = \alpha_t X_t$$

$$C_1 = .8 (150,000\text{um.}) = 120,000\text{um.}$$

$$C_2 = .4(300,000\text{um.}) = 120,000\text{um.}$$

$$C_3 = .3(400,000\text{um.}) = 120,000\text{um.}$$

$$\text{VAN} = \frac{120,000\text{um.}}{(1+.09)^1} + \frac{120,000\text{um.}}{(1+.09)^2} + \frac{120,000\text{um.}}{(1+.09)^3} - 600,000\text{um.}$$

$$= 120,000\text{um.}(2.531) - 600,000\text{um.} = -296,244\text{um.}$$

Consequently, the project has a negative VAN and must be rejected.

### EXAMPLE 3

#### CAPM approach for the certain equivalent method

A company considers an investment project with the following values:

Risk - free rate ( $R_f$ ) = 9%

Profit rate in the market ( $R_m$ ) = 13%

Cash - flows ( $X_t$ ) = 750 thousand RON

Initial investment ( $I_0$ ) = 6,000 thousand RON

Beta ( $\beta_i$ ) = .70

$\sigma_m^2 = .03$

We obtain from the equation (4):

$$V_i^0 = \frac{750 - (.13 - .09) \times \frac{(.70)(.30)(700)}{(.03)}}{(.09)} = \frac{750 - 196}{(.09)}$$

$$= 6,155 \text{ thousand RON}$$

$$\text{VAN}^0 = 6,155 \text{ thousand RON} - 6000 \text{ thousand RON} = 155 \text{ thousand RON}$$

Since the project cost is of 6,000 thousand RON, and the project value is of 6,155 thousand RON, the current net value is of 155 thousand RON, and the project should be accepted.

# THE IMPACT OF THE COUNTRY RATING ON THE CORPORATE RATING: EMPIRICAL PERSPECTIVE IN THE CONTEXT OF FINANCIAL GLOBALIZATION

■

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***Abstract.** The project concentrates on the relationship between corporate rating and country rating. The approach is empirical. A series of hypothesis regarding the content and the direction of the relationship between the two variables are tested using various statistical methods. The focus is directed to a potential impact of the country rating on the corporate rating, especially from the perspective of the differentiation of this impact in terms of corporate segment localization in European emerging or in developed countries. Research keeps also on identifying the impact of this correlation on the finance mechanisms of the corporations based in East European emerging countries. The case study is based on a database containing financials relative to 150 companies.*

**Key-words:** rating; sovereign risk; idiosyncratic risk; globalization; sovereign ceiling.

**JEL Classification Numbers:** G21, G30, G33

## **Introduction**

The correlation between country and corporate rating has been an interesting research topic for the last years. There have been conducted many studies regarding the essential steps that have to be followed up in order to deliver a viable corporate rating, especially concerning the most significant financial indicators which should be analyzed. Meanwhile it has been underlined that corporate rating is impacted also by sovereign risk. Basel criteria introduced the concept of limitation imposed by the country rating<sup>(1)</sup>.

Thus corporate rating became multi-dimensional approached, not only at the level of the internal environment of the company, but also at the macroeconomic level.

East Asian financial crises as well as the current subprime mortgage financial crises point out the importance of the corporate rating assignment process. Moreover, globalization determined consistent inflows directed towards the emerging countries because of the higher return perspectives. In this context, both idiosyncratic and systemic risk have to be reflected into the corporate rating.

During the last financial crises, rating agencies have been accused of not being able to predict the rating downgrade and to avoid the collapse. In fact, they proved to be pro-cyclical since a rating downgrade during such a period determined automatically

similar phenomena. Thus corporate rating has lost its predictive power, tending to become rather obedient than being able to anticipate it.

It has been acknowledged also that an accurate rating can be delivered only applying the appropriate model which should take into account the specific features of every country the corporation is located into. Even the most successful commercial application belonging to Moody's – RiskCalc Model- implies a multidimensional approach in terms of credit scoring model adapted to the specific of every developed country.

Unfortunately, emerging countries do not benefit from such powerful predictive tools; based on similarities between the accounting systems of emerging and developed countries, proxy models are valorized for developing ones (Bharath, Shumway, 2004).

The most recent theories relative to the relationship corporate-country rating subscribes to the idea of such a deep correlation in the case of the emerging countries (Peter, Grandes, 2005); as for the developed ones, it has been pointed out that idiosyncratic risk is determinant when delivering the corporate rating, the country risk not having the same importance.

This article aims at identifying the way country rating affects the corporate financial performance. The case-study is performed at the level of 150 companies located in both emerging and developing countries and contains a comparative analysis in terms of financial indicators. Two statistical tests –one including a regression, the other one a causality test- are also performed.

The paper is structured as follows: section 2 contains the general framework regarding the correlation between corporate and country rating, including particularities implied by the credit rating within the emerging countries, section 3 includes the case-study and section 4 embraces the final conclusions.

## **Section 2**

The general framework of the relationship between country and corporate rating has built up all over a chain of modern concepts and ideas.

Financial globalization determined huge capital inflows to be directed towards emerging countries. Indeed, developing countries imply higher profitability potential, but risks are also directly correlated with. From this perspective, new models capable of predicting and managing at a more powerful level the credit risk are needed.

Rating agencies have adapted to the financial globalization phenomena and implemented models capable of integrating also the country risk dimension, but unfortunately the emerging countries are not covered from this point of view.

KMV model belonging to Moody's or RiskMetrics belonging to Standard and Poor's are not especially adapted to companies located into emerging countries, this representing an actual research challenge for all the financial laboratories.

The correlation between country and corporate rating can be approached also in the context of Basel 2 implementation.

From the perspective of new Basel II, especially in terms of internal rating approach, every credit institution will have to elaborate the own credit risk assessment model. Moreover, Basel II focused on the sovereign ceiling policy. A private entity will not be able to receive an upper rating than the country it is located into, which creates real asymmetry effects. A private entity will be always downgraded in case country rating will be downgraded, but as for the case of a potential country rating upward, the corporate rating will not be correlated accordingly.

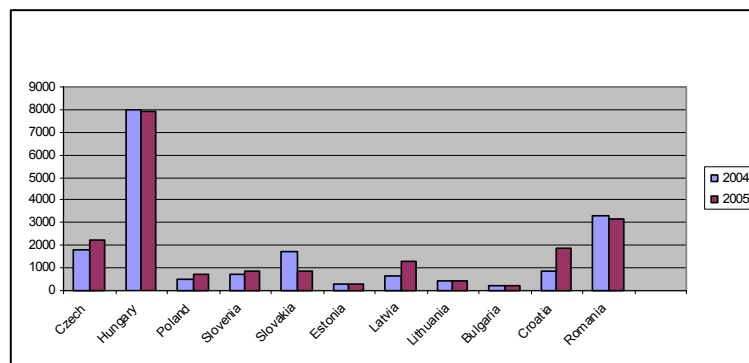
Thus the relationship between the two variables becomes more and more challenging, especially in the context of actual financial crises when rating agencies have

not been capable of acting anti-cyclically. It is obvious that globalization determined them becoming more general in their assessment process. The global view tends to make them ignore the particularities implied by the emerging countries.

From the global perspective, companies located into emerging countries are more sensitive to the macroeconomic environment and a keen interest of the rating agencies regarding the correlation between corporate and country rating might result in a higher risk premium reflected into tougher financing conditions.

But as for the financial system safety, at a global level, a profound analytical approach of the correlation would have positive effects and it would strengthen the anti-cyclical behaviour. Rating assignment process becomes this way a very important mechanism which supports sustainable growth theories. Corporate segment represents a key-resource which contributes to a high extent to economical growth. As long as a solid and viable rating will be delivered, corporate failure procedure can be avoided which would ensure a more performant financial management.

The particularities implied by the emerging countries in terms of corporate rating assignment derive from the features of their macroeconomic environment. Since it tends to be more unstable because of the economical and political conditions, the corporate default rate is higher in comparison with the developed countries.



**Figure 1.** Corporate failure rate in Eastern European Countries 2004/2005  
Source: www.coface.ro

Damodaran (2004) pertains that it is necessary to determine an exposure of every multinational corporation to country risk by the integration of the risk premium into the equity cost. This risk premium is correlated with the country rating delivered by the rating agencies in accordance with the macroeconomic stability.

Unlike developed countries where credit-rating transparency is legally founded at the level of international accounting standards, but also at the level of the corporate failure legislation, corporate segment within the emerging countries is not supposed to obey to the same regulations. According to the report published by BIS in 2005, the degree of informal economy within the emerging countries is higher than 35% which complies with the asymmetric information theory.

### Section 3: Case study

#### 3.1. Database and methodology description

The sources the information was obtained from were the following:

- Hewlett-Packard Division containing information relative to the Financial Statements of various companies located both in emerging and developed countries;
- Bloomberg agency site which contained information regarding the country rating were the companies are located into.

The assembly of financial indicators that will be analyzed is the following: Current Liquidity ratio ( $I_1$ ), Quick Liquidity ratio ( $I_2$ ), Short Term Debt Cash-Flow Coverage ( $I_3$ ), Return on Tangible Net Worth ( $I_4$ ), Earnings before Taxes/Total Assets ( $I_5$ ), Operating Expenses/Net sales ( $I_6$ ), Debt/Tangible Net Worth ( $I_7$ ), Interest Coverage ( $I_8$ ), Short Term Debt/Total Debt ( $I_9$ ), Leverage multiplier ( $I_{10}$ ), AR turnover ( $I_{11}$ ), AP turnover ( $I_{12}$ ), Working Capital Turnover ( $I_{13}$ ), Total Assets Turnover ( $I_{14}$ ), Altman Z-score ( $I_{15}$ ).

The initial point of the analysis will be focused on a comparative analysis of financial indicators in terms of descriptive statistics characterizing companies located into emerging and developed countries.

First the companies will be analyzed at the global level which includes the whole sample of companies and excludes a potential influence of the country rating.

Second, the sample of companies will be divided into two sub-samples: one including companies located into emerging countries and the other one including companies located into developed countries.

#### 3.2. Descriptive statistics analysis of the financial indicators

##### Descriptive statistics of the corporate rating at the global level, for companies located both in emerging and developed countries

Table 1

Descriptive Statistics (conf. fin. 2007.sta)

	Mean	Confid. -95.000%	Confid. 95.000	Sum	Minimum	Maximum
VAR1	1.299178	1.209908	1.388449	94.84	0.34	2.4
VAR2	0.789589	0.689772	0.889407	57.64	0	2.35
VAR3	1.35589	-1.3653	4.077084	98.98	-1.01	99.62
VAR4	33.71695	24.799	42.63489	2461.337	-95.77	151.24
VAR5	29.34014	-0.23625	58.91653	2141.83	-4.91	822
VAR6	16.44288	12.01771	20.86805	1200.33	-1.05	112.47
VAR7	10.179	6.025144	14.33286	743.067	-7.24	122.69
VAR8	4.104658	1.122891	7.086424	299.64	-5.44	100
VAR9	79.52274	73.31821	85.72727	5805.16	20.46	100
VAR10	6.590521	4.986759	8.194283	481.108	-6.24	43.21
NEWVAR11	19.75863	-4.66472	44.18198	1442.38	0	900.66

NEWVAR12	11.42027	3.284602	19.55595	833.68	0	293.3
NEWVAR13	21.28822	-0.77627	43.35271	1554.04	-634.8	361.5
NEWVAR14	8.927973	-3.74234	21.59828	660.67	0	472.82
NEWVAR15	10.11288	-3.3742	23.59995	738.24	0.03	497

Variance	Std. Dev.	Standard Error	Skewness	Std. Err. Skewness	Kurtosis	Std. Err. Kurtosis
0.146394	0.382614	0.044781625	0.673728392	0.281029217	0.872270874	0.555223
0.183029	0.427819	0.050072413	0.933459295	0.281029217	2.496810998	0.555223
136.027	11.66306	1.365058315	8.538644903	0.281029217	72.9378062	0.555223
1460.951	38.22239	4.473592446	-0.385924797	0.281029217	3.4949552	0.555223
16069.29	126.7647	14.83668538	5.904859859	0.281029217	34.10880151	0.555223
359.7216	18.96633	2.219840704	2.203393629	0.281029217	7.729327325	0.555223
316.9634	17.80346	2.083737919	4.196338566	0.281029217	22.5910837	0.555223
163.3253	12.77988	1.495771807	6.410445831	0.281029217	45.8994027	0.555223
707.1696	26.59266	3.112435596	-0.986375014	0.281029217	-0.663367015	0.555223
47.24829	6.873739	0.804510291	3.373907423	0.281029217	15.47853654	0.555223
10957.63	104.6787	12.25171678	8.508045973	0.281029217	72.57912324	0.555223
1215.887	34.86957	4.081174348	7.608696657	0.281029217	61.44324586	0.555223
8943.225	94.56862	11.0684203	-3.94085058	0.281029217	34.60490479	0.555223
2990.839	54.68856	6.357416068	8.590933039	0.279196952	73.86764696	0.551684
3341.502	57.80572	6.76564811	8.531049327	0.281029217	72.85045725	0.555223

Source: own processing.

Proceeding with the comparative analysis, it is obvious that the descriptive statistics of the companies grouped at the general level are less performant than the descriptive statistics of the companies belonging to developed countries. The median corresponding to the Current Liquidity Ratio is 1.3 for the global level while for the case of developed countries is 1.45 and 1.23 for the developing countries.

The minimum level corresponding to the interest coverage ratio is -5.44 at the global level which is similar to the one of the emerging countries; the minimum level for developed countries is -1.56.



**Descriptive statistics of the corporate rating for companies located in developed countries**

Table 2

	Mean	Confid. -95.000%	Confid. 95.000	Sum	Minimum	Maximum
VAR1	1.454091	1.225482	1.6827	31.99	0.34	2.4
VAR2	0.690455	0.40856	0.97235	15.19	0	2.35
VAR3	0.060455	-0.0922	0.213112	1.33	-0.04	1.6
VAR4	30.06591	6.513331	53.61849	661.45	-95.77	151.24
VAR5	4.224091	1.178827	7.269355	92.93	-4.91	23.88
VAR6	34.2	24.65164	43.74836	752.4	-0.78	112.47
VAR7	22.6	10.97924	34.22076	497.2	0.49	122.69
VAR8	5.851818	-3.51913	15.22277	128.74	-1.56	100
VAR9	45.61182	36.50074	54.7229	1003.46	20.46	98.81
VAR10	8.919091	7.060018	10.77816	196.22	1.38	17.18
NEWVAR11	6.393636	4.217333	8.569939	140.66	0	13.67
NEWVAR12	4.315455	3.163251	5.467658	94.94	0	8.86
NEWVAR13	11.03955	0.746264	21.33283	242.87	0	96.71
NEWVAR14	0.541364	0.400874	0.681853	11.91	0	1.26
NEWVAR15	1.174545	0.853302	1.495789	25.84	0.03	3.46
Variance	Std. Dev.	Standard Error	Skewness	Std. Err. Skewness	Kurtosis	Std. Err. Kurtosis
0.265854	0.51561	0.109928468	-0.205446643	0.490962	-0.1667	0.95278
0.404233	0.635793	0.135551586	1.129806483	0.490962	0.907865	0.95278
0.118547	0.344307	0.073406528	4.670339348	0.490962	21.86963	0.95278
2821.852	53.1211	11.3254573	-0.785737469	0.490962	2.421724	0.95278
47.17449	6.868369	1.46434118	1.924955359	0.490962	4.386805	0.95278
463.7833	21.53563	4.591411661	2.170240968	0.490962	8.194769	0.95278
686.9522	26.20977	5.587942337	2.985149054	0.490962	10.41599	0.95278
446.7089	21.13549	4.506101666	4.613679914	0.490962	21.48972	0.95278
422.2766	20.54937	4.381140398	1.254384776	0.490962	1.11457	0.95278
17.58127	4.193002	0.893951031	0.090867569	0.490962	0.421537	0.95278
24.09328	4.908491	1.046493743	0.267268425	0.490962	-1.63168	0.95278
6.753293	2.59871	0.554046792	0.391972805	0.490962	-0.78212	0.95278
538.9705	23.21574	4.949611882	3.13627588	0.490962	9.774787	0.95278
0.100403	0.316864	0.067555638	0.373834006	0.490962	-0.49918	0.95278
0.524959	0.724541	0.154472608	2.026778856	0.490962	4.982444	0.95278

Source: own processing.

The maximum level for the weight of the short term debt into the total debt ( $I_9$ ) is 100 for the global and developed countries level and 41.61 for the case of the emerging countries.

It is obvious that most of the companies located into emerging countries had adopted financing structures based on long term debt since a higher weight of the short term debt into the total debt will make them being perceived as riskier. The financial effort implied by the long term debt is considered to be softer than the one implied by the short term debt.

The standard deviations corresponding to the financial indicators of the companies located in emerging countries are to a high extent superior to the standard deviations of the financial indicators corresponding to companies located in developed countries. The instability conferred

**Descriptive statistics of the corporate rating for companies located  
in emerging countries**

Table 3

## Descriptive Statistics (emerging.sta)

	Mean	Confid. -95.000%	Confid. 95.000	Sum	Minimum	Maximum
VAR1	1.232353	1.150821	1.313884916	62.85	0.71	2.25
VAR2	0.832353	0.749112	0.915593998	42.45	0.11	1.95
VAR3	1.914706	-2.01051	5.839917453	97.65	-1.01	99.62
VAR4	35.2919	26.8066	43.77720084	1799.887	-13.22	131.92
VAR5	40.17451	-2.22191	82.57093339	2048.9	-4.65	822
VAR6	8.782941	5.643163	11.92271901	447.93	-1.05	49.6
VAR7	4.820922	2.455366	7.186477441	245.867	-7.24	45.58
VAR8	3.35098	1.450728	5.251233033	170.9	-5.44	41.61
VAR9	94.15098	91.11233	97.18963215	4801.7	49.2	100
VAR10	5.586039	3.458177	7.713901303	284.888	-6.24	43.21
NEWVAR11	25.52392	-9.66817	60.71601801	1301.72	2.02	900.66
NEWVAR12	14.4851	2.833387	26.1368088	738.74	1.43	293.3
NEWVAR13	25.70922	-5.84364	57.26206901	1311.17	-634.8	361.5
NEWVAR14	12.64373	-5.84446	31.13191102	644.83	1.2	472.82
NEWVAR15	13.96863	-5.43839	33.37564754	712.4	1.94	497
		<b>Standard</b>		<b>Std.Err.</b>		<b>Std.Err.</b>
<b>Variance</b>	<b>Std.Dev.</b>	<b>Error</b>	<b>Skewness</b>	<b>Skewness</b>	<b>Kurtosis</b>	<b>Kurtosis</b>
0.084034353	0.289887	0.040592	1.163369	0.333464	2.408033	0.65592
0.087594353	0.295963	0.041443	1.248806	0.333464	4.31809	0.65592
194.7722494	13.95608	1.954242	7.139862	0.333464	50.98487	0.65592
910.1966381	30.16947	4.22457	0.890227	0.333464	0.882396	0.65592

22722.67121	150.7404	21.10788	4.89671	0.333464	23.07088	0.65592
124.6231652	11.16347	1.563199	2.438823	0.333464	5.648299	0.65592
70.74037531	8.41073	1.177738	4.099043	0.333464	18.18413	0.65592
45.64819702	6.756345	0.946078	4.1371	0.333464	21.07631	0.65592
116.724709	10.80392	1.512852	-2.68184	0.333464	7.316524	0.65592
57.23845368	7.56561	1.059397	3.962093	0.333464	17.68527	0.65592
15656.37509	125.1254	17.52107	7.118525	0.333464	50.77356	0.65592
1716.249129	41.42764	5.80103	6.385535	0.333464	43.14059	0.65592
12585.72437	112.1861	15.7092	-3.56969	0.333464	25.86702	0.65592
4321.052276	65.73471	9.204701	7.13858	0.333464	50.97237	0.65592
4761.224396	69.00163	9.66216	7.137892	0.333464	50.96566	0.65592

Source: own processing.

By the macroeconomic environment is dominant in the case of the emerging countries.

The variance corresponding to the leverage multiplier is 57.23 for the emerging countries, 4.19 for the developed ones and 47.24 for the general level.

The Altman Z-score has the highest variance -3.341,502 at the global level while at the level of the emerging countries has a value of 4.761,22; for the level of the developed countries the variable reaches the point of 0.52.

The minimum values for all the financial indicators are reached in the case of emerging countries while the maximum values are reached in the case of the developed ones.

From this perspective, we can assume that macroeconomic environment had a strong impact on the corporate rating. The macroeconomic volatility implied by the emerging countries environment affects the evolution of the financial variables.

### 3.3. Statistical perspective on the relation between corporate and country rating

In order to get a deeper insight regarding the potential impact of the country rating on the final corporate rating, there have been performed a regression and a Granger test. The regression conceived the corporate rating as dependent variable and all the other variables as independent ones, including the country rating.

This regression is performed just in order to see the statistics associated to the country rating in terms of country rating impact on the final corporate rating.

## Output of the corporate rating regression

Table 4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VAR1	1.84E-13	1.24E-13	1.486227	0.1427
VAR2	-0.440000	1.28E-13	-3.43E+12	0.0000
VAR3	-5.39E-17	3.34E-15	-0.016112	0.9872
VAR4	0.420000	1.11E-15	3.77E+14	0.0000
VAR5	0.200000	4.53E-16	4.42E+14	0.0000
VAR6	6.85E-16	2.57E-15	0.265977	0.7912
VAR7	0.400000	3.06E-15	1.31E+14	0.0000
VAR8	-0.750000	6.58E-15	-1.14E+14	0.0000
VAR9	0.270000	1.03E-15	2.62E+14	0.0000
VAR10	-1.00E-14	7.93E-15	-1.266072	0.2106
NEWVAR11	-6.15E-14	8.56E-15	-7.183595	0.0000
NEWVAR12	-6.59E-15	4.86E-15	-1.357861	0.1799
NEWVAR13	3.74E-16	4.23E-16	0.884990	0.3799
NEWVAR15	1.15E-13	1.58E-14	7.305208	0.0000
COUNTRAT	2.96E-15	1.80E-15	1.645720	0.1053
R-squared				
	1.000000	Mean dependent var	43.17501	
Adjusted R-squared				
	1.000000	S.D. dependent var	31.55549	
S.E. of regression				
	3.09E-13	Sum squared resid	5.44E-24	
Durbin-Watson stat				
	1.803138			

Source: own processing.

The standard error associated with the country rating as dependent variable is a very low one (2.96E-15) in comparison with the standard error associated to the operating expenses reported to net sales as dependent variable (6.85E-16).

The probability associated to the Null Hypothesis is also one of the lowest (0.1053).

We could conclude that country rating has a strong impact on the corporate rating.

In order to refine the analysis of the relationship between the two variables, a Granger causality test will be performed.

The Probability associated to the Null Hypothesis slightly exceeds the value of 0.5 which does not permit drawing a clear conclusion – rejecting or accepting the null hypothesis –, but based on the previous analysis, the relationship between the two variables is validated.

**Output Granger Causality Test performed between corporate and country rating****Pairwise Granger Causality Tests****Date:** 10/28/07 **Time:** 22:03**Sample:** 1 74**Lags:** 2*Table 5*

<b>Null Hypothesis:</b>	<b>Obs</b>	<b>F-Statistic</b>	<b>Probability</b>
COUNTRAT does not Granger Cause SCORING	150	0.63524	0.53301
SCORING does not Granger Cause COUNTRAT		0.05028	0.95100

**Source:** own processing.**Conclusions**

This paper focused on the global perspective on corporate rating which conceives it as a variable determined not only by the internal environment of the company, but also by an external macroeconomic synthetic variable – the country rating.

Deep comparative analysis of the descriptive statistics have been performed as well as statistic tests – Regression built between corporate rating as dependent variable and a series of financial ratios as independent ones, Granger Causality test- .

The overall conclusion subscribes to the influence resulting from country rating towards corporate rating. The most important financial indicators specific to the companies based in emerging countries were characterized by a higher volatility and low values in comparison with companies located in developed countries.

Moreover, the financial indicators characteristic to companies based in emerging countries were the ones focused on liquidity and solvency while profitability and activity dynamic indicators were specific to companies located in developed countries.

The impact of the country rating on the corporate one is to be considered as an important element for the financial leverage management performed at the level of the companies located into emerging countries which will have to implement more active strategies, adapted not only to the challenges implied by the internal environment of the company reflected into the idiosyncratic risk, but also to the macroeconomic one. Thus, their financial management will have to be a multidimensional one, in the way that systemic risk is likely to be integrated too.

The future research papers will be focused on refining the particularities of credit risk/corporate rating implied by the emerging countries.

**Note**

<sup>(1)</sup> According to Basel Committee on Banking Supervision (2001), *The new Basel Capital Accord*

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# MICRO AND MACROECONOMIC DETERMINANTS OF OIL STOCK PRICES ON ROMANIAN CAPITAL MARKET

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***Abstract.** The purpose of the present study was to investigate whether the main fundamental and macroeconomic factors can explain oil stock performance on Romanian market for the period of March 2001 to March 2007. This paper focuses on the main economic factors that could affect stock price movement and can contribute in predicting future stock values. Generally, the results are consistent with the belief that changes in companies' fundamentals and macroeconomic aggregates are likely to affect stock prices.*

**Key words:** value relevance of micro and macroeconomic indicators; investment decision; oil stock prices.

**REL classification:** 11B

## **1. Introduction**

In search of the financial information with a certain impact on the investment decision many studies revealed that the information content of financial indicators explains a significant part of contemporaneous and future stock return. Beginning with E. Fama (1981), Chen, Roll and Ross (1986), who found that inflation rates were negatively related to the expected stock returns, many studies made on different countries and markets have tried to find reliable associations between macroeconomic variables and security returns. For example: Mukherjee, Naka (1995) revealed in their study a cointegration relationship between the Japanese industrial production and stock return; Goswami and Jung (1997) found that Korean stock prices are positively related to industrial production, inflation and short-term interest rate, and negatively related to long-term interest rates and oil prices; Humpe and Macmillan (2005) found that US and Japan stock prices are influenced by industrial production and the consumer price index; Gan, Lee, Au Yong, and Zhang (2006) demonstrated that the factors with explanatory power over New Zealand stock prices are interest rate, money supply and real growth domestic product.

In search to explain the stock price movements and their main micro determinants other researchers studied the relationship between P/E ratio and investment performance (Basu, 1977, pp. 663-682), high debt/equity ratios (Bhandari, 1988, p. 507), size, leverage, book-to-market and beta (Fama, French, 1992), strong size effect on the stock market returns (Muneesh, Sehgal, 2004, p. 89), the relationship between market, size and book-to-market equity factors and expected stock returns in the Japanese market (Charitou, Constantinidis, 2004, p. 1).

The identification of the “forces” that drive oil stock returns of six major oil companies from several countries was the major concern of Lanza, Manera, Grasso and Giovannini (2005), who analyzed the long-run relationships among the stock price of the oil companies, the spread between spot and future oil price, the relevant stock market index and the exchange rate. Relevant papers for identification of the forces that drive energetic sector were written also in Canada by Sadorsky (2001) and Boyer and Filion (2004)

Taking into consideration the results of all these studies, the central aim of our analysis is to determine the nature of the causal relationship between oil stock prices on Romanian Capital Market and micro and macroeconomic variables.

Due to the fact that in the last years the oil sector has known a fluctuating evolution, the oil companies’ shares were much traded, thus making them very interesting for a case study. The evolution of oil stock prices has been crucial for many important players on capital market, because there is no investor not to have in his portfolio oil stocks.

## 2. Data base and methodology of the study

In this paper the relationships between Romanian oil stocks returns and selected microeconomic and macroeconomic variables have been investigated for the period March 2001 to March 2007, using quarterly data. The analysis was restraint to this period in order to take into consideration accounting information reported under IAS requirements. Given the availability of the data, the study was performed on four oil companies listed on the Bucharest Stock Exchange: Petrom S.A. (SNP), Petrolexportimport S.A. (PEI), Rompetrol Well Services S.A. (PTR), Oil Terminal S.A. (OIL)

In order to find the factors that influence the oil stock price, a set of microeconomic and macroeconomic variables was analysed. Our choice of indicators to be tested is presented in the table 1.

**Micro and macroeconomic variables of the model**

*Table 1*

Crt. No.	Series	Description
<b>Microeconomic variables</b>		
1	CR	Current Ratio= Current assets/ Net current liabilities
2	ADR	Assets to Debt Ratio =Total Assets/Total Liabilities
3	DR	Debt to Asset Ratio = Total Liabilities /Total Assets
4	ER	Equity to Asset Ratio = Shareholder’s Equity/Total Assets
5	LR	Debt to Equity Ratio=Total debt/Total equity
6	EFA	Equity to Fixed Assets=Shareholders Equity/Fixed Assets
7	DCR	Debt Coverage Ratio=Net Turnover/Total Liabilities
8	ROE	Return on Equity = Net Income/ Shareholder’s Equity
9	ROIC	Return on Investment Capital =(Net Income+Interest Expenses)/(Long Term Liabilities+Shareholder’s Equity)
10	ROA	Return on Assets =Net Income /Total Assets
11	NPM	Net Profit Margin Ratio = Net Income/Net Turnover
12	ICT	Invested Capital Turnover =Net Turnover/(Long Term Liabilities+Shareholder’s Equity)



13	TM	Trading Margin = Sales of merchandises - Cost of merchandises
14	ACP	Average Collection Period=Accounts receivable/sales*360
15	NT	Net Turnover
16	NI	Profit/ Loss (Net Income)
17	AT	Asset Turnover=Net Sales/Total Assets
<b>Macroeconomic variables</b>		
1	AER	Average Exchange Rate RON/EUR
2	BM	Broad Money (M2)
3	FT	Foreign Trade
4	CA	Current Account Balance
5	GDP	Gross Domestic Product
6	AIR	Average Interest Rate of Banks
7	PCURALS	World Eastern Price Urals
8	IO	Industrial Output
9	FDI	Foreign Direct Investments

The macroeconomic data series used are quarterly data for the same time period as the stock market data (1<sup>st</sup> Quarter of 2001 till the 1<sup>st</sup> Quarter of 2007), selected from Monthly Bulletins published by National Bank of Romania and from publications and statements of the National Statistics Institute.

In calculating the microeconomic factors we used financial information from Vanguard database. The stock prices of oil companies were taken from KTD Invest homepage. To take into consideration the changes in value of these variables and their impact on stock price movements we have considered them as indexes (ratio between the value of the variables at the end of a quarter and their value at the end of the same quarter of the previous year). We compute the stock price index by dividing the average stock price estimated for each quarter to the average stock price determined for the same quarter of the previous year.

By applying the techniques of Ordinary Least Squares method, we test the deterministic relationships between the stock prices and these fundamental micro and macroeconomic factors. The regression equation we used is the following:

$$Y_i = \beta_0 + \beta_1 X_{i,1} + \dots + \beta_k X_{i,k} + \varepsilon_i \quad (1)$$

Where:

$Y_i$  – quarterly stock price index estimated for the oil company “i”;

$X_{i,l,k}$  – micro and macroeconomic variables selected as explanatory variables;

$\beta_0$  – regression constant (intercept);

$\beta_{l,k}$  - reflect the independent contribution of each explanatory variable, to the predicted value of the dependent variable (stock price index),  $Y$ ;

$\varepsilon_i$  - the random errors, are independent normally distributed random variables with zero mean and constant variance.

A Granger-causality analysis has been also carried out in order to assess whether there is any potential predictability power of one indicator for the other. In assessing the relations between variables, we performed unit root tests for stationarity,

heteroskedasticity, serial correlation, multicollinearity and normality tests for residuals. Before running the regression, to avoid spurious results that one non-stationary time series against another can lead, the stationarity of series was checked. Two widely used unit root tests were applied: the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

Heteroskedasticity is a problem often encountered in cross section data which refers to non-constant variance in the regression random errors. An important consequence of heteroskedasticity is that the OLS method becomes inefficient. This happens because in situations of heteroskedasticity, some observations are more accurate (have less variance) than others. As a result, the t-values for the estimated coefficients cannot be trusted. Clearly, these observations should be given greater weight in deciding upon the line of best fit. Observations having high variance should be given less weight. In order to test the null hypothesis of no heteroskedasticity we used White's test which is computed by an auxiliary regression, where there are regressed the squared residuals on all possible (nonredundant) cross products of the regressors.

One of the assumptions of OLS estimation to produce so-called best linear unbiased estimators is that the error terms are statistically independent. Autocorrelation of residuals has negative effects in a time series regression model (can lead to inefficient least-squares estimates, incorrect standard confidence intervals for  $\beta$  etc.), being highly essential to try to detect error autocorrelations. In this respect we used Durbin-Watson test and Breusch-Godfrey LM Test.

In a regression model, failure of the assumption of no multicollinearity results in inefficient estimates and biased tests of hypotheses. One way to assess the possibility of multicollinearity among the variables is to perform correlations. If a correlation coefficient matrix demonstrates correlations of 0.80 or higher among the variables, there may be multicollinearity.

To analyze the relationship between the selected factors and stock prices, we made separate investigations for each of the analyzed oil companies. The econometric soft used for this study is E-VIEWS version 4.1 an econometric software package, primarily developed to investigate time series data.

### 3. Data analysis results

Stationarity tests performed -Augmented Dickey-Fuller and Phillips-Perron tests - revealed that the majority of the series are non-stationary in their levels, thereby they had to be stationarized by taking the second differences. We proceed our analysis under the assumption that all micro variables have a unit root. In case of SNP analysis the test results indicate that with the exception of a few variables which are stationary in their levels (ROE, ROIC, ROA, NPM, NI), the rest of the variables are non-stationary in their levels and stationary in the first difference or second difference.

Different variables were found stationary in case of PEI and these are CR, ADR, DR, ER, LR, DCR, ROIC. After performing ADF and PP tests, only three variables were found (EFA, ROA, NPM) in analysis of PTR company. Regarding the variables series of OIL company, three of them were found to be stationary in their levels with ADF test: ADR, EAR, EFA. For the other variables was necessary to calculate their first difference to induce the stationarity.

Regarding macroeconomic indicators, the tests results indicate that Gross Domestic Product, Foreign Direct Investments and Average Interest Rate of Banks (only under ADF test) are stationary in their levels at 5% significance. Testing for the stationarity of the first difference and the second difference was necessary to be computed in case of

other variables, respectively Average Exchange Rate RON/EUR, Foreign Trade, Current Account, PCURALS, Industrial Output, Broad Money.

The unit root tests were performed also on stock prices. For all the series analyzed we can't reject the null hypothesis that they are not stationary in their levels, but this hypothesis wasn't rejected after the series were differenced once (in case of SNP, PTR, OIL stock prices) or twice (in case of PEI stock prices) at 5% significance level.

The stationarity is a necessary condition for performing Granger causality test, and therefore we induce stationarity by calculating two differences to all the series in order to proceed with the Granger test. This induces a smoothing of the data series and as a result the causality relation might be difficult to be found. Only the results that reject the null hypothesis that there are no causal relationships between the variables and stock prices at a confidence level of 5% are included in the tables below.

#### Relevant results of Granger Causality Test

Table 2

Null Hypothesis:	F-Statistic	Probability
<b>PETROM S.A.</b>		
ADR does not Granger Cause YSNP	11.6406	0.0066
CR does not Granger Cause YSNP	15.6060	0.0027
DCR does not Granger Cause YSNP	9.0132	0.0133
ER does not Granger Cause YSNP	5.7264	0.0378
NI does not Granger Cause YSNP	17.8005	0.0010
NPM does not Granger Cause YSNP	16.1458	0.0015
ROA does not Granger Cause YSNP	15.3466	0.0029
ROE does not Granger Cause YSNP	14.8995	0.0032
ROIC does not Granger Cause YSNP	14.9751	0.0031
TM does not Granger Cause YSNP	4.9085	0.0452
<b>PETROEXPORTIMPORT S.A.</b>		
FDI does not Granger Cause YPEI	12.0460	0.0034
BM does not Granger Cause YPEI	28.8186	0.0001
ACP does not Granger Cause YPEI	8.9982	0.0090
<b>ROMPETROL WELL SERVICES S.A.</b>		
ER does not Granger Cause YPTR	5.6943	0.0306
NI does not Granger Cause YPTR	5.1377	0.0386
<b>OIL TERMINAL S.A.</b>		
ACP does not Granger Cause YOIL	5.2643	0.0366
BM does not Granger Cause YOIL	5.1466	0.0385

The Granger-causality analysis has been carried out in order to assess whether there is any potential predictability power of one indicator for the other. The results reveal that SNP stock prices are the most influenced by the analyzed microeconomic factors. This

might suggest that shareholders are very sensitive to the general performance of the company more than to the general macroeconomic context.

Because of the controversy surrounding the Granger causality method, empirical results and conclusions drawn from them should be considered with caution. We extended our analysis by using the regression model (1) in order to identify the sense and magnitude of micro and macroeconomic indicators' impact on oil stock prices.

The results obtained by running the tests on variables series are presented further. White's heteroskedasticity test indicated that the squared error is uncorrelated with all the independent variables, the squares of the independent variables and all the cross products. The multicollinearity does not exist in the studied regression models, all correlations among explanatory variables included in the regression models being less than 0.80. Normality test for residuals applied - Jarque-Bera test - confirmed that all series are normally distributed.

The coefficient of determination ( $R^2$ ) of each regression model indicated that a great proportion of the companies' stock value can be explained by the determinant factors selected.

By applying the regression model for variables presented in table 1 and estimated for each oil company we found the following relevant results. A statistically significant positive relationship was found between Ural oil prices and the oil companies stock prices. These results showed that the investors should continue to hold their oil stocks if oil prices and energy costs continue to remain high.

A positive relationship was expected to exist between stock prices and GDP. However, in case of SNP stock prices we found a negative relation. This is not a particular case, similar results were obtained also by Dimson (2005), in a recent study conducted on the relationship between stock returns and GDP. Using data from 11 countries over 105 years was found no evidence of a positive relationship between GDP growth rates and stock market returns, more, there were several countries exhibiting a negative correlation. This dynamic may be caused by two reasons: an overreaction to good economic news or a declining risk premium in countries with improving economies.

Foreign direct investments on Romanian market has driven many times the evolution on Bucharest Stock Exchange, positively - through capital inflows and negatively - by reorientation of liquidities towards other markets or other financial investment areas. By having a small number of issuers, a small capitalization and a low value of daily transactions, emerging capital markets are more sensitive to all foreign direct investments movements. The percentage of foreign direct investments in Romania's GDP is not a high one comparing with those existing in other European countries, but the financial force of the foreign investors is notable in the evolution of blue-chips from BSE, as, in general, the financial analysts state. The foreign investors support the ascending and the descending trends of stocks. In contrast with these expectations, the tests results revealed a low negative influence of foreign direct investments on SNP, OIL and PTR stock prices. However, the regressions results revealed that Average Exchange Rate has a strong positive influence over OIL and PTR stock prices.

The most important microeconomic indicators with sensible impact on oil stock prices are presented further. The Equity to Fixed Assets factor has a strong negative influence on SNP stock price, the regression coefficient being 13.10. The same negative influence can be observed also for OIL company when the regression coefficients were 5.92 and 7.27 in two regression models. In case of PTR stock price the test results showed a strong positive impact of EFA, the regression co

Equity-to-fixed-assets ratio indicates the extent to which the property assets and other fixed assets are covered by the equity capital. It is possible to have a high equity to

fixed assets ratio and still have a high long-term debt to fixed asset ratio if a large portion of current assets are financed with owner's money. Nevertheless, this ratio may be useful as an indication of the ability of the company to borrow for the purchase of additional fixed assets. But firms with highly depreciated fixed assets may have higher ratios and still have difficulty in getting credit.

A direct relation was also found between Asset to Debt Ratio (for SNP and PTR), while a negative relation was revealed between Debt to Asset ratio and OIL stock prices. An explanation could be that investors react positively to low leveraged companies and negatively to high leveraged companies.

As the test's results showed, Asset Turnover Ratio influences positively SNP stock prices, the regression coefficient being 3.53. The influence of Current Ratio on stock price has a low impact but a positive one in case of OIL and SNP stock prices. Also a direct strong relation was found between Invested Capital Turnover Ratio and OIL and PTR stock prices (the regression coefficients are 4.08 and 8.91). The strongest positive influence on SNP stock prices was found to be the indicator Equity to Asset Ratio with a regression coefficient of 10.69. Shareholders respond positively when their equity, compared to total value of company's assets increases, this leading to stock prices growth.

#### 4. Conclusions

The results of the study, while not surprising, are evidence that macroeconomic changes, as well as fundamental factors do have an influence on the value of stock. These changes in stock prices due to macroeconomic development may reasonably be expected to vary across segments of the economy because of variation in firms operating characteristics. As the indicator impact on stock movements vary from a company to another, we can not establish certain indicators that can guide the policy makers or which can be used in order to a prediction model for stock prices trends. The limitations of this study include the fact that analysis of the oil industry was made on a small sample size. Further researches are needed on a larger sample to focus on the above issues to understand the capital structures and other financial indicators such as micro- and macroeconomic variables that might affect a firm's performance, and eventually develop a prediction model for oil companies.

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## FINANCING OF NEW BUSINESS IDEAS IN SMALL ENTERPRISES



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***Abstract.** Financing represents a central element of entrepreneurship. Financial resources allow developing new business projects and start up of activities of small enterprises. Unfortunately, the restrict credit politics for small enterprises and the absence of their resources represent important obstacle for implementation of new business ideas. In our research, we try to identify the main problems which oppose to the promotion of business ideas in small enterprises.*

**Key words:** venture capital; Business Angels; mezzanine financing; bootstrapping financing; spin-off.

### **Financing of small enterprises**

Many new established enterprises promote their business ideas by attempting to use proper sources of capital – such as equity capital. The equity capital is represented by financial resources which are brought by the person or persons that create the enterprise.

The entrepreneur is a decision factor with a positive way of thinking. He/she creates and develops an enthusiastic view over economic phenomenon, which is based on a collection of specific ideas, non yet used or turned to good account on the existing market. The way to realize this vision is clear, although the details could be incomplete, flexible and could be developed in time. Thus, the entrepreneur will imply with determination in the development of strategies to transform this vision in reality. In their activity, he will assume the responsibility to realize ideas and will assume all the risks. The entrepreneur estimates the costs, the requirements or the demands of the market or of the clients and will not hesitate to ask for help in establishing alliances in view of business' success.

In the most cases, the business is started based on the personal funds. The person, who creates the enterprise based on the personal funds, the person is free to take proper decisions.

The financing type “bootstrapping” (financing by own forces) implies the financing with personal financial resources. This financing form was used by the firms that had exponential grows, like Goggle, which is based on the financial resources of two candidates for doctoral degree at Stanford University, before it use extern capital.

The firm's growth implies direct or indirect extern financing, generally.

One financing form is based on the extern capital, that are the financial resources of the extern sundry creditors given as loans for a certain period of time. By acceptance of the

loan, the owner keeps its position in organization but must to give back the borrowed capital and the interest.

Another way of direct extern financing can be realized by the financial firms as “Venture Capital” or “Business Angels”.

Extern financing refers to the indirect financing using project or investments funds, which are based on the concept of the participation to the profit. The participation to the capital of the firm implies to obtain certain shares for the sundry creditors of the capital. For them, it must not to return their investments, but to grant proper dividends.

The extern forms of financing for small enterprises are lower. We can mention in this category the following forms: Venture Capital, Business Incubators, and Spin-Off.

A mix form of financing (between personal capital financing and extern financing) is that financing called “mezaninne” - a hybrid financing instrument. In this case, the creditors of capital are informed about the development of new enterprise, but their influence, as a result of their participation of the capital of the firm, must not significant enclose the decisions of the owner.

#### **Financing of the enterprises by venture capital and business angels**

Venture Capital represents a risk capital fund, fund supplied by the specialized financial firms, which action as intermediaries between the primary financial sources (as pension funds or banks) and the beneficiary firms.

Venture Capital is a specialized fund, created for a delimited period, used for investments in young enterprises, which have a high growth potential. By participation to the capital of the young enterprise, the fund hold certain control rights over the activity of the enterprise but, in the same time, give it managerial support. The objective of the providers of Venture Capital is to realize an increase based on the value added. Their main objective is not oriented to receive the dividends, but to reinvest financial resources to increase the profit of the firm and the percent of shares hold by the Venture Capital.

The investment of the Venture Capital in a firm is realized in three steps:

- initial capital – is supplied for research, set up and develop an initial concept;
- start-up capital – is supplied to develop product and to realize marketing initial process, in condition that the product are not launching on the market and are not traded;
- expansive capital – is supplied for growth and developing of the company, to increase the capacities of production, market, developing of new product and increase of working capital.

Venture Capital can have extern, intern or multinational funds; this in condition that they are strong flows of capital across the borders.

The building of a Venture Capital can be approached from two points of views: management and the destination country. The management criterion implies the creating funds from the geographical location of the firms that invest these funds. The destination criterion implies the building of funds from the geographical destination for these investments.

Risk Capital can be considered as a determinant factor for entrepreneurship. It is a main source for financing the enterprises; especially those based on the performing high-tech technology, with a crucial role in developing and promotion innovations in the firms.

Venture Capital has a strong presence in developed regions, like Europe and USA. Thus, in 2005, USA attracted over 39% from capital risk funds of OECD. Great Britain attracted as investments 11% from capital risk funds of OECD, that represent over 40%



from the total of investments of risk capital in Europe, with an important percent in GBP, over 30%.

In Europe, the dimension of attracted funds is different from each country, but we can notice their important weight in GBP: 40% for Denmark, over 30% for Sweden and Great Britain and less but significant weight for the other countries.

Major investments are made in high-tech firms, with a weight of 40% in the total risk capital funds of OECD. It remarks example of USA (88%) and Canada (81%). Europe shows a special situation, with dissemination on a large scale (from 90% in Ireland, to 20% or less in Hungary, Czech Republic or Nederland). The causes are the absence of coherent politics at level of UE, which lead investments to three different branches of high-tech sectors: communications, information technology and health and biotechnology.

“Business Angels” are physical persons with experience and power in business and finance, which make investments directly in company, having specially an informal role.

“Business Angels” fill the gap of financing characterized by a relative low infusion of capital and high risk. In this category of investors we can make difference between active “Business Angels” and passive “Business Angels”.

Active “Business Angels” are entrepreneurs, which offer to enterprise not only their own capital, but their experience and personal contacts, too. In comparison, passive “Business Angels” offer to enterprise only their financial capital.

“Business Angels” make investments to a great extend in USA rather than in Europe.

The higher grade of profession of business investments for Venture Capital rather than Business Angels is the significant difference between the two forms of investments.

#### The differences between Venture Capital companies and Business Angels companies

Table 1

Venture Capital Companies	Business Angels Companies
Invest in all phases of development of a company	Invest especially in the initial phase of business and rarely in other phases.
The amount of investments is high.	The amount of investments is low.
Investments are made in any zone.	Investments are made around 80 km.
The investment has the main goal to obtain profit.	Investment can be made to help a relative or a friend, too.
Company has as basis a direct control.	Investment has as basis the development of a product and a market quote.
Requirements and acceptance standards are high.	Requirements are in general formal.
The objectives are clear defined.	The objectives are less clear defined.
Company offer consultancy to the selection of management.	The assistance to selection of management is less systematic.

#### Financing start up a business in Romania

In general, when we search for financing opportunities for a new business idea, a lot of problems may occur. The main problems identified and that represent the point of start for our research can be explained by the following questions:

- Which are the main sources of financing for small enterprises?
- Which is the place of the risk capital in the portfolio of the banks that offer loans for business?

Using different research made in Romania, the great part of small enterprises has as basis their informal resources when they want to promote business ideas. The informal capital that is base for new business has as foundation the familiar resources and the resources offered by Business Angels.

The main source of financing of a new business idea is offered by family (54% response), followed by the banks (39%). It mentioned that the loans offered by the banks under risk-free conditions, using assurance of the amount, in general as mortgage form, for buildings or houses.

The third source for loans is derived from friends, colleagues or head of company (12%).

In the present we identify a new source for loans, using of state funds.

In the literature occurs the concept of social network associated to promotion of business ideas.

The social network for a new enterprise has based the group family, friends and acquaintances and plays an important role in the case of start up a new enterprise. Thus, an entrepreneur that has created a social network can identify more business opportunities. On the other hand, the social network can be valued for obtain some resources (financial, informational or another benefits), that are important for new enterprise.

The difficulties in financing of new enterprises can be determined by the fact that UE have not a unitary stock market, as NASDAQ in USA, which can cover request for financing or growing enterprises. UE offer fewer solutions to promote business ideas of small enterprises, especially in the earlier stages.

Another factor that breaks the process of promotion of new business ideas is the gap between theory and practice. In present we assist in many fields of activities (for example micro and nano technology) to the significant differences between the quality of laboratory research in universities or research institutes and economic success. Although we assist to increase of number of technological transfer center in Romania, these have not enough strength to support success business, yet. Some young enterprises promote new innovative ideas, but problems occur referred to their trading, beginning with incoherent politics of licenses, absence of competencies in trading of licenses or absence of competencies to attract the financing and communication resources with potential investors or bankers. Absence of professional characteristics represents a major feature in promotion of new business ideas.

To implement business ideas it is necessary to change the special technical orientation of many entrepreneurs, to take into consideration the development of new competencies associated to start up and promote a business.

They are business partners which, based on their technical competencies, think their success model without take into account the structure of market. For this it is important only technical solution, which in many times do not ignore the preferences of potential clients.

Thus, many business ideas are loosed because they are not primary analyzed the conditions from the market.

#### **The effects of investments in entrepreneurship**

Investments in new start up enterprises suppose sometimes support of entrepreneurship. Each entrepreneur will bring benefits not only to their company, but to the economy in which company are developed. These benefits are:

- creation the labor places. The private sector is the biggest employer of labor force. The entrepreneur realizes his commitment in a product activity, but, in

the some time, he/she creates new labor places and employees another worker, too. This fact has a positive effect, lead to increase of individual gains and state incomes, due to collected taxes. As a result, growth the power of buying of peoples, that determine increase of demands for goods and services, have as result a trigger on of production and new employments. It is a complex process that can be considered reiterated.

- development of the market, the goods and the various and quality services. By promotion on the market of new product and services, increase and diversity the offer, that lead to increase of competition on the market, to increase of quality level and to decrease of prices, that represent advantages for the consumer. In the some time, it must not neglect the aspect that the entrepreneur is a creative and full resources element for the market that can create new market, new buyers and new sellers. This modern vision make difference between entrepreneur and commonly business man;
- encouragement of processing of local materials in finite goods for intern or extern consumer. Due to their innovative character, the entrepreneur is not content by using the traditional resources and he try to find new resources, which can have a comparative advantages from the point of view of suppliers, costs and quality;
- assignation the capital resources. The entrepreneur has an important role in organize, coordinate and control the main factors of production, used to create goods and services. The capital resources are the financial resources, but there are other assets (cars, equipments, buildings, etc.) which are involved in activities, too. The entrepreneur have initiative and confidence in accumulation and mobilization of capital resources for a new business or to extend the existing business;
- promotion of using of modern technologies in small and medium companies. This fact implies using the performing existing technologies, but promotion of new technologies, new industries, new product, that lead to increase productivity, too. In the same time, there are encouraged studies and research to create and develop modern equipments, which will be used in production;
- industrial developing, especially in rural zone. This fact implies using of performing equipments and has gaining the general economic development, especially the development of industrial factor in rural zone. As a result, it is produced a decrease of dependency of personal gains from the agricultural production in rural zone, dependency that is specially affected by the weather factor.

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# ENTRY AND EXIT DECISIONS UNDER UNCERTAINTY: A REAL OPTION APPROACH

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***Abstract.** This paper focuses on models proposed in financial literature for establishing optimum time for entry and exit as strategic decisions for a firm, decisions that can be modeled through real options. Uncertainty refers to price for the product obtained from operating the project, and equally the investment cost. Using as an example a project analyzed by a company from furniture industry, we demonstrate that, under uncertainty, entry in the market takes place at a price level that is much higher than total cost, while decision to exit from the market is adopted when price level is much lower than the variable cost. We also analyze effects of this phenomenon, named hysteresis, when model parameters change.*

**Key words:** capital budgeting; uncertainty; entry options; exit options; hysteresis.

REL Classification: 7J, 11D

## **Introduction**

Traditional capital budgeting, based on discounted value, is not enough in an uncertain environment. It must be completed with models under uncertainty, such as sensitivity analysis, scenarios or Monte Carlo simulation. A different approach for investment analysis is represented by real options, defined and assessed by analogy with financial options.

In this paper, we focus on two important decisions for a firm: entry and exit decisions. We discuss about implementing a project or abandoning it, situations that could be patterned with real options.

A firm holds an option to invest, by postponing the immediate investment, and it must decide upon the optimum time to exercise, which is equivalent with entry in the market. The possibility of deferring a project is significantly valuable for irreversible capital goods. For a firm, degree of irreversibility differs with capital specificity for an industry (an asset is less irreversible if it has alternative uses). From macroeconomic perspective, investments are completely irreversible, because disinvestment made by a company assumes only a change of ownership, while another company takes over the same project.

After implementing a project, firm has the possibility to stop operating it, under unfavorable circumstances. This exit option can be materialized in two different situations: stop operating the project and place assets in preservation, or disinvestment for salvage value. Therefore, closing a business and abandonment are two different things. Closing the project gives the possibility (option) of reopening it, assuming a cost of maintenance and a

cost of restarting it after a period of time. Abandonment is irreversible and it does not imply costs.

**Modeling simultaneously entry and exit options**

Brennan and Schwartz (1985a) and (1985b) discuss about entry and exit options together. In the first cited article, they build a model which allows estimating the prices that generate entry on the market and exit from a business, using the example of a mine. Natural resources sector has the specific feature of high prices volatility, which represents in fact a high uncertainty.

The idea of simultaneously analyzing these two categories of real options was used by Dixit (1989) that proposed a similar model, completed later by Choi and Lee (2000).

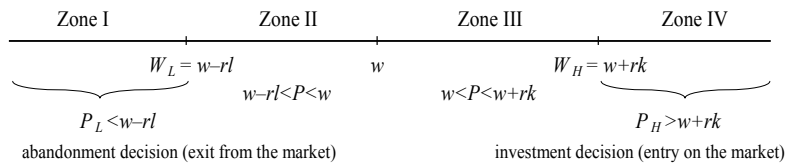
We consider an investment project with parameters: sunk cost  $k$ , exit cost  $l$ , unit operating cost  $w$  and unit sale price for the product  $P$ . Interest rate is  $r^{(1)}$ . Parameters  $w, r, k$ , and  $l$  are constant and nonstochastic, while price  $P$  is an exogenous variable that follows a standard Wiener process:

$$\frac{dP}{P} = \mu_P dt + \sigma_P dz,$$

where:  $\mu_P$  is growth rate trend for price and  $\sigma_P$  is instantaneous volatility;  $E(dz) = 0$  and  $E(dz^2) = dt$ .

This model is based on shareholders wealth value maximizing rule, so entry and exit decisions are adopted according as uncertainty about product price is solved (Figure 1). Investor decides to accomplish the project if:  $P > w+rk \equiv W_H$  (this high level of price, noted with  $P_H$ , is greater than  $W_H$ ), otherwise investment decision is delayed.

If investment is already made and price lowers, but not less than level  $w-rl \equiv W_L$ , investor continues to operate the project because returns under average obtained in this situation are compensated by returns above average obtained while price was higher than  $W_H$ . If price goes down under the level  $W_L$ , stopping activity is a better solution than continuing it. The low level for price that generates adopting exit decision is noted with  $P_L$  and it is smaller than  $W_L$ . All we have to do now is to estimate  $P_L$  and  $P_H$ .



**Figure 1.** Adopting entry/exit decisions depending on changes in price

$V_0(P)$  and  $V_1(P)$  represent expected net present value of the project, as a function of price, for idle firm (state 0) or operational firm (state 1). We have to choose optimum time to switch from state 0 (nonactive) to state 1 (active) or conversely<sup>(2)</sup>.

$P_L$  and  $P_H$ , along with constants  $A$  and  $B$  are determined as solutions for equations system:

$$\begin{cases} V_0(P_H) = V_1(P_H) - k \\ V_1(P_L) = V_0(P_L) - I \\ V_0'(P_H) = V_1'(P_H) \\ V_0'(P_L) = V_1'(P_L) \end{cases} \Leftrightarrow \begin{cases} AP_H^{-\alpha} + \frac{P_H}{r-\mu} - \frac{w}{r} = BP_H^\beta + k \\ AP_L^{-\alpha} + \frac{P_L}{r-\mu} - \frac{w}{r} = BP_L^\beta - I \\ -A\alpha P_H^{-\alpha-1} + \frac{1}{r-\mu} = B\beta P_H^{\beta-1} \\ -A\alpha P_L^{-\alpha-1} + \frac{1}{r-\mu} = B\beta P_L^{\beta-1} \end{cases}$$

with:  $-\alpha = \frac{(1-m) - \sqrt{(1-m)^2 + 4q}}{2}$  and  $\beta = \frac{(1-m) + \sqrt{(1-m)^2 + 4q}}{2}$ ,  $m \equiv 2\mu/\sigma^2$

and  $q \equiv 2r/\sigma^2$ .

The most important feature for these decisions under uncertainty is hysteresis<sup>(3)</sup>. For example, if price is lying between  $w$  and  $w+rk$ , firm decides to delay investment decision. If price increases up to level  $W_H$ , investor accomplishes the project and entry on the market. When price decreases back under level  $W_H$ , it does not imply that company abandon the project and exit from the market.

Under uncertainty, the interval of inactivity for a company increases from  $(W_L, W_H)$  to  $(P_L, P_H)$ , and effects of hysteresis amplify<sup>(4)</sup>:

$$P_L < w - rI \equiv W_L \quad \text{and} \quad P_H > w + rk \equiv W_H$$

For large projects, with many periods needed for implementing, investment cost is not fixed from the beginning. It is liable to uncertainty as much as estimated prices are and it is a stochastic variable. Pindyck (1993) identifies two sources of uncertainty regarding investment cost: a technical one, concerning the capacity to make the project, which is solved only if the project is implemented, and another one connected with production factors costs, coming from changes in prices for materials and labor, which implies postponement of investment.

Choi and Lee (2000) completed the model proposed by Dixit (1989), by considering investment cost  $I$  as a stochastic variable, along with price  $P$ :

$$\frac{dP}{P} = \mu_P dt + \sigma_P dZ_P \quad \text{and} \quad \frac{dI}{I} = \mu_I dt + \sigma_I dZ_I$$

While operating the project, firm holds a PUT option to abandon it, for an exercise price given by salvage value, which is a proportion of initial cost:  $\delta I$ , with  $\delta \geq 0$ . Firm value is a function of two variables, product price and investment cost:  $V(P, I)$  represents value for idle firm, that has an option to invest, and  $W(P, I)$  is value for active firm, that holds an option to abandon:

$$V(P, I) = A_0 P^{-\alpha} I^{1+\alpha} + B P^\beta I^{1-\beta} \quad \text{and} \quad W(P, I) = A P^{-\alpha} I^{1+\alpha} + B_1 P^\beta I^{1-\beta} + \frac{P}{r - \mu_P}$$

The two prices that determine entry or exit from the market are represented by  $Q_L$ , and  $Q_H$ , with  $Q \equiv P/I$ . Values for these variables, along with parameters  $A$  and  $B$  are determined as solutions for equations system:

$$\left\{ \begin{array}{l} V(P_H, I_H) = W(P_H, I_H) - I_H \\ W(P_L, I_L) = V(P_L, I_L) + \delta I_L \\ V_P(P_H, I_H) = W_P(P_H, I_H) \\ V_I(P_H, I_H) = W_I(P_H, I_H) - 1 \\ W_P(P_L, I_L) = V_P(P_L, I_L) \\ W_I(P_L, I_L) = V_I(P_L, I_L) + \delta \end{array} \right. \Leftrightarrow \left\{ \begin{array}{l} BQ_H^\beta = AQ_H^{-\alpha} + \frac{Q_H}{r - \mu_P} - 1 \\ \beta BQ_H^{\beta-1} = -\alpha AQ_H^{-\alpha-1} + \frac{1}{r - \mu_P} \\ AQ_L^{-\alpha} + \frac{Q_L}{r - \mu_P} = BQ_L^\beta + \delta \\ -\alpha AQ_L^{-\alpha-1} + \frac{1}{r - \mu_P} = \beta BQ_L^{\beta-1} \end{array} \right.$$

where:  $-\alpha = \frac{(a-b) - \sqrt{(b-a)^2 - 4ac}}{2a} < 0$  and  $\beta = \frac{(a-b) + \sqrt{(b-a)^2 - 4ac}}{2a} > 1$ ,

with:  $a = \frac{1}{2}(\sigma_P^2 - 2\rho\sigma_P\sigma_I + \sigma_I^2)$ ,  $b = \mu_P - \mu_I$ ,  $c = \mu_I - r$ .

The first two equations signifies that switching from nonactive state to operational state is done by exercising CALL option to invest, paying exercise price  $I_H$ , while reverse situation is accomplished if abandonment PUT option is exercised for salvage value  $\delta I_L$ . The last four relations indicate that project value is a continuous and smooth function in variables  $P$  and  $I$ .

If investment cost  $I$  is not stochastic, then Choi and Lee (2000) model becomes, in fact, Dixit (1989) model, with only one stochastic variable, product price.

Joaquin and Khanna (2001) completed continuous time models developed in real options literature on entry and exit decisions until then, by introducing production costs. The two authors demonstrate that cash flows and assets value (firm size before implementing the project) have negative impact on net project value. For instance, increasing cash flows means higher abandonment costs and lower value for exit option. As for assets value, a smaller firm has an advantage to a bigger firm, if the project has lower exit costs, which means that it will enter in the market or exit from the market before the bigger firm.

#### Establishing optimum time for entry/exit decisions using the example of a company from furniture industry

“Mobex Design” company produces and sells domestic furniture and analyzes the possibility to extend its business on market for office furniture. Investment consists in equipment for cutting, finishing and applying veneer on plywood, needed for assembling furniture pieces. For the new product, estimated variable cost is  $w = 55$  euros, while investment cost is  $k = 70$  euros. We consider a stochastic selling price (Brownian movement) with instantaneous growth rate  $\mu_P = 0$  and volatility  $\sigma_P = 0.1$ . Interest rate is  $r = 10\%$  and exit cost is  $1 = 10$  euros.

For the base case, variable and total costs are:  $W_L = 54$  and  $W_H = 62$ , and trigger prices for entry and exit decisions are:  $P_H = 74.5$  and  $P_L = 45.3$ . We can explain this as follows: firm delay investment until price reaches 74.5 euros (20.1% higher than total cost of 62 euros), when it exercises entry option and implement the project. Abandonment option is exercised and firm decides to exit from the market if price decreases and reaches a level of 45.3 euros, which is 16.2% lower than variable cost. Hysteresis is given by gap between  $P_H$  and  $P_L$  (= 29.2 euros), which is bigger than gap between the two costs  $W_H$  and  $W_L$  (= 8 euros).

Further on, we study effects of this phenomenon for changes in value of model parameters, performing a sensitivity analysis. In Table 1 are presented values for variables



$W_L$ ,  $W_H$ ,  $P_L$  and  $P_H$ , when parameters  $\mu_p$ ,  $\sigma_p$ ,  $w$ ,  $r$ ,  $k$ , and  $l$  changes. The last two rows from each panel represent the gap, expressed as percentage, between exit trigger price and variable cost, respectively entry trigger price and total cost, that helps us to interpret hysteresis effects for every parameter in the model.

Sensitivity analysis

Table 1

Changes in $\mu_p$					
	-0.05	-0.02	0	0.02	0.05
$W_L$	54.0	54.0	54.0	54.0	54.0
$W_H$	62.0	62.0	62.0	62.0	62.0
$P_L$	49.9	47.4	45.3	42.7	38.9
$P_H$	84.7	78.4	74.5	71.1	67.9
$ P_L - W_L /W_L$	7.6%	12.2%	16.2%	20.9%	28.0%
$(P_H - W_H)/W_H$	36.6%	26.4%	20.1%	14.7%	9.5%

Changes in $\sigma_p$					
	0.01	0.05	0.1	0.15	0.2
$W_L$	54.0	54.0	54.0	54.0	54.0
$W_H$	62.0	62.0	62.0	62.0	62.0
$P_L$	52.8	48.8	45.3	42.5	40.3
$P_H$	63.4	68.7	74.5	79.9	85.2
$ P_L - W_L /W_L$	2.2%	9.6%	16.2%	21.3%	25.4%
$(P_H - W_H)/W_H$	2.3%	10.8%	20.1%	28.9%	37.3%

Changes in $w$					
	45	50	55	60	65
$W_L$	44.0	49.0	54.0	59.0	64.0
$W_H$	52.0	57.0	62.0	67.0	72.0
$P_L$	36.6	40.9	45.3	49.6	54.0
$P_H$	62.9	68.7	74.5	80.2	86.0
$ P_L - W_L /W_L$	16.8%	16.4%	16.2%	15.9%	15.7%
$(P_H - W_H)/W_H$	20.9%	20.5%	20.1%	19.7%	19.4%

Changes in $r$					
	6%	8%	10%	12%	14%
$W_L$	54.4	54.2	54.0	53.8	53.6
$W_H$	59.2	60.6	62.0	63.4	64.8
$P_L$	45.0	45.1	45.3	45.4	45.5
$P_H$	72.3	73.4	74.5	75.6	76.7
$ P_L - W_L /W_L$	17.3%	16.7%	16.2%	15.7%	15.1%
$(P_H - W_H)/W_H$	22.1%	21.1%	20.1%	19.2%	18.3%

Changes in $k$					
	0	35	70	105	140
$W_L$	54.0	54.0	54.0	54.0	54.0
$W_H$	55.0	58.5	62.0	65.5	69.0
$P_L$	48.7	46.2	45.3	44.7	44.4
$P_H$	61.2	68.8	74.5	79.6	84.5
$ P_L - W_L /W_L$	9.9%	14.4%	16.2%	17.2%	17.8%
$(P_H - W_H)/W_H$	11.3%	17.6%	20.1%	21.5%	22.4%

Changes in $l$					
	0	10	20	30	40
$W_L$	55.0	54.0	53.0	52.0	51.0
$W_H$	62.0	62.0	62.0	62.0	62.0
$P_L$	46.4	45.3	44.2	43.2	42.2
$P_H$	74.1	74.5	74.8	75.1	75.4
$ P_L - W_L /W_L$	15.7%	16.2%	16.6%	16.9%	17.2%
$(P_H - W_H)/W_H$	19.5%	20.1%	20.7%	21.1%	21.6%

*Changes in  $\mu_p$*

We consider that selling price could increase with 5%, but also could decrease with 5%, because of intensifying competition on this market. Figure 2 illustrates the fact that  $W_L$  and  $W_H$  are not affected by changes for this parameter, while entry/exit trigger prices are simultaneously decreased. Hysteresis is not significant: it decreases a little at the beginning, then, when price growth rate is close to 5%, the gap between the two prices starts to increase. Investment is more easily implemented and more hardly abandoned, because the trigger prices decrease.

*Changes in  $\sigma_p$*

Price volatility may vary between 1%<sup>(5)</sup> and 20%. Variable cost and total cost are not changing, while  $P_H$  rises and  $P_L$  diminishes with volatility. Figure 3 shows that hysteresis is not present in a certain environment, and entry trigger price is precisely total cost and exit trigger price is even variable cost, less interest on exit cost. The higher the uncertainty, the bigger is the gap between the two prices. For example, if volatility is 20%,  $P_L$  is 25.4% lower than variable cost, and  $P_H$  is 37.3% higher than total cost. It means that hysteresis is significantly increasing, investment is more hardly made and abandoned.

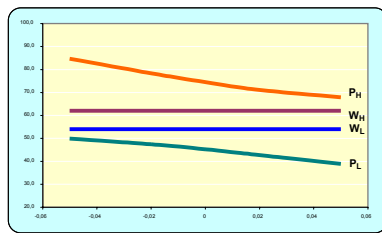


Figure 2. Sensitivity analysis –  $\mu_p$

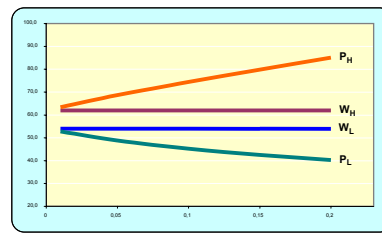


Figure 3. Sensitivity analysis –  $\sigma_p$

*Changes in w*

Variable cost may vary between 45 and 65 euros, which implies that  $W_L$  and  $W_H$  change, but gap between them remains constant. The higher is the variable cost, the higher are trigger prices, for entry and for exit from the market. Investment is more hardly made and more easily abandoned, but hysteresis effect is scarcely perceptible, because of increase in variable cost (Figure 4):  $P_L$  remains about 16–17% under variable cost, and  $P_H$  is about 20–21% over the total cost.

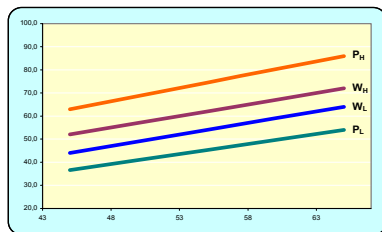


Figure 4. Sensitivity analysis – w

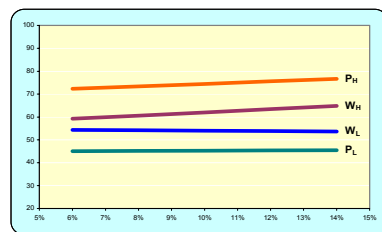


Figure 5. Sensitivity analysis – r

#### Changes in $r$

Interest rate may be found between 6% and 14%. Increase in interest rate implies rising of  $W_H$  and decreasing for  $W_L$ . As  $P_L$  grows and comes closer to  $W_L$ , and  $P_H$  increases at a lower rate and comes closer to  $W_H$ , hysteresis diminishes (Figure 5). A higher interest rate involves an increased value for delay option (investment is more hardly implemented) and a decreased value for abandonment option, so exercising it becomes more attractive for investor (project is more easily abandoned).

#### Changes in $k$

To better illustrate hysteresis, we allow a larger interval for variation in investment cost, between 0 and 140 euros. Results are similar with those found for price volatility. Anyhow,  $W_H$  and  $P_H$  increase along with sunk cost, and gap between them grows from 11.3% to 22.4%. As gap between  $P_L$  and  $W_L$  also increase from 9.9% to 17.8%, is obviously that hysteresis significantly increases with investment cost (Figure 6). Investment decision is more hardly adopted, because sunk cost is higher for irreversible assets and delay option is more valuable. In the same time, project is more hardly abandoned.

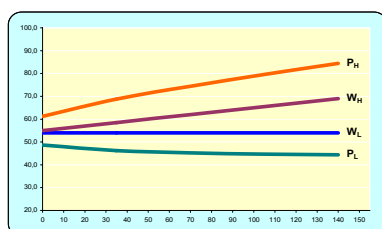


Figure 6. Sensitivity analysis –  $k$

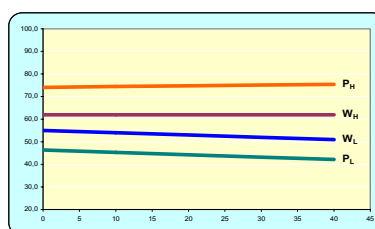


Figure 7. Sensitivity analysis –  $l$

#### Changes in $l$

We considered that exit cost may be somewhere between 0 and 40 euros. Gap between  $W_L$  and  $P_L$  increases from 15.7% to 17.2%, and gap between  $W_H$  and  $P_H$  rises from 19.5% to 21.6%. Under these circumstances, we notice (Figure 7) that hysteresis grows with exit cost. Effects of this phenomenon are similar, but smaller in scope than for parameter  $k$ . Investment is more hardly adopted and abandoned.

#### Conclusions

Numerical results obtained for the case of the company in furniture industry conduct us to the same conclusions that authors of the models presented in this paper reached. The most important conclusion is that hysteresis appears under uncertainty (price volatility) and increases with it. Similar results are obtained for sunk cost, respectively exit cost. This phenomenon is quite unchanged for other parameters of the model (its increasing or decreasing is scarcely noticeable).

If sunk cost is also a stochastic variable, changes in its instantaneous growth rate ( $\mu_1$ ) implies that investment is more easily implemented and more easily abandoned, because its salvage value is higher, being a proportion of initial investment cost.

Growing volatility for sunk cost determines an appreciably increasing in hysteresis, just as for the case of price uncertainty, because option to invest and option to

abandon are more valuable, so these options are more hardly exercised comparing with the situation with less or not at all uncertainty.

Concluding this article, we can say that only in a certain environment regarding the product price or recover of initial investment cost when project is abandoned, hysteresis is not present. Otherwise, this phenomenon exists and it increases with uncertainty, with sunk cost and exit cost.

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### Notes

- (1) Interest rate in Dixit's model is symbolized with  $\rho$ , but we replaced this symbol with  $r$ , to eliminate the confusion with correlation coefficient defined in Choi and Lee model.
- (2) This is linear stochastic programming. Mathematical details do not represent an objective for this paper, so we present only the results, our concern being applicability of the model for investments in real assets.
- (3) Hysteresis is the irreversible phenomenon, which means that successive states for a substance, determined by parameter changes, differs from successive states determined by contrary changes for the same parameter (definition from Romanian Explanatory Dictionary, 1975).
- (4) If there is no uncertainty (Marshallian theory), the entry trigger price is  $W_H$ , which is the total cost (operational cost plus interest on investment cost), and exit price is  $W_L$ , which is the variable cost less interest on cost to suspend operations, if there is one.
- (5) This value is assimilated to absence of volatility; we did not consider zero volatility because of calculation reasons (a number divided to zero).

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# TESTING THE RANDOM WALK HYPOTHESIS ON THE BUCHAREST STOCK EXCHANGE BET INDEX

■  
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**Abstract.** *The fundamental goal of this approach is the random walk hypothesis. This paper tests the random walk hypothesis for BET Index of the Bucharest Stock Exchange and the implications of this assumption. The random walk model of stock prices generates several important implications for practitioners.*

**Key words:** financial markets; stock exchange index; random walk; efficiency of the financial assets; econometrics.

## **Analysis of the random walk hypothesis**

The evaluation and prognosis pattern of both the efficiency of the financial assets and the investing risk, represents the main purpose of the random walk model. According to this hypothesis, efficiency distribution of financial stocks and shares should be normal. By applying this distribution, one can estimate the risk of financial assets on any given time interval. If the price of a financial asset doesn't behave on a random walk pattern, than there is no relationship between the prices of the respective asset on different time intervals. Financial markets regarded as emergent best show this behaviour by posing a high risk on short-term, but when balance is reached on such markets, one can obtain significant benefits.

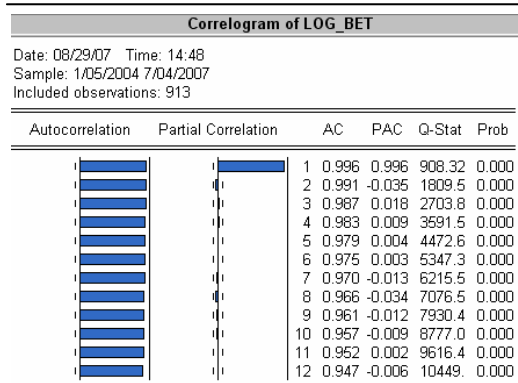
Testing the random walk hypothesis for time series that follow financial assets trend-lines is of major interest for investors and stock-market analysts. Rejecting this hypothesis calls forth the forecast of future share prices, which may lead to the attainment of extra profits through arbitration.

## **BET Index Tests**

We shall try to test the validity of the random walk hypothesis for the Romanian stock-market BET Index, using daily data covering the analysis period of 05.01.2004 – 27.08.2007. The econometric estimations have been calculated with the Eviews 3.0 econometric program. The methods employed were: *autocorrelation coefficients* and *unit root*.

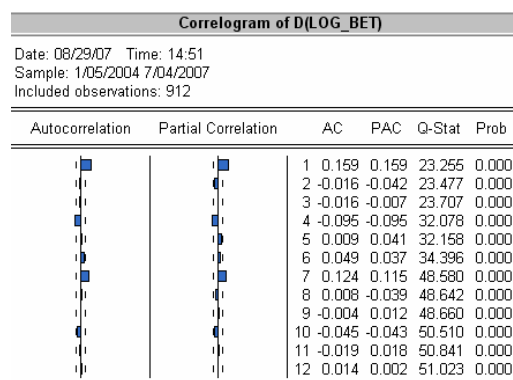
### **1. Autocorrelation coefficients method (Testing the serial independence)**

Autocorrelation coefficients - Level:



The graphic shows that the autocorrelation coefficient of lag 1 is significant and positive.

Autocorrelation coefficients – First difference:



The graphic shows that the autocorrelation coefficient of lag 1 is significant and positive. Moreover, the autocorrelation coefficient of lag 4 is negative.

Using this autocorrelation coefficients method, it can be argued that the BET Index time series is 1st order summable.

The autocorrelation coefficients of the BET<sup>(\*)</sup> Index efficiency, calculated on the basis of the data series of the index values, can be represented as:

Level:

<sup>(\*)</sup> The indicators have been calculated by using the daily values of the BET Index during the period 05.01.2004 – 27.08.2007.

Correlogram of R_BET						
Date: 08/29/07 Time: 15:40						
Sample: 1/05/2004 7/04/2007						
Included observations: 913						
Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
■	■	1	0.160	0.160	23.428	0.000
		2	-0.010	-0.037	23.525	0.000
		3	-0.013	-0.006	23.683	0.000
■	■	4	-0.097	-0.096	32.262	0.000
		5	0.010	0.042	32.352	0.000
		6	0.047	0.035	34.394	0.000
■	■	7	0.118	0.109	47.230	0.000
		8	0.004	-0.042	47.248	0.000
		9	-0.007	0.009	47.297	0.000
		10	-0.047	-0.045	49.320	0.000
		11	-0.020	0.017	49.694	0.000
		12	0.013	0.001	49.858	0.000

According to the calculated results for the Bucharest Stock Exchange BET Index, the autocorrelation coefficient of lag 1 is 0,160 (statistically different from 0).

## 2. Unit Root Test

The Unit Root test shows the stationarity of a time series. A stationary series is called integrated of „d” order (integrating order) and its notation is I(d). The integrating order represents the number of unitary roots contained in the time series or the number of differentiation operations so that the series becomes stationary. The Unit-Root test can be marked out by Dickey-Fuller and Phillips-Perron tests.

### Dickey – Fuller Test

The econometric estimations resulted from the test were:

#### Augmented Dickey- Fuller Unit Root Test - Level:

ADF Test Statistic	-2.067540	1% Critical Value*	-3.9731
		5% Critical Value	-3.4171
		10% Critical Value	-3.1306

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOG\_BET)

Method: Least Squares

Sample(adjusted): 1/12/2004 7/04/2007

Included observations: 908 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_BET(-1)	-0.007961	0.003851	-2.067540	0.0390
D(LOG_BET(-1))	0.166683	0.033136	5.030293	0.0000
D(LOG_BET(-2))	-0.042770	0.033671	-1.270224	0.2043
D(LOG_BET(-3))	0.010587	0.033698	0.314184	0.7535
D(LOG_BET(-4))	-0.093358	0.033278	-2.805375	0.0051

C	0.028655	0.013289	2.156290	0.0313
@TREND(1/05/2004)	4.14E-06	2.67E-06	1.549999	0.1215
R-squared	0.042635	Mean dependent var		0.000703
Adjusted R-squared	0.036260	S.D. dependent var		0.006535
S.E. of regression	0.006416	Akaike info criterion		-7.252468
Sum squared resid	0.037086	Schwarz criterion		-7.215376
Log likelihood	3299.620	F-statistic		6.687522
Durbin-Watson stat	1.990764	Prob(F-statistic)		0.000001

**Augmented Dickey- Fuller Unit Root Test - First difference:**

ADF Test Statistic	-13.74524	1% Critical Value*	-3.9731
		5% Critical Value	-3.4171
		10% Critical Value	-3.1306

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(LOG\_BET,2)  
 Method: Least Squares  
 Sample(adjusted): 1/13/2004 7/04/2007  
 Included observations: 907 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG_BET(-1))	-0.935136	0.068033	-13.74524	0.0000
D(LOG_BET(-1),2)	0.102463	0.059908	1.710331	0.0875
D(LOG_BET(-2),2)	0.055803	0.052435	1.064234	0.2875
D(LOG_BET(-3),2)	0.064946	0.043467	1.494127	0.1355
D(LOG_BET(-4),2)	-0.039179	0.033516	-1.168971	0.2427
C	0.001160	0.000439	2.641807	0.0084
@TREND(1/05/2004)	-1.09E-06	8.19E-07	-1.332859	0.1829
R-squared	0.428334	Mean dependent var		-4.74E-06
Adjusted R-squared	0.424522	S.D. dependent var		0.008474
S.E. of regression	0.006429	Akaike info criterion		-7.248390
Sum squared resid	0.037196	Schwarz criterion		-7.211266
Log likelihood	3294.145	F-statistic		112.3908
Durbin-Watson stat	2.001237	Prob(F-statistic)		0.000000

**Testul Phillips – Perron**

The econometric estimations resulted from the test were:

**Phillips - Perron Unit Root Test - Level:**

PP Test Statistic	-2.158819	1% Critical Value*	-3.9730
		5% Critical Value	-3.4171
		10% Critical Value	-3.1306



\*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 6	( Newey-West suggests: 6 )	
Residual variance with no correction		4.22E-05
Residual variance with correction		4.97E-05

Phillips-Perron Test Equation

Dependent Variable: D(LOG\_BET)

Method: Least Squares

Sample(adjusted): 1/06/2004 7/04/2007

Included observations: 912 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_BET(-1)	-0.007830	0.003854	-2.031390	0.0425
C	0.028223	0.013304	2.121433	0.0342
@TREND(1/05/2004)	4.06E-06	2.68E-06	1.517032	0.1296
R-squared	0.006541	Mean dependent var		0.000703
Adjusted R-squared	0.004355	S.D. dependent var		0.006522
S.E. of regression	0.006508	Akaike info criterion		-7.228293
Sum squared resid	0.038500	Schwarz criterion		-7.212452
Log likelihood	3299.102	F-statistic		2.992364
Durbin-Watson stat	1.677713	Prob(F-statistic)		0.050663

**Phillips - Perron Unit Root Test - First difference:**

PP Test Statistic	-25.47293	1% Critical Value*	-3.9730
		5% Critical Value	-3.4171
		10% Critical Value	-3.1306

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 6	( Newey-West suggests: 6 )	
Residual variance with no correction		4.14E-05
Residual variance with correction		3.65E-05

Phillips-Perron Test Equation

Dependent Variable: D(LOG\_BET,2)

Method: Least Squares

Sample(adjusted): 1/07/2004 7/04/2007

Included observations: 911 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG_BET(-1))	-0.842040	0.032787	-25.68195	0.0000
C	0.001030	0.000430	2.396789	0.0167
@TREND(1/05/2004)	-9.59E-07	8.13E-07	-1.180718	0.2380
R-squared	0.420759	Mean dependent var		-6.48E-06

Adjusted R-squared	0.419483	S.D. dependent var	0.008458
S.E. of regression	0.006444	Akaike info criterion	-7.247976
Sum squared resid	0.037707	Schwarz criterion	-7.232121
Log likelihood	3304.453	F-statistic	329.7840
Durbin-Watson stat	1.983612	Prob(F-statistic)	0.000000

#### Interpreting results

- Both methods employed (the autocorrelation coefficients method and the Unit Root test) point out the validity of the Unit Root hypothesis (the null hypothesis) for the *level*. On the other hand, for *the first difference*, this hypothesis is not accepted, which leads to the conclusion that value series of the BET Index is a 1<sup>st</sup> order summable (follows a I(1) process);
- The determinacy coefficient *R-square* ( $R^2$ ) indicates the linear autoregressive model as the best fitting model for *the first difference*. In the case of the ADF test, the  $R^2$  values are 0.042635 (explains the evolution of the BET Index in a 4.2%) for the *level* and 0,428334 (42.8%) for the *first difference*. In the case of the PP test, the  $R^2$  coefficient has a 0.006541 (0.6%) value for the *level* and 0,420759 (42%) for the *first difference*.
- The value of the Durbin-Watson coefficient is close in all cases to 2, which indicates that the residual variable is not correlated. From this point of view, all the tests carried out were significant;

#### Conclusions

The applications carried out in this paper have been conducted by analyzing the Bucharest Stock Exchange BET Index. The final econometrical modelling leads us to the following conclusions:

- according to the unit root test, the BET Index series is a 1<sup>st</sup> order summable;
- the asymmetry of the BET Index efficiency values is negative;
- the chronological BET series doesn't follow a random walk pattern, this hypothesis being rejected. This implies the possibility of a certain part of stock market investors (collecting extra profits) to forecast future price-levels, because the prices don't reflect entirely the information existing on the market.

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## INCREMENTAL VALUE AT RISK - SELECTION, CRITERION FOR PORTFOLIO COMPOSITION. CASE STUDY



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***Abstract.** This paperwork underlines the importance of the index of Value at Risk in measuring global portfolio risk and the incremental risk induced from any additional assets. The advantage of the method is made evident practically. Starting from Markowitz portfolio selection algorithm, seeing the good effects of the diversification on risk, we suggested the insertion of new titles in the portfolio. Their selection was not made relying on the old fundamental analysis, but on a new one, Incremental Value at Risk. So, we avoided to calculate many indexes, insuring the efficiency growth in portfolio selection and diversification area.*

**Key words:** return, risk; optimal portfolio; portfolio diversification; value at risk.

REL classification: 11B

The risk of assets may be quantified using many index types. For stocks we have standard deviation, downside risk, tracking error, the volatility coefficient but we may consider even the liquidity, the correlation coefficient, the Skewness index for asymmetry and the Kurtosis index for flattening (Dragotă, 2003), because these ones help also to identify and to appreciate the level of risk. For bonds, the risk indexes are related with the rate of interest fluctuation and the maturity of the assets. These ones are the duration, sensitivity and convexity (Amenc, Le Sourd, 2003).

As it may be observed, to make a mix investment on primary assets market assume to define the global risk of the portfolio, because stocks and bonds do not have the same indexes in this area. The problem can be solved using Value at Risk, index which had been used first time from J.P Morgan. VaR resume in one figure a lot of kinds of risk expression forms, generated by the variety of portfolio components. So, VaR offers a global image for portfolio risk.

For a portfolio, VaR measure the maximum lost that it can take in a specific period of time, with a specified probability of apparition, in an unfavorable context of the financial market. Generally it is taken a 99% confidence interval, that meaning there are only 1% chances for the portfolio to loose a specific amount or, in other words, the future portfolio value to be lower than a minimum point accepted. That value is calculated for ten days which correspond to the medium period market trend changes (Amenc, Le Sourd, 2003). So we may say that VaR represents an extremely index in risk measurement, used for short time, quantifying future maximum possible lost in comparison with a minimum accepted level of its value (established by the investors themselves), with a specific probability (Amenc, Le Sourd, 2003).

By this traditional role, VaR affords also to study the opportunity of buying or selling a specific asset of the portfolio. Starting from a basic portfolio, studying the values of VaR for some others portfolios built on this first one, as derivations by including un

extra asset, it becomes possible to decide if we choose well (if the new portfolio, containing another extra asset gives plus value in the same or smaller risk conditions). In the same time, the methods help to identify the portfolio manager ability to select the pertinent assets from market, those ones which maximize the final fortune of the investor. So, the new VaR criterion may be used to observe the impact of a new transaction on global portfolio risk. The new index is Incremental VaR. Next to Morningstar (Sharpe, 1998) evaluation system, Lobosco (1999) or Modigliani and Modigliani (1997) model, which study the manager's skills in selecting the notables assets on market, Dowd developed in 1999 a new formula using Incremental VaR, and suggests it to evaluate investment decisions.

Next we will use Dowd algorithm using Romanian capital market data base, for testing if assets historical data and fundamental analysis sign correctly their future performance.

First of all we will describe the new VaR method, starting from the hypothesis of the investor who wants to modify the portfolio structure and component. Seeing this objective, we will study all possible return-risk combinations for each portfolio component change and will choose optimal situation. This one will be analyzed with Incremental VaR. This way it's easy to find which assets to buy (or sell) looking for those ones which give a low (or high) value to the Incremental VaR versus plus return expected.

Dowd' method (1999) starts from the return-risk ratio for a portfolio. Normally, the marginal performance level renders this ratio growth. So:

$$\frac{R_{p\text{-new}}}{\sigma_{p\text{-new}}} \geq \frac{R_{p\text{-basic}}}{\sigma_{p\text{-basic}}} \text{ where:}$$

- $R_p$  represents the portfolio rate of return (basic one or a new one)
- $\sigma_p$  represents portfolio standard deviation.

Replacing  $R_{p\text{-new}}$  with the sum  $a * R_a + (1 - a)R_{p\text{-basic}}$ , where:

- $R_a$  represents extra assets rate of return;
- $a$  represents extra assets share in portfolio,

and computing data seeing also that:

$VaR_{\text{new}} - VaR_{\text{basic}} = \text{IncrementalVaR(IVaR)}$  we get the conclusion:

$$R_a \geq R_{p\text{-basic}}(1 + \eta(\text{VaR})) \text{ where: } \eta(\text{VaR}) \text{ represents how much grows VaR}$$

because the acquisition of a new asset, meaning  $\frac{1}{a} \times \frac{\text{IVaR}}{\text{VaR}_{\text{basic}}}$ .

All things presented by now we shall apply on a real portfolio, made from Bucharest Stock Exchange listed assets.

We had to choose the assets part of the portfolio by using their issuing fundamental analysis, based on data registered till the 28<sup>th</sup> of October, the 2007. Seeing these historical information (for two years by now), we computed the daily rate of return<sup>(1)</sup>, the risk as standard deviation<sup>(2)</sup> as well as volatility coefficient expression<sup>(3)</sup>, the Skewness and Kurtosis indexes<sup>(4)</sup> which mark the rate of return series normality and correlations between the rate of return registered by assets in discussion. First of all we bank on liquidity criterion to make our decision (because of acting on an extra volatile period of the market). So we choose the most liquid assets, that meaning with a big frequency and big

amounts in transaction, all these to prevent the impossibility of selling it in the case of bad anticipations looking their trend.

After the last public information at the 28<sup>th</sup> of October, year 2007, most liquid assets were SIF ones. Oil Terminal Constanta, UAMT Oradea, SIF Oltenia, SIF Moldova and CNTEE Transelectrica Bucuresti were on top because their price growth. Most active assets were SIF, but also Petrom, Biofarm Bucuresti, BRD Societe Generale, Banca Transilvania and SSIF Broker Cluj. The news which captivated our attention were about Petrom, wich expands business in Bulgaria and about Oltchim which will be private starting next year, 2008\*.

Whereas this short analysis, we choose some assets which, at very first sight, are following the risky profile criteria we assumed. We had intention to discuss also about bonds but there were not public all needed kind of data. So we limited on stocks, like SIF, Oil Terminal Constanta, Transelectrica Bucuresti, Petrom, Oltchim, Banca Transilvania, BRD Societe Generale, SSIF Broker Cluj, Biofarm Bucuresti. Their registered volatility coefficients are very low, next to zero, that meaning their evolution is independent from the market. This situation is favorable because the testing period took place in a falling down market context\*\* (5). We will analyze also some other blue-chips, because they are very liquid and give good results in long-term investments\*\*\*. We picked up Turbomecanica SA, Rompetrol Rafinare SA and Impact Developer and Contractor SA.

Considering the medium historical rate of return criteria, we observe that BANCA TRANSILVANIA has the lower result and OIL TERMINAL CONSTANTA registered the highest. The biggest risk belongs to OIL TERMINAL CONSTANTA and the smallest to TURBOMECHANICA. Seeing the ratio between rate of return and risk, we will select the stocks giving maximum of effect on risk unit, or the best score (6).

For this ratio the investor subjectively established a minimum of 0.06 percent of return given in one percent of risk conditions, as criterion of selection. We will choose all the stocks with a higher result, up to this limit: IMPACT, TURBOMECHANICA, BIOFARM, SSIF BROKER, OLTCHIM, BRD SOCIETE GENERALE, PETROM, SIF3, SIF5, TRANSELECTRICA and OIL TERMINAL CONSTANTA.

Next, for the Skewness and Kurtosis indexes, we observed that all excluded stocks present results that do not accomplish the normal distribution needs, so their medium historical rate-of-return cannot be used as estimation of future result\*. Considering also this conclusion, we kept only IMPACT, TURBOMECHANICA, BIOFARM, SSIF, OLTCHIM, SIF3, TRANSELECTRICA and OIL TERMINAL CONSTANTA.

We did not stopped after these conclusions, we profound our study with some other performance indexes which define the financial situation of the issuer, like debt-to-equity ratio, liquidity coefficient, Return of Assets and Return of Equity, Earnings per Share, Price Earnings Ratio \*\*\*\*. The debt-to-equity ratio respects legal limits (not Oltchim which started its expansion), so the issuers have possibilities and afford to meet reimbursement without to affect long and short term financial balance. The same conclusion is given from liquidity coefficient which excels almost in all cases the recommended level of 2-2.5.

The Return of Equity had higher values than Return of Assets ratio, showing us that the credits were taken in favorable conditions that the costs are lower than return. The highest results for profit rate, in the first semester of 2007, were registered by IMPACT

\* [www.ktd.ro](http://www.ktd.ro), [www.bvb.ro](http://www.bvb.ro)

\*\* [www.bvb.ro](http://www.bvb.ro)

\*\*\* Victor Dragota, Carmen Maria Lacatus, 2005

\*\*\*\* [www.ktd.ro](http://www.ktd.ro)

Bucuresti, TURBOMECHANICA, BIOFARM, SSIF BROKER and SIF3. But all these values are regressing versus the ones of last year. Only SSIF Broker makes exception of it. Earnings per Share Index underlines the special position that SSIF BROKER and TRANSELECTRICA have. Price Earnings Ratio had a spectacular evolution for IMPACT (it doubled), OLTCHIM and OIL TERMINAL CONSTANTA (about 300). In the last cases the index values are very high, explained by great expectations the market formulate seeing these companies' performances.

After all these new results, we appreciate that all selected assets confirm the conclusion of the first selection criteria we considered.

With these stocks we will make a portfolio, using Markowitz algorithm. Our choice certifies to be a good one because even the correlation coefficients are positive but very much closed to zero. So, the stocks are not strongly correlated (the issuers take part from different economic areas) and their combination in a portfolio will have a good impact because if the rate of return of one stock decreases, the trends of the other ones which is related to will be not be influenced in the same direction or if they are, it will not have the same intensity.

Markowitz model have next hypothesis (1952): the stocks will be selected by the single rate of return-risk ratio criterion; they will have only positive shares in portfolio (that means the share  $X_i$  may not be negative because are not allowed stocks acquisitions banked on credits with none risk rate of interest in economy, so to buy over financial resources). Future rate of return and standard deviation are estimated in a static hypothesis (that's the reason we studied the normality of the rate of return distribution). The investor likes to assume risk, expecting also big gains. That may be possible because of the very volatile context of the market those days, which makes possible to obtain higher benefits speculating the inefficiency of the market. The central point of the model is the maximization of the investor's fortune, that involving an optimal portfolio to offer maximum earnings performance in some given risk conditions or a given level of return in as minimum as possible risk conditions.

Starting first formulation, we established in personal way the rate of return expected at the daily level of 0.25%. This requirement is based on the very good historical results of the stocks (a medium about 0.2% daily computed). So we will try to identify that specific structure of the portfolio which will produce a daily medium rate of return in minimal risk conditions. The results for each share are: IMPACT 12.28%, BIOFARM 9.41%, TURBOMECHANICA 9.19%, SSIF BROKER 10.78%, OLTCHIM 8.89%, SIF3 14.84%, TRANSELECTRICA 22.83%, OIL TERMINAL CONSTANTA 11.79%<sup>(6)</sup>.

We may observe that, because the Markowitz hypothesis restrictions, BRD and Petrom had been eliminated because their shares were negatives and short sell is not accepted. These conditions the portfolio has a standard deviation of 1.03% and a daily rate of return of 0.24%. If we suppose we invest 100.000.000 monetary units, VaR will be, for different confidence intervals:

#### VaR for the basic portfolio

Table 1

Confidence interval (%)	Z parameter	VaR
90	-1.28	-1,314,231.2
95	-1.74	-1,786,533.1
97	-1.88	-1,930,277.1
99	-2.33	-2,392,311.6

Source: elementary data picked up from www.bvb.ro and www.ktd.ro, processed by the author.

The results will be interpreted this way:

- 1) with 10% probability, on short term, there may be a maximum loss for portfolio about 1,314,231.2 monetary units;
- 2) with 5% probability, on short term, there may be a maximum loss for portfolio about 1,786,533.1 monetary units;
- 3) with 3% probability, on short term, there may be a maximum loss for portfolio about 1,930,277.1 monetary units;
- 4) with 3% probability, on short term, there may be a maximum loss for portfolio about 2,392,311.6 monetary units.

We should observe that portfolio risk is really high.

Starting this moment we will use Incremental VaR index to test if a specific stock may be or not included in the portfolio, function of extra risk induced by it, in the same expected rate of return level.

Next we choose some particular, with no criteria to take care of, haphazardly. For those we will compute, the same we did first, the rate of return, the risk and the correlations with the other portfolio's stocks. The new issuers we studied are: BERMAS SUCEAVA, BANCA TRANSILVANIA, KANDIA, POLICOLOR, FLAMINGO, ZIMTUB and TURISM SERVICII. We pursued that historical data to be statistical representative and we took them from the same period of time, two years (by the 28<sup>th</sup> of October, 2007).

Each situation and asset we calculated VaR and analyzed the impact on portfolio risk which every new asset has. The problem was to diversify the portfolio, keeping the expected rate of return level but in lower risk terms. So, the portfolio will suffer changes in structure and components, and it will be taken in consideration that variant which gives the highest negative Incremental VaR.

#### VaR for the new given portfolio, with one extra type of asset

Table 2

Stocks/ confidence interval	90%	95%	97%	99%
BERMAS	-1,322,539.20	-1,797,826.73	-1,942,479.45	-2,407,434.64
BANCA TRANSILVANIA	-1,396,617.05	-1,898,526.30	-2,051,281.29	-2,542,279.47
KANDIA	-1,236,875.29	-1,681,377.35	-1,816,660.58	-2,251,499.55
POLICOLOR	-1,293,145.35	-1,757,869.45	-1,899,307.23	-2,353,928.64
FLAMINGO	-1,400,915.89	-1,904,370.04	-2,057,595.22	-2,550,104.71
ZIMTUB	-1,360,150.95	-1,848,955.20	-1,997,721.71	-2,475,899.78
TURISM SERVICII	-1,325,972.07	-1,802,493.29	-1,947,521.48	-2,413,683.54
<b>Basic Portfolio</b>	-1,314,231.00	-1,786,533.00	-1,930,277.00	-2,392,312.00

Source: elementary data picked up from www.bvb.ro and www.ktd.ro, processed by the author.



Comparing results, we see just KANDIA and POLICOLOR have a decreasing effect on global risk, measured by VaR. Assembling it both in the same time, the findings were:

**VaR for the basic portfolio improved with new KANDIA and POLICOLOR components**

Table 3

Medium daily rate of return expected	0.25%
Quantity of associated risk	0.91%
VaR with p=90%	-1,162,456
VaR with p=95%	-1,580,214
VaR with p=97%	-1,707,357
VaR with p=99%	-2,116,033

**Source:** elementary data picked up from [www.bvb.ro](http://www.bvb.ro) and [www.ktd.ro](http://www.ktd.ro), processed by the author.

It may be observed that the new situation, with these 2 extra stocks, gives better result in VaR terms, so, the maximum possible loss decreases very much, for every confidence interval.

After this conclusion, we tried, using another kind of analysis, to find best assets which match the basic portfolio and have good effects on risk level. So, we made a fundamental one to find, by other criteria, the best titles from given ones (that were aleatory picked up) that to reach investor's objectives in rate of return and risk terms. That step was more difficult and asked more time, double, than the other one because we had to interpret many indexes and correlate their findings.

For the return-risk ratio, we distinguished POLICOLOR and KANDIA. The Kurtosis and Skewness coefficients had very closed values to normal distribution ones, excepting Kandia which does not register such a big difference to cancel the representative mean and dispersion of data series. Volatility coefficients, calculated on BET-C reference, are much closed to zero, all cases. So, we may say all stocks selected by VaR criterion have been selected also by these new criteria. They are performant and their results are independent from market evolution (6). The last conclusion becomes very important and has to be favorable interpreted because of the falling down context of the whole market that period.

Looking to the other performance indexes\*, we discover that debt-to-equity ratio has values in the given limits for the selected stocks (KANDIA, POLICOLOR), but certainly superior to the other we analyzed, that showing it have big investment projects pending. The liquidity index reflects that the companies have good capacity to sustain their short term debts, we have to mention that the issuers we regard registered best results in this field, but all the companies have levels of this index over 1, the recommended one. For Return of Assets, TURISM SERVICII took the first place (99%), than BERMAS SUCEAVA on second and POLICOLOR (15% and 8%). The exceptional result of TURISM SERVICII cannot be favorable interpreted because the previous one was negative (-14%) and that means very high volatility. Net profit variation for last months may be appreciated only for BANCA TRANSILVANIA and POLICOLOR. For the other companies this kind of index was in regression, and this fact is underlined by the Earnings per Share index too. For Price Earnings Ratio, BANCA TRANSILVANIA and BERMAS had the best values of all. We have to say that PER was increasing for the regarded assets,

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\* [www.ktd.ro](http://www.ktd.ro)

and that means the investors' trust in issuers is bigger and bigger because of the propitious information about their future development.

The conclusions of this detailed analysis are that POLICOLOR and KANDIA, but also TURISM SERVICII with some reservations, are giving the best results seeing the performance criteria we followed, so it will be part of the portfolio. The same conclusion we had using a shorter and easier analysis, based on VaR.

After the example above mentioned (6), we may appreciate the Incremental VaR utility in portfolio optimization, in the context of its permanent diversification seeing new opportunities. The classical analysis it is not easy to identify the correct assets, as we demonstrated. To compute and to interpret fundamental analysis indexes gives references about the economic growth chances of the issuers, the reached and potential performance level, the risk conditions, its solvency and liquidity and not the last the considerations market formulated versus that asset future evolution, the trust and expectations that investors have about it ( seeing the other result mentioned above).

The new method simplified very much things, generating easier similar conclusions as we had following classical procedure. So, one kind of index, Incremental Value at Risk replaces a big work volume. There are eliminated many computations and portfolio manager's work will be more efficient, as well to pick up information, synthesizing it and to interpret too. The conclusions are the same but first time we obtained them in an incomparable shorter term. We recommend this method like device in stocks' selection in diversification of portfolio context and to use Incremental Value at Risk like marginal risk measure potentate by acquisitions.

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#### Notes

- (1) The mean historical rate of return was computed using the arithmetic average of the daily result for the last two years, taking care to correct the prices about the technical operations which have been took place, like stock-split, stock-dividend and stock-cash;
- (2) The difference between the effective results of rate of return and its average;
- (3) This are measuring the intensity of stocks' trend connection;
- (4) The volatility coefficient had been computed versus BET-C, considerate representative for Romanian capital market;
- (5) Skew ness to be as closed possible to zero and Kurtosis to 3;
- (6) The case study relates on the historical prices of the stocks, published on the web address of Bucharest Stock Exchange and KTD Investment Company. This information had been processed and interpreted by the author.

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# THE IMPACT OF TAKEOVERS, LEVERAGED BUY-OUTS AND VENTURE CAPITAL ON CORPORATE GOVERNANCE

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**Abstract.** *In this paper you will find described the impact of takeovers, buy-outs and venture capital on corporate governance mechanisms. Corporate takeovers represent an important external governance mechanism, by means of which shareholders can replace underperforming or opportunistic managers. Also, many studies show that shareholders of takeout firms earn greater returns. Moreover, a buy-out can be considered a means of restoring active governance and settling many internal control issues. In particular, the management buy-outs (MBOs) induce a series of important consequences, such as capital restructuring in favor of the inside management.*

**Key words:** corporate governance; shareholder; takeover; buy-out; venture capital.

REL 11G: "Buy-outs, mergers, firm liquidation"

Agency theory stated that in some instances, the internal governance mechanisms do not succeed to adequately monitor managers' activity and suggested that corporate takeovers may represent an important external governance mechanism, by means of which shareholders can replace underperforming or opportunistic managers. The launch of a hostile takeover bid, for example, is generally perceived by the bidder as a signal that the target's assets are not being exploited with maximum efficiency, for shareholders' benefit. Takeovers play a very important role in corporate governance, as proved by the attention allotted to this subject by scholars and academicians.

Starting from the idea that control takeovers represent a mechanism for reconciling the interests of shareholders and managers, then takeover targets should exhibit weaker pre-bid performance, as compared to other firms. This issue has generated a significant amount of research, using a variety of performance measures.

The literature review outlines two different approaches for analyzing the companies' performances surrounding takeover activity. The first approach is based on the analysis of stock market data and it focuses on abnormal share price movements at specific moments in time, during the takeover process. The other approach is based on the usage of accounting information, recommending traditional methods for measuring historic financial performance: return on sales, assets and capital employed; the increase of sales, etc.

The majority of undertaken research failed to identify target performance that is significantly different, as compared to several market-related performance benchmarks. For example, Agrawal and Jaffe (2003, pp. 721-746) concluded that there is no consistent evidence to support the thesis that targets exhibit lower performance, prior to takeover. Despite this result, they find evidence of underperformance by targets of hostile bids and tender offers, for a period of five or more years prior to the bid, but argued that this long length of time cannot be relevant.

In Great Britain, Franks and Mayer (1996, pp. 163-181) find no evidence to sustain abnormal performance in the five years prior to takeover. Also, O'Sullivan and Wong (1999, pp. 139-155) failed to identify abnormal returns over the three previous years influencing the outcome of hostile bids. In the United States of America, Martin and McConnell (1991, pp. 671-687) reported significantly weaker returns in the case of targets where managers are replaced after the takeover.

In general the findings of these studies are inconclusive. The computed absence of pre-bid underperformance, using market and accounting based approaches, shows that takeovers play an insignificant governance role. However, recent research identified higher rates of CEO turnover in takeover targets exhibiting weak pre-bid performance, which implies that control takeover has a significant impact on corporate governance mechanisms.

Once a takeover bid is launched there is no guarantee it will be successfully completed. Takeover attempts may fail for a variety of reasons, such as: the defense efforts undertaken by the management of the target company, the intervention of regulatory authorities, the bid rejection by target shareholders or voluntary withdrawal on the bidder's part. According to the studies performed on the case of Great Britain by O'Sullivan and Wong (1998, pp. 17-35), 47% of bids resisted by the target's management, in the period 1989-1993, were subsequently abandoned, while 6% of agreed bids were unsuccessful. For the period 1980-1989, Holl and Kyriazis (1996, pp. 165-184) estimated a success probability of 0.958 for friendly bids, as compared to a success probability of only 0.609 for contested bids.

Regarding the takeover process, an interesting aspect is the manner in which companies decide to resist a takeover bid. It differs from one country to the other, according to the applying regulations. Thus, in Great Britain, companies are confronted with rigid rules, with the effect of restricting their possibilities to defend themselves against unwanted bids. For example, companies are not permitted to employ pre-bid takeover defenses, and once a bid is launched, shareholder approval is required for almost all the defensive measures that are pursued. However, in the USA, defensive tactics are within the discretion of the board of directors and are widely used.

The two most utilized defensive measures are: profit reports (59%) and promises of increased dividends (45%). There also are several other defensive strategies which were especially designed to "defeat" a takeover attempt. Sudarsanam (1995, pp. 223-240) reports that 24% of the targets from the analyzed sample enlisted the support of a "white knight" (a friendly company which launches a counterbid for the target). Targets can also pursue a restructuring activity, such as making a bid for another company or disinvesting some underperforming assets of the business; consequently they will "promise" increased performance. Other defense strategies identified by Sudarsanam include using trade unions and employees to lobby against the rationalization aspects implied by the takeover bid.

The outcome of a takeover bid can also be influenced by: the composition of the board of directors, the degree of managerial ownership and the size of the target (market value). Very interesting: Cotter, Shivdasani and Zenner (1997, pp. 195-218) found that resistance by boards with a majority of independent directors generates higher returns for shareholders. Stultz (1988, pp. 25-54) demonstrates that high levels of managerial ownership may reduce the likelihood of success for a takeover bid. This is so because managers will solicit premiums so high that takeovers become unprofitable transactions for bidders. In the case of hostile bids, O'Sullivan and Wong (1999), and Sudarsanam (1995) do not identify sufficient arguments to support the fact that managerial ownership significantly influences the outcome of the takeover bid.

In respect to the size of the target company, Cotter, Shivdasani and Zenner (1997) found that size does not influence bid outcome, when all bids are examined. But, when looking at hostile bids only, according to the results obtained by O'Sullivan and Wong (1999), and Sudarsanam (1995), there is a higher acquirement probability for target companies with greater market values. Larger targets are more difficult for managers to "defend".

If takeovers are theoretically associated with the efficient fulfillment of corporate governance objectives, then it is important to consider the impact of such operations on shareholders' wealth, both in the target companies and in the companies bidding for takeover. The studies show that the shareholders of target companies record significant increases in their returns. By analyzing a number of 1900 takeovers, between the years 1955 and 1985, Franks and Harris (1989, pp. 225-249) report gains of 23% in the takeover announcement month; the overall gains, obtained between months -4 and +1 (compared to moment 0 of takeover) were of 29%. Limmack (1991, pp. 239-251) reports overall gains of 37% in a study carried out on a sample of 462 completed takeover bids, between the years 1977-1986.

Andrade, Mitchell and Stafford (2001, pp. 103-120) provide an updated summary of gains to target shareholders. They processed a sample of 2000 takeovers in the USA, between 1973-1988, and report average gains to target shareholders of 16%, for a day period of (-1, +1), centered in the takeover day. For the sake of the argument, Huang and Walking (1987) identified higher (but statistically insignificant) returns to targets of contested bids.

Unlike the results obtained by analyzing target companies, the short-term impact of takeover bids on the wealth of the shareholders of acquiring companies is generally mixed (positive and negative), but, at the same time, insignificant. Some studies show weakly positive returns, others report weakly negative returns and several other studies report no statistically significant impact. For example, Walker (2000, pp. 53-66) reports no significant bidder gains from tender offers, but instead identified significantly negative returns for bidding companies involved in mergers.

The post-acquisition performance, recorded on a long term basis by bidding companies has attracted a great deal of research. Early studies report weaker performance. In this respect, I must mention Mandelker (1974) and Langetieg (1978, pp. 365-384): both authors reported negative abnormal returns for a period of 40-70 months after the acquisition date. Asquith (1983) found negative significant returns for bidders of both successful and unsuccessful takeovers, but mentions that the returns of unsuccessful acquisitions are "less negative". More recent studies reinforce these findings. Thus, Dickerson, Gibson and Tsakalotos (1997, pp. 344-361) show that after the takeover, the acquirers' profitability reduces, on average, by approximately 2.04% per year.

Finally, as a result of a takeover, the managers of the acquired firm are usually replaced. This implies that control takeover of a company has a significant impact on corporate governance. The empirical analyses confirm this fact. Walsh (1988, pp. 173-183) compared the managerial turnover from 55 target firms with the turnover rate from a corresponding sample of non-target firms. The turnover rate is significantly higher in the acquired firms, in the five years following the takeover. In particular, Dayha and Powell (1998) report that the turnover rate (among all levels of executives) is greater in the case of hostile bids.

Furthermore is presented in this paper the contribution of the mechanisms involved in venture capital investments and leveraged buy-outs, to dealing with corporate governance issues.

A leveraged buy-out (LBO) represents a corporate restructuring operation, which involves simultaneous changes in: ownership, financial structure and incentive systems of firms. There is a considerable degree of overlap between specialist providers (LBO associations) of funds to buy-outs and venture capital firms. In both cases, the funds belong to other persons.

In the case of venture capital firms, investors' funds are placed in new companies, which are very profitable and which have a great performance potential. Such a company serves the role of financial intermediary in markets where lenders and borrowers meet with great difficulty, due to high costs. The venture capital industry has grown dramatically in the last two decades. However, the research in this area is mostly descriptive and somewhat atheoretical (Sapienza et al., 1996, pp. 439-469).

Venture capital firms' involvement is especially relevant regarding IPO firm performance. As noted by Sahlman (1990, pp. 473-521), the majority of returns for venture funds are earned by investing in companies that "go public" by initial public offerings. According to other researchers, the venture capital involvement in the financial structure of an organization serves as a powerful positive signal to potential investors. In this way, very often, venture capital backing has been associated with lower underpricing (Megginson, Weiss, 2001, pp. 879-903). To sum up, the role of venture capitalists in corporate governance is not restricted to providing funds pre-IPO; in fact they are associated with lower IPO costs.

A buy-out may be considered a device which restores active governance and resolves several internal control problems. In the case of a leveraged buy-out (LBO), a publicly quoted corporation is acquired by a specially established private company. The latter's equity is usually subscribed by: a specialized LBO association; some institutional investors and the management of the bought-out corporation. The principal equity subscribers are able to obtain a substantial percentage of the ownership, because the "bulk" of the deal price is met by borrowings. The resulting private company is controlled by a small board of directors, representing the LBO association and the major equity owners. The CEO is usually the only insider admitted on the board (Jensen, 1989, pp. 61-74).

A leveraged buy-out may involve the acquisition of a company's divested division or subsidiary by a new company, in which the existing management takes a substantial proportion of the equity. This type of acquisition is called "management buy-out" (MBO). Instead of the LBO association, MBOs require the financial support of a venture capital firm.

MBOs have strong implications for corporate governance, respectively: a substantial restructuring of equity in favor of the insiders; the involved institutions (including venture capital firms) will be motivated to actively participate as monitors for the acquired firm; the large-scale substitution of debt for equity (the new company will have a different financial structure) will reduce dramatically the discretion of managers, who will have to propose and fulfill a coherent repayment timetable, including interest; all of these modifications are accompanied by a variety of incentive schemes. Considering that management operations, such as the identification of opportunities and innovation were frequently restrained by the bureaucracy existing in corporations, LBO transactions may nevertheless increase the discretionary power of top-management teams. According to some authors (Wright et al., 2001, pp. 111-125), management teams will benefit from more discretion, in order to decide: what is best for the future of the business; what organizing model and what managing methods are more appropriate for the firm; what business plan is more profitable for themselves and the firm.

Theoretical research shows that at the moment a leveraged buy-out or a venture capital firm's investment is carried out, investors are faced with a potential *adverse*

selection problem, because they are unable to predict the managers' performance after takeover completion. Adverse selection also raises crucial problems to institutional investors regarding the effectiveness of post-transaction monitoring, as stated by Stiglitz and Weiss (1981). As a result, the functioning of the control mechanism introduced in the new company may lead to inefficient decisions.

An extensive set of empirical studies have analyzed the impact of leveraged buy-outs on corporate performances. The obvious improved performance of the acquired firm can be attributed to: the superior functioning of corporate governance mechanisms; wealth redistributions between stakeholders; the manipulation of accounting information by the management team, who wanted to reflect apparent underperformance prior to the buy-out.

Lichtenberg and Siegel (1990) analyzed the productivity impact of leveraged buy-outs. Using a longitudinal database composed of 12000 manufacturing plants from the USA, they found that total productivity for plants involved in LBO transactions, between 1981-1986, rose from 2% (above industry sector) to 8.3% (above industry sector), over the first three years after buy-out. In the largest buy-out study to date, Harris, Siegel and Wright (2005) assessed the total productivity of plants, before and after MBO transactions. They used a longitudinal database composed of approximately 36000 manufacturing plants from Great Britain, from which some 4877 experienced an MBO, during 1994-1998. The results are in contrast to the ones computed for the American industry, as they suggest that MBO plants were approximately 2% less productive than the others.

In conclusion, takeovers, LBO/MBO transactions and venture capital firms play a distinctive role regarding corporate governance mechanisms.

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## TAXATION OF RESTRUCTURING OPERATIONS OF COMPANIES



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***Abstract.** The economic development in the last years, the world countries national economies globalization determined many enterprises with unique or diversified objects of activities to look in common for a growing strategy.*

*The competition, the technological evolution and the performance makes the companies to develop, to grow. The development is a complex process realized in multiple ways with multiple transformations and consequences for the companies.*

*The opposite of the growing operations are the operations of ending the activity, from the shareholders wish or not.*

*These operations for development of a company or for ending a company are operations of restructuring. The restructuring operations have a special fiscal treatment according to the law.*

**Key words:** merger; absorption; division; liquidation; fiscality.  
Clasificare REL 11G

The companies, as legal persons can be formed, can be consolidated or developed, or reduce their activity or can be dissolved or liquidated function of the economic conjuncture favorable or not. If development and consolidation, and reducing the activity maintain the legal person, dissolution and liquidation goes to the erasure of the company from the economic life (Matis, 2003, p. 189).

The restructuring operations can take to continuing the activity or to reduce the activity. Merger and division are operations which go to continuing the activity and dissolution and liquidation goes to stopping the activity.

The restructuring of a company is determined by the influential of many facts, such as (Tiron, 2000, p. 11):

- economic concentration
- economic development in many countries, market globalization
- access to international market.

The economic concentration is the situation when a few economic agents have a high percent of economic activity on a specific market (such as total sales, assets or working capital). Merger is one of the economic concentration forms<sup>(1)</sup>.

The economic development in many countries was the first step to the appearance of powerful companies which dominated segments of market and the development of financial market makes easier the shares acquisition.

The access to international market such as information, communication were diversified which become a simulative fact through companies development and entrance to international market.

The restructuring operation of a company needs an adequate fiscal treatment, according to the operation type, treatment which is legislated by the taxation code.

The operation through the activity of a company continues are merger and division. According to article 238 from Companies Law no. 31/1990 republished and modified, merger is:

a) the operation whereby one or more companies are wound up without going into liquidation and transfer to another all their assets and liabilities in exchange for the issue to the shareholders of the company or companies being acquired of shares in the acquiring company and a cash payment, if any, and eventually 10% of the nominal value of the shares so issued or, where they have no nominal value, of their accounting par value (*merger by acquisition*);

b) the operation whereby several companies are wound up without going into liquidation and transfer to a company that they set up all their assets and liabilities in exchange for the issue to their shareholders of shares in the new company and a cash payment, if any, and eventually 10% of the nominal value of the shares so issued or, where they have no nominal value, of their accounting par value (*merger by the formation of a new company*).

From juridical point of view, merger is a way of reorganization consist of putting in common of assets of two ore more companies and division consists of sharing the assets and liabilities between two companies (Bodu, 2004, pp. 69-82).

Merger is a way of companies reorganization, an economical concentration through two ore more companies decides to put in common their assets and liabilities in order to continue together their activities. The classic forms of merger are absorption and merger by the formation of a new company.

Companies Law no. 31/1990 defines also the division:

a) the operation whereby a company after is dissolved without liquidation, transfer to another company all their assets and liabilities in exchange for the issues to the shareholders of the dissolved company of shares in the beneficial company and eventually 10% of the nominal value of the shares so issued or, where they have no nominal value, of their accounting par value;

b) the operation whereby a company after is dissolved without liquidation, transfer to a new company all their assets and liabilities in exchange for the issues to the shareholders of the dissolved company of shares in the new company and eventually 10% of the nominal value of the shares so issued or, where they have no nominal value, of their accounting par value.

Division is the merger opposite operation, consists of sharing the assets and liabilities to another companies. If the beneficial companies are already registered is division by absorption and if the beneficial companies are new formed is a division by formation of a new company. The transmission of all assets and liabilities is named total division and the transmission of a part of assets and liabilities is a partial division.

In economic way merger is expression of a concentration and regrouping, a union of competences and division is sharing a company in one ore more different companies by different criterias (Toma, 2003, pp. 15-16).

Company's law defines merger and division by the way of realization. Merger is made through absorption of company or by two ore more companies which decide to work together and division consist of sharing the assets and liabilities of a company between two re more companies.

About the taxation system, a long period of time the merger was vague presented. Although the juridical frame was established by Law no. 31/1990, the taxation rules weren't presented. A few aspects about merger taxation were presented in Law no. 414/2002 about income tax.

The procedural, accounting and taxation forecasts were presented also in MPFO no. 1223/1998 which soon was abrogated and replaced by MPFO no. 1078/2003. This order elucidated a few aspects about merger taxation.

In 2004 appeared MPFO no. 1376/2004 for approving the methodological rules about merger, division, dissolution, liquidation of entities and about excluding an associate and their fiscal treatment. This order replaces the old rules and is based on Taxation Code approved by Law no. 571/2003.

The merger is submitted by the next rules:

#### **1. Income tax**

The Taxation Code treats in Title II, art. 27 the taxation of a few reorganizations forms, through is merger too. So, the Taxation Code specifies that in merger between two or more juridical entities, when shareholders of any merging entity acquire shares in the new entity, there are the next rules:

- the assets and liabilities transfer is not a taxable transfer;
- the exchange of shares held at a Romanian juridical entity for shares held to another Romanian juridical entity is not a taxable transfer;
- the tax value of an asset or liability is equal for the person who obtain that asset is equal with fiscal value of the asset at transferring entity;
- the tax value of shares obtained by an entity should be equal with fiscal value of the transferred shares;
- the transfer of a provision or a reserve is not considered a reduction or cancel of the provision or reserve if another entity takes those and maintain those at the same value;
- If a Romanian juridical entity holds over 25% of another Romanian juridical entity shares which transfers assets and liabilities to the first entity through merger or division, the cancel of the shares is not a taxable transfer.

The Taxation Code clarifies also the tax value term. The tax value of an asset, a liability or a share is the value which is used for calculating the depreciation or profit or loss. The fiscal depreciation is calculated according to art. 24 from Fiscal Code.

The legal reserve is deductible in a limit of 5% of net profit before determination of the income tax, minus non-taxable incomes plus expenses of these, until de 5<sup>th</sup> part of subscribed and paid-up capital. If the reserve is used for adjustment or for distribution the reconstitution of reserve is not deductible anymore. The reserve of juridical entities which supplies utilities for the reorganization entities can be used for adjustment of shares from changing debts.

Also, decreasing or canceling of any provision or reserve which was previously deducted is included in taxable incomes, indifferently if the decrease or cancel is about modify the provision destination or reserve or the provision or reserve is distributed to the merging entities.

The incomes for assets transfer are non-taxable incomes and the demise assets expenses are non-deductible expenses.

#### **2. Dividend tax**

For equity elements of net profit (reserves, net profit for previously exercises which was not distributed) the dividend tax is calculated and payable in case of merger or division

#### **3. Value-added tax**

Value-added tax is owed for goods delivery, which according to art. 128 from Fiscal Code is any transfer of goods deed from the owner to another person, directly or through persons acting in the owner's name.

In the same article, align. 5 specify that goods transfer made as assts and liabilities transfer in merger is not goods delivery indifferently if is with payment or not.

#### **4. Fiscal losses**

Fiscal loss that is registered by the tax payers ceases to exist through merger is not recuperated by the new company or by acquiring company.

Fiscal loss registered by acquired company until the date on which merger takes effect is adjusted.

In European law the system of taxation applicable to mergers is settled by the Directive issued in 1990.

According to MPFO no. 1376/2004 the taxable treatment of merger is different by merger's form.

So, at the acquired company, the incomes from assets transfer, in account are non-taxable incomes. Also, expenses from disposal of assets are non-deductible expenses.

The acquired company transfers to the acquiring company assets and liabilities at their tax value, based on the value used for depreciation calculation, without reevaluations and accounting values, the depreciation is going to be made in the left period.

The decrease or cancel of any provision or reserve previously deducted at payable profit calculation is taxable income, except when the acquiring company takes the provision or reserve.

The financial statements and payment of income tax has to be made 10 days before publishing date when merger takes effect.

At the acquiring company, fiscal loss at the acquired company is not recuperated by the acquiring company.

For determination of taxable profit the assets and liabilities tax values are used, same values at the acquired company. If the tax value from the acquired company is not known for the acquiring company this value is zero.

If in the transfer are provisions or reserves previously deducted these are included in taxable incomes. Also, if the legal reserve value is over 1/5 of capital, the difference is not a taxable income if the reserve is maintained at the same value.

In merger by formation of a new company, at the new company, fiscal loss at the acquired company is not recuperated by the acquiring company.

For determination of taxable profit the assets and liabilities tax values are used, same values at the acquired company. If the tax value from the acquired company is not known for the acquiring company this value is zero.

The operations which go to ending the activity are dissolution and liquidation. Dissolution and liquidation are operations which refer to the same economic process, bringing to an end the activity of a company. Ending the activity of a company needs a few steps with the result not only the erasing a company and also the liquidation of assets and liabilities of the company.

Voluntary dissolution and liquidation are made by the initiative of the shareholders and juridical dissolution and liquidation takes place when the company is insolvable, which goes to the insolvency procedure. The juridical dissolution and liquidation is determined by the debtor or by the creditors.

Voluntary liquidation is made according to Companies Law, republished and occurs when the members of the company resolve to voluntarily wind-up the affairs of the company and dissolve. Voluntary liquidation begins when the company passes the resolution, and the company will generally cease to carry on business at that time (if it has not done so already). If the company is solvent, and the members have made a statutory declaration of solvency, the liquidation will proceed as a members' voluntary winding-up. In such case, the general meeting will appoint the liquidator(s). If not, the liquidation will

proceed as a creditor's voluntary winding-up, and a meeting of creditors will be called, to which the directors must report on the company's affairs. Where a voluntary liquidation proceeds by way of creditor's voluntary liquidation, a liquidation committee may be appointed.

Juridical liquidation is made according to Insolvency Law no. 85/2006 through the petition of the debtor or the creditors or any other interested persons or institution. Juridical liquidation is determined by the court order of the syndic judge. The juridical liquidation is a complex procedure with two different steps: reorganization and bankruptcy and is made by the liquidator under the control of syndic judge and creditors. The reorganization is the recovery of the company and avoiding bankruptcy. In case of impossibility of reorganization the solution is bankruptcy.

The taxation of liquidation is made by the rules of Taxation code.

In voluntary liquidation according to article 12 of Taxation code, the incomes obtained in liquidation or dissolution of a Romanian legal person is incomes obtained in Romania and taxable incomes.

In the title which refers to income tax is a separate chapter "Reorganization, liquidation and other assets and shares transfers" which specifies that distribution of assets by a Romanian legal person through their shareholders, such as dividends or as the result of liquidation is a taxable transfer. The tax value is 16% of the income. The losses from uncollected debts are deductible expenses if the debtor is dissolved for limited companies or if the debtor is liquidated and there is not any successor. The benefit for the liquidation operations is taxable.

The decrease or cancel of any provision or reserve which was already deductible is included in taxable incomes.

The dividends of shareholders are taxes with dividend tax,

The liquidation incomes are investment incomes. According to article 66 of Taxation code, the taxable income for liquidation or dissolution without liquidation of a legal person is the surplus of distributions amount over the contribution of a person to equity. The tax is 16%.

For VAT, according to the taxation code any distribution of assets to the shareholders, including a distribution in case of liquidation or dissolution is taxable.

The fiscal treatment of insolvency companies is different such as the company is in observation, in reorganization or in bankruptcy.

**a) The taxation in the observation period**

In the observation period the activity of the debtor's company continues. In case that is a profitably activity, the benefit must be used for creditor's payment. All the payments are made only with the authorization of judicial manager named by the syndic judge. Is not allowed to pay the creditors claims even that they had been financed profitable activities. The benefit is calculated considering the undischarged debts.

The judicial manager has to check all the operations made by the debtor in the last three years before the opening of the insolvency procedure, and he can cancel operations which were made with the purpose of hiding assets or incomes for the creditors. In case of canceling operations, usually transfers of assets at minimal prices, the outcome has to be corrected and the taxable base after ajustation generates supplementary taxes, penalties and to claims increase.

For the claims before the insolvency opening the penalties are calculated until the opening date.

**b) The taxation in the reorganization period**

In case of approval of a reorganization plan, the company activity continues, claims are reduced by payments according to the payment plan. The decrease of debts is taxable incomes.

In the reorganization period are calculated interests, penalties for claims after the insolvency opening date, which are paid also according to the payment plan.

In the observation period and in the reorganization period the company must pay also the current debts.

**c) The taxation of the bankruptcy**

In bankruptcy, the incomes are obtained from selling the debtor's assets and from interests of the amounts held in banks. There are no expenditures like protocol or sponsorship. The publication expenditures are made only for selling the assets, is not necessary to calculate the depreciation because the depreciation expenditures are not made for obtained incomes.

About VAT tax, according to the taxation code at selling of assets are applied the simplified measures according to article 160. So, on the invoices is written reverse taxation, without afferent tax.

The provisions are deductible 100% of customer's debts if the next conditions are fulfilled:

1. Are registered after 1.01.2007;
2. The debt is against a legal person in bankruptcy;
3. Are not secured by other legal person;
4. Are obligations of a person which is not affiliated?
5. Were included in taxable income.

Rules about the taxation treatment of liquidation are also in Taxation Procedure code. For unpaid administrative claims generated before or after insolvency opening are calculated interests and penalties until bankruptcy opening.<sup>(2)</sup>

The advantages of merger or division taxation is many times covered by taxation laws and by many institutes which forbidden some transactions with companies who wants not to pay taxes.

Many times the insolvency companies have administrative claims which can not be paid only through a reorganization plan. The advantage of a reorganization plan is the payment of claims step by step in the reorganization period. In case of bankruptcy the administrative claims are paid after secured claims and employees claims.

The taxation of restructuring operations, such as merger, absorption, division, liquidation is an important part of these operations. The companies must respect the taxation rules.

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**Notes**

<sup>(1)</sup> According to Concurrences Council rules approved by Order no. 63/2004, O. M. no. 280/2004

<sup>(2)</sup> According to Taxation Procedure Code modified through OUG 35/2006, O.M. no. 941/2003

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- \*\*\* Law no. 85/2006 insolvency law, O.M. no. 359/2006



# THE INTANGIBLE ASSETS AND THE ENTERPRISE FINANCING

■

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**Abstract.** *In the present market economy, the enterprises' access to the funding sources is more and more difficult, because their funding is conditioned by achieving a proper profitability, assurance of the liquidity state and assuming the risk. The fulfilment of these conditions would situate the enterprise into a leader position and the funding won't be a problem. A proposal for improving the funding is the evaluation of the existing intangible assets from the enterprise and including of this value in the share capital. Thus, the credibility in front of the creditors of the enterprise will rise and the funding will be realised much easier, because the leverage grade is diminishing. This paper presents into a practical case, these effects of the intangible assets evaluation in a Romanian enterprise from textile sector.*

**Key words:** enterprise performance; funding; enterprise value; intangible assets; goodwill.

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## **Introduction**

The enterprise efficiency and value is very important for creditors / investors in the market economy terms. For many times, the enterprise value maximization depends on the managerial qualities of the enterprise leader, the way of their resources administration for obtaining of the profit maximization. Thus, the manager must have the *innovation and creativity inclination*, to hold knowledge in the financial domain, in the marketing, in the production and personnel management, to have qualities as honesty, personal integrity, flexibility and responsibility assuming the efficient administration for the patrimony. The supporting of these qualities represents a real chance of the any enterprise for breaking from crisis, as well as for proper and efficient using of the material and financial resources from the enterprise.

## **1. The intangible assets**

Any enterprise is needed to attract resources for the developed activities financing indifferent that is being in their development faze of the activity or in the production capacity maintaining. The grounding of the financing decision suppose the following aspects analyse: the length of time of the financing resources are necessary, the financing resources cost, the financing contract flexibility, the taxation impact on the enterprise financing policy, the agent costs but and the information asymmetry problem (Dragotă, 2005, pp. 322-324).

The enterprise ability to evaluate of their products and of their clients products in term of their contribution to the rising of the enterprise value is more needed for the competitiveness and long term success assurance. But, in the present, there is very difficult to evaluate the enterprise performance because of the volume, complexity and the information value from these processes that is continuously increasing (Fahy, 2004,

pp. 57). Usually, to the enterprise performance evaluation / measuring are used many financial indicators as: the net present value, the economic added value, the profitability, liquidity, solvency, leverage ratio (Brealey, 2003, pp. 321-329), but these are not leading to the enterprise real value obtaining.

In the majority Romanian enterprises there is an internal unused resource that results from the intangible assets evaluation. The entrepreneurs don't know yet the positive effects of this evaluation on the enterprise results.

The main *positive effect* is the appreciation of the own capital because the intangible assets evaluation have created in the liabilities an account related to the assets revaluation. If this value resulted from the intangible assets revaluation is included then in the nominal share capital, there is produced their overvaluation that lead to the improvement of the enterprise market image and to the perfecting of the financing possibilities through more chances for new financing source attraction.

The intangible assets are immaterial elements that can be or not registered, front ranker in the enterprise patrimony, but are contributing to maintain and development of the enterprise potential activity, are influencing the financial activity and results and implicitly the value (Toma, 1996, p.115).

The intangible assets *that can be registered* in the enterprise patrimony are included in the fixed assets of the balance sheet. In this category take part: fictitious assets, advanced expenses, research and development expenses, patents, licenses, marks, devices, granting or other fixed assets.

*The fictitious assets* have contained elements that aren't market or economic value and that, in fact, are expenses admitted to be recovered in many financial exercises: setting up expenses, overdraft of the capital and expenses for activity starting: prospecting, publicity.

The intangible assets *that can't be registered* in the enterprise patrimony are: enterprise commercial standing, products superiority, the placing, goodwill, reliability and solvency in front of the clients and banks, the position in front of the public and administrative authorities, the technical, commercial and managerial competence.

This paper presents the intangible assets evaluation to the MOD Ltd. that is functioning in the textile sector. This enterprise doesn't allocate funds for research and development in the last year, so it hasn't brought anything new on the market for achieving quality products. So, the first measure that must be taken should be the increasing in the resources expenses for applicative researches related to their product features improvement, to the technological process perfecting, to activity development, new products obtaining etc. Consequently, the enterprise must take measures for this situation improvement.

Thus, the enterprise has the following intangible assets in patrimony: manufacturer's mark, invention patents and know-how. For this enterprise that has a mark well-known on the market, patents and know-how, we are proposing the evaluation of the intangible assets for their *market value overdraft* and *diversifying of the financing possibilities* both on the monetary market and the capital market.

The *manufacturer's mark* is used by enterprises for differ their products by the identical or similar products of other enterprises from the country or abroad. The manufacturer's mark has warranted the minimal qualitative parameters foreseen in the mark certificate and that are in accordance with the world technique knew on their release date. The *invention patent* is a warranted act on the industrial property related on an investment. The invention patent has many other important functions: informing, the invention transfer facility, the commercialisation of the achieved products. The *know-how* (Talaghir, 1998, pp. 122-123) is refers to: the technical knowledge, the formulas, technical

definitions, documents, designs, models etc., the formula related on the manufacturing art; the knowledge and accumulated experience for applying in practice of a some technique; the trade with human intelligence; the exchanges of the human intelligence lead to the economic collaboration stimulation. This needs a fund of knowledge and technical experience that isn't patented and is kept in secret in the enterprises.

## 2. The Evaluation methods of the intangible assets

The main evaluation methods of the intangible assets (Toma, 1996, pp.116-118) are:

**a) The patrimony approach.** In this approach, the fictitious assets, the patents, licenses etc. are considered non-values and are taken into calculus of the net worth and of the other patrimony values with the zero value. The same thing is available on the research-development expenses that are referring to the existent products or to the studies and researches that maintain the present potential of the enterprise. The expenses with studies and researches related on new products or development, in general, can be taken into the assets calculus.

**b) The evaluation through profitability approach.** Generally, the intangible assets are the source of the one part from the global value of the enterprise named *stock trade* or *goodwill*. The goodwill (Gw) represents the aptitude of an enterprise for generating more or less profit into an established exploitation frame (people, products, equipments, markets, custom). The goodwill value is more tied by the enterprise psychology: this value will be higher when the enterprise is in a healthy state, its people are strongly motivated for work, the products are well placed on the market, the custom is thoroughly, the financial administration is more satisfying etc. Generally, the enterprise value (V) is calculated with the formula:  $V = AN_{Cor} + Gw$ .

The goodwill can be evaluated through more methods:

- *the superprofit capitalization.* The superprofit appear from the moment when the profitability achieved by the enterprise is higher then the profitability that can be obtained investing on the market an equivalent capital with the *corrected net worth* ( $AN_{Cor}$ ) or the superprofit is draw out after the breakeven passing;

- *the goodwill evaluation through difference* between the enterprise profitability value and corrected net worth;

- *the direct method of the goodwill evaluation* consist in the reconstituting and measuring of the needed expenses for constitution of the stock trade. This method can be applied only to the new founded enterprises or to the launching period. If the effectively profitability is higher then we have *goodwill* and if is lower we have *badwill* that penalize the enterprise patrimony value for insufficient profitability, that can be met especially in industry and it can be proceeded in two ways: is considered that can't be admitted the idea of an badwill and then will be used the zero value or is recognized the dequotation principle that consist in the fact that the enterprise value can be legally fall under the corrected net worth. The maximum limit of the dequotation is established by the market value of the assets or by the liquidation value.

### c) The specific evaluation methods of the intellectual property rights

- *the evaluation methods of marks.* Published by the fiscal authority, the Guide of Goods Evaluation specify: "the mark don't make the object of an evaluation if is exploited by their owner in an industrial or commercial enterprise, because it is included in the intangible elements of the goodwill and being supposed to a global evaluation". Some methods of marks evaluation are:

- *the turnover method*. In keeping with this method, the mark value is calculated starting from the turnover from the last three years, to which is added the coefficients that diminishing the mark impact on the enterprise. The turnover method is used only for the exploited marks and measure the mark weight on the market;

- *the profit method*. In keeping with this method, the mark value is established starting to the profit (B) level achieved by the enterprise that exploit it weighed with a coefficient ( $2 < C_0 < 5$ ) in accordance with the formula:  $V = C_0 + B$ . The  $C_0$  coefficient takes into account the following factors that can't be objectively appreciated: the exploitation level of the mark, the mark image, the potential custom of the mark, the extent of the juridical protection of the mark, the invested capital profitability;

- *the replacing cost methods*. This method started to the hypothesis of recreation of an equivalent mark that means a mark that have the same level of custom fidelity and has the same notoriety. But this possibility can be accepted only for new marks and no leader, because for the others, the replacing based only on expenses is unrealistic. The judgement is falsified by the fact that the mark existence on the market increasing for their buyer the cost of creating of an equivalent mark.

The cost approach isn't in accordance with the economic value theory because a good can need higher costs without have a value adequate with this costs level. This approach doesn't take into account the results. The mark, being an investment, the buyer intent to estimate the effects that will be produced;

- *the due method*. The mark value is equal with the future due on which the titular should be received if he should accept a license for his work. The present value is obtained through the future income actualisation. The Guide of Goods Evaluation specifies that the value of the weight coefficient is determined by mark reputation and its profitability. This coefficient can be: higher than 7 if these elements are extremely favourable and lower than 4 if is referring to a decline mark, lower profitable moreover the exceptional cases;

➤ *the evaluation methods of the patents and know-how*

There aren't fundamental differences between the patents and know-how evaluation. The most known evaluation methods are:

- *the method of research expenses* (research costs). The patent value is due to the entire value of the expenses performed for research and development needed for achieving an invention or a patent. There is known that the financial efforts needed for a good production isn't equal with the market value. But, thus determined value will allow to the license seller to establish a reasonable price because licensing to this price he have avoided to engage the same expenses for achieving a similar result after many years;

- *the profit method*. The patent value is evaluated to 20% from the profit forecasted for current exploitation period. Thus, 20% from profit will belong to the license owner for their research efforts and 80% to the person which assume the future exploitation risk of the license and which will take care of the production and commercialization of the products related to the investment;

- *the royalty method*. In the case of the patent or know-how evaluation that are in exploitation it is difficult to determine the results exclusively due to the patent, without taking into account the whole enterprise. In the *Evaluation Guide of the Goods*, the fiscal authority make reference to a "well establish practice" in accordance with the patent value represents the multiply between the last annual royalty and a coefficient that vary in accordance with the patent life duration. This method was proposed by J. Ferbos and G. Lacroix and is asking to take into account the patent specific risks and all objective factors that could affect the project results.

The evaluation difficulties of the unexploited patent aren't bigger than in the exploitation patent case. But, the unexploited patent evaluation is more ticklish because: the necessary information could be inexistent; the incertitude of the divers parameters; the patent value can't be lower than the costs that generated it.

### 3. Case study – the intangible assets evaluation to the MOD Ltd.

In this chapter there is proceed to the goodwill evaluation through the superprofit capitalization and through difference and than to the evaluation of the intellectual property rights.

#### 3.1. The superprofit capitalization

The superprofit ( $S_{Pr}$ ) appear from the moment when the enterprise profitability is higher than the profitability that should be attaining investing a capital equivalent with the corrected net worth on the capital market, thus:

$$S_{Pr} = CB - AN_{Cor} \times i, \text{ where:}$$

$$CB = \text{the enterprise profit capacity; } CB = \frac{\sum_{t=1}^n Pr_{Cor\ defl\ t}}{n}, \text{ where:}$$

$Pr_{Cor\ defl\ t}$  = the discounted corrected net profit for  $t$  year;

$AN_{Cor}$  = the corrected net worth;  $AN_{Cor} = TA - A_{itg} - D$  where:

$TA$  = the whole assets;

$A_{itg}$  = the intangible assets;

$D$  = liabilities;

$i$  = the neutral capitalization ratio.

The goodwill (Gw) is attained through the superprofit capitalization on a few years (n), thus:

$$Gw = n \times (CB - AN_{Cor} \times i).$$

There are taking into consideration the following information from the MOD Ltd. that in 2006 had realised the increasing in the production capacity:

➤ in 2006, the whole assets was 2,596,412 RON, the fictitious assets was 132 RON, the registered capital (CS) was 311,219 RON, the own capital (CP) 1,429,015 RON, permanent capital ( $C_{Perm}$ ) 1,719,015 RON, the financial debts ( $D_f$ ) 290,000 RON and the whole debts 1,167,397 (in accordance with the "Balance sheet");

➤ in the 2004-2006 period, the net profit ( $Pr$ ) had registered the following values (in accordance with the "Profit and Lose account"): 305,596 RON, 581,818 RON, and respectively 1,062,191 and in the 2007-2009 period is forecasted an upswing with 10% yearly;

➤ in the 2004-2006 period, the turnover (CA) had registered the following values (in accordance with the "Profit and Lose account"): 2,110,521 RON, 3,804,079 RON, and respectively 6,257,437 RON and in the 2007-2009 period is forecasted an upswing with 15% yearly;

➤ the annual inflation ratio in the 2004-2006 period was 9.3% in 2004, 8.6% in 2005 and 4.87% in 2006, and in 2007-2009 period is considered on an average of 5% yearly;

- there is considering that doesn't exist situations that should generate extraordinary expenses or income;
- the profit tax is 16% ;
- the neutral capitalization ratio ( i ) is 15%.

### The profit capacity determination

Table 1  
- RON -

	2004	2005	2006	2007	2008	2009
The net profit in accordance with the Balance sheet	305,596	581,818	1.062.191	-	-	-
The corrected profit	305,596	581,818	1.062.191	1.168.410	1.285.251	1.413.776
Turnover	2,110,521	3,804,079	6,257.437	7.196.053	8.275.461	9.516.780
The corrected profit / turnover	14,48%	15,29%	16,97%	16,24%	15,53%	14,86%
Deflated corrected profit	380,407	662,626	1.113.920	1.168.410	1.224.049	1.282.337
The whole deflated corrected profit	5,831,749					
The profit capacity	971,958					

On the base of MOD Ltd. information has result that the profit capacity is 971.958 RON (table no. 1), the corrected net worth is:  $AN_{Cor} = 2,596,412 - 132 - 1.167,397 = 1,428,883$  RON and the goodwill is:  $Gw = 6.67 \times (971,958 - 1,428,883 \times 0.15) = 5,050,837$  RON.

#### 3.2. The goodwill evaluation through difference

The enterprise value ( V ) represents the difference between corrected net worth (  $AN_{Cor}$  ) and goodwill ( Gw ). So, the goodwill is  $Gw = V - AN_{Cor}$  .

The enterprise value is calculated thus:  $V = \frac{CB}{i} = \frac{971,58}{0.15} = 6,479,720$  RON.

In these conditions, the goodwill is 5,050,837 RON for the analysed enterprise.

#### 3.3. The evaluation of intellectual property rights

We are realising the marks, patents and know-how evaluation for the enterprise MOD Ltd.

##### The marks evaluation

The marks evaluation will be realised using the turnover and profit methods, thus:

##### a) The turnover method

In keeping with this method, the mark value is calculated thus:

$$V_M = \sum_{j=t}^{t-2} CA_j \times I_m \times T_n \times A \quad \text{where:}$$

j = the last analysed three years: 2002, 2005 and 2006;

$I_m$  = the mark influence on the purchasing decision and can be take values comprised between 0,01 for a mark with a weak notoriety and 0,20 for a well-known mark. Because the MOD Ltd. has a known mark, we are considering the 0,15 value;

$T_n$  = the spontaneously notoriety coefficient that have tend to 1 for a frequently quotation mark and to 0,2 for a unquoted mark. We are considering the 0,8 value for analysed enterprise;

$A$  = the autonomy coefficient of the mark.  $A$  will take the 1 value because the analysed enterprise has only a mark.

Taking into account these dates, the mark value is:  
 $V_M = (2.110.521 + 3.804.079 + 6.257.437) \times 0,15 \times 0,8 \times 1 = 1.460.644$  RON.

#### b) The profit method

To this method, the mark value is calculated in according with the formula:

$V_M = C_0 + B$ , where:

$C_0$  = a coefficient that can take the values comprised between 2 and 5 in function of the exploitation level of the mark, the potential custom and the extent of juridical protection of the mark, and the invested capital profitability. The invested capital profitability ( $R_{K_{inv}}$ ) represents the proportion between the profit and permanent capital:

$$R_{K_{inv}} = \frac{1.062,191}{1.719,015} = 61.79\% . \text{ Thus, we are considering } C_0 = 4 .$$

$B$  = the enterprise profit, that is calculated as proportion between profit and turnover:  $B = \frac{1.062,191}{6,257,437} = 6.97\% \approx 17\%$ .

In these conditions, the mark value is:  $V_M = 4 + 17 = 21\%$  from turnover or  
 $V_M = 21\% \times 6,257,437 = 1,314,062$  RON.

#### 3.4. The patents and know-how evaluation through the profit method

In the enterprise analysed case, the patent is evaluated on 20% from the profit achieved in the present exploitation period. Thus, the patent value ( $V_B$ ) is:

$$V_B = 20\% \times 1,062,191 = 212,438 \text{ RON.}$$

#### 4. Conclusions

Applying the presented evaluation methods on the intangible assets of the MOD Ltd., results that the goodwill is 5,050,837 RON. Through the evaluation of the intangible assets is created an account named "revaluation reserves" in the balance sheet liabilities that will overdraft the own capital to 6,479,852 RON. If is taking the decision for overdraft of the nominal share capital with the value of these reserves, than the registered capital will be 5,362,016 RON.

In this conditions, the global leverage is diminishing from 81.69% to 18.02%, the financial leverage is diminishing from 20.29% to 4.48%, and result that the improvement of these indicators will facilitate the access to other financing source.

The incorporation of the intangible elements value in the registered capital will due to an increase of the whole assets from 2,596,412 RON la 7,647,249 RON, that is a

strength point in the loans obtaining, that is the enterprise credibility will grow in front of the creditors, especially bank then the enterprise realise a feasibility study for crediting or a business plan if the enterprise should attain a unredeemable financing from the European Union.

Also, the overdraft of the nominal share capital correlated with the higher profitability will determine the increase in the share course to the stock exchange that will attract new investors and new financing source for investments.

Finally, through the intangible assets evaluation are used efficient the objects of the intellectual propriety from an enterprise and can be achieved new intellectual propriety objects that can be valued through licenses.

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