Propagation effects of taxes in Romania: An input-output analysis

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Abstract.*: The Input-Output model (IO) is an important tool of economic analysis, providing a predictive analysis framework for economic changes, if properly used. In developing measures, strategies, etc. at macro level it is important to identify the links that occur between* branches *of the economy for a better understanding of "enabler"* branches *which have the highest contribution to output creation. In this research the IO method was used to analyze effects of taxes within the Romanian economy, based on data provided by the National Institute of Statistics (NIS), using IO statistical tables for 2000 and 2006.*

Keywords*: Input-Output Analysis, Tax Multipliers, Forward Linkage, Backward Linkage, Romania*

JEL Classification*: C67, D57*

1. Optimal taxation dilemma

In all economies, the public decision-maker faces permanently, on one hand, the need to collect increasingly consistent financial resources, raising or diversifying existing taxes, yet, on the other hand, affects taxpayers (whether these are

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individuals or firms) since they always expect the diminution in all taxes, that is, of their level or number. Therefore the concept of optimal taxation was and still is a research field as controversial as prolific in approaches seeking a *sui generis* balance between opposing viewpoints and interests.

Optimal tax theory refers to how taxes can be structured to bring along the lowest costs or to provide the best outcomes in terms of social welfare. If variable taxation takes into account the differential size of revenues, turnover and wealth, lump-sum taxation does not take into account the value of the financial resources of a business, for example, implying the payment of a fixed amount to the state budget regardless of the income level.

The lump-sum tax may also mean equal treatment for all taxpayers, in order to increase the budget revenues, starting from the premise that it does not change the firm's options (e.g., consumption, labour supply). In other experts' opinion, this type of tax does not lead to diminishing tax evasion and is difficult to implement because firms are always tempted to hide their available resources.

The tax on income of employees and individuals may influence the labour supply, and the consumption and investment behaviour as well. Discussions on the conflict between tax efficiency and tax equity, and the initiatives to establish an optimal tax, are permanently challenged by complying with the profitability principle.

Referring to the implementation of a flat tax, many experts consider that it generates adverse effects on employees receiving a low salary; the earnings generated being insignificant compared to the phenomenon of price increase. Most employees do not earn enough after implementing the flat tax, which is a factor with strong "social polarisation" potential in favour of social categories with relatively high income levels.

Using taxes as a tool to influence the decisions of individuals and businesses must simultaneously ensure tax fairness and performance, as well as the settlement and neutrality of taxation that should contribute to stimulating economic development and assuring low administrative costs. In practice, such compatibility is hardly achievable. On one hand, the impact of taxation refers to the volume and structure of demand due to resizing of individuals and businesses income and, on the other hand, providing the necessary financial resources used in the process of supporting growth.

Taxes in all their complexity and diversity and their generated direct and indirect effects represent a kind of "necessary evil" that must be optimized due to their double circumstance, namely:

- costs for taxpayers that diminish their consumption and investment capacity;
- state budget revenues needed for maintaining and developing the public infrastructure, and the general living conditions, along with the activities in the private, public and joint sectors, as well.

Under the conditions in which the state aims for higher revenues, while taxpayers expect as low costs as possible generated by tax payments, justifiably the question arises about the optimum sizing of taxation, a *sine qua non* condition of public goods and services production, without which private business cannot exist.

2. About the methodology used

In our research, we attempt to draw out some elements for justifying taxation optimization, by taking into account the interdependencies between the component branches of the national economic system analysed quantitatively and qualitatively by means of the IO model, starting from the well known equilibrium equation:

$$X = (I-A)^{-1} * Y \tag{1}$$

where: I is the unit matrix, and X is the output's vector; Y is the final demand vector.

Matrix $(I-A)^{-1}$ is called *total requirements matrix* or *Leontief inverse matrix*. If we consider that the *Leontief inverse matrix* is B then the sum of each column represents the *output multipliers* (B_j):

$$B_j = \sum_{i=1}^{n} b_{ij} \tag{2}$$

The Leontief inverse matrix represents the starting point in deriving the multipliers. The IO analysis offers two distinct results for each analysed branch, namely backward linkages and forward linkages. The backward linkage is used to indicate the interconnection of a particular branch to other branches from which it purchases inputs. Increasing output of branch *j* indicates the additional available amounts of products to be used as inputs by other economic branches. The backward linkages are demand-oriented.

Tax multipliers are obtained using the Leontief inverse matrix and the matrix of tax direct coefficients, as follows:

$$T = L * B \tag{3}$$

where: *T* is the tax multipliers matrix; *L* is the tax coefficients matrix containing on the main diagonal the tax coefficients and zero for the rest, tax coefficients being estimated as ratio of taxes to output.

The Leontief inverse matrix elements are multiplied by the ratio between taxes and output for each branch, thus the tax multiplier being obtained. *Tax multipliers* or *tax backward linkage coefficients* ($TaxBL$) for each branch are calculated as follows:

$$TaxBL_j = \sum_{i=1}^{n} t_{ij} \tag{4}$$

By means of the tax multiplier we quantified the relationship between the tax coefficient and the change by one value-unit of the final demand. The tax multipliers show how many times state tax revenues change in the case of one value-unit change of final demand within the respective branches. On the other hand, the increase in the total production of sector *j* increases its total supply for the rest of the economic sectors in the model that uses sector *j* product as an input in their production process (Bonfiglio et al., 2006). The *forward linkage* is used to indicate those intersectoral transactions. If the backward linkages are demand oriented, the forward linkages are supply oriented. The forward linkage coefficients reveal the intermediate consumption as a percentage of total sectoral sales including final demand (Augustinovics, 1970). The forward linkage is used to indicate the interconnection of a particular branch to those to which it sells its output. In the case of taxes, the forward linkage coefficients are determined as follows:

$$TaxFL_i = \sum_{j=1}^{n} t_{ij} \tag{5}$$

where $TaxFL$ - tax forward linkage coefficient.

If linkages are used to identify key sectors with high multipliers in a particular economy, only domestic intermediates should be used to assess the forward and backward linkages in the national context (Eurostat, 2008).

The transposed matrix of A (A^T *matrix*) is used in estimating the volume of total taxes, as follows:

$$T_t = (I-A^T)^{-1} * T_d \tag{6}$$

where: T_t - total taxes; T_d - direct taxes (taxes on the line, from the *transactions table*, values in mil. lei); A^T - transposed matrix of A.

Equation (6) presents the multiplier effect (total taxes). A certain level of taxation, necessary to a budget deficit target, requires that the total forward and backward tax burden should be equal to total taxes (T_t). Taxation attracts a volume of taxes equal to T_t in forward and backward interdependent branches of the national economy. The difference between total taxes and direct taxes is a useful instrument for investigating the tax burden for each economic branch. The difference between T_t and T_d shows the total propagation effect within other branches by the taxes from one specific branch.

$$\Delta T = T_t - T_d \tag{7}$$

According to the empiric studies, there are branches that have a less direct contribution to tax revenues but generate (as a result of various links between branches) a higher taxation depending on the size of ΔT recorded in other economic branches.

3. The analysis of coefficients for the Romanian case

In the following section, the results of the analysis for the Romanian case are shown; the data used are from the *TEMPO* database of the National Institute of Statistics (NIS), Romania, for the years 2000 and 2006. The first step of analysis was to aggregate branches (see Annex) so that the 105 branches of the NIS classification were reduced to 43 branches.

Contribution to Gross Value Added (GVA)

The branches with a greater participation in the creation of the national GVA for both years are: Crops (9.04% in 2000 and 6.67% in 2006); Food industry (5.50% and 4.68%); Production and supply of electricity, steam, gas, hot water and air conditioning (3.29% and 2.43%); Constructions (5.35% and 8.40%); Wholesale and retail (10.96% and 11.51%); Other transport (3.10% and 5.26%); Telecommunications (3.75% and 2.97%); Financial, banking and insurance activities (4.43% and 2.03%); Real estate (8.54% and 8.34%); Professional, scientific and technical activities (3.46% and 4.65%); Public administration and defence, compulsory social assistance (5.24% and 5.26%); Education (2.89% and 3.59%); Health and social assistance (2.09% and 2.75%); Other collective services, social and personal activities (3.17% and 3.24%).

In the analyzed period, increases in branches' contribution to the creation of national GVA were in: Constructions (+ 3.04 p.p.); Wholesale and retail (+0.54 p.p.); Other transport (+2.16 p.p.); Professional, scientific and technical activities

(+1.19 p.p.); Public administration and defence, compulsory social assistance (+0.03 p.p.); Education (+0.70 p.p.); Health and social assistance (+0.67 p.p.); Other collective services, social and personal activities (+0.07 p.p.).

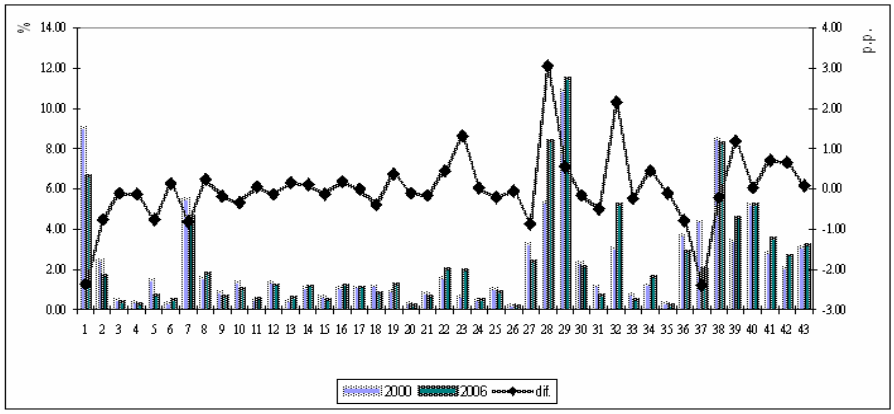

Figure 1 - Branch contribution to national GVA creation, 2000 and 2006 (%)

Source: Authors' calculations based on NIS data.

Decrease in branches' contribution to GVA creation was recorded in: Crops (-2.37 p.p.); Food industry (-0.82 p.p.); Production and supply of electricity, steam, gas, hot water and air conditioning (-0.86 p.p.); Telecommunications (-0.78 p.p.); Financial, banking and insurance activities (-2.40 p.p.); Real estate (-0.20 p.p.).

In general, the tertiary sector increased its contribution to the creation of national GVA, while the primary sector reduced it significantly, resulting in the economy's orientation towards the services sector (transport, trade, construction). Without denying the importance of the tertiary sector for sustainable economic knowledge-based growth, it may be noted that the "pseudo-tertiarisation" trend in the economy represents vulnerability for the sustainable growth process. Freeloading, speculative services, unlike the healthy ones servicing mainly the real economy may generate the oversizing of (nominal) monetary economy with strong inflationary impact, macroeconomic instability and real economy decline.

Special attention has been paid also to self-consumption, viewed from the perspective of taxes. Self-consumption is represented by the coefficients on the main diagonal of the *A* matrix. High self-consumption reflects a branch with

relatively great independence and one may say that this branch bears the taxes by itself. Low self-consumption reflects the dependence of one branch on other branches, taxes having the impact on several branches (taxes from a branch are interlinked to taxes in other branches).

For 2000 it can be noticed that on the first three positions are placed the following branches with a high self-consumption: Manufacture of beverages and tobacco products (0.305); Production and supply of electricity, steam, gas, hot water and air conditioning (0.304); Manufacture of basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products (0.295).

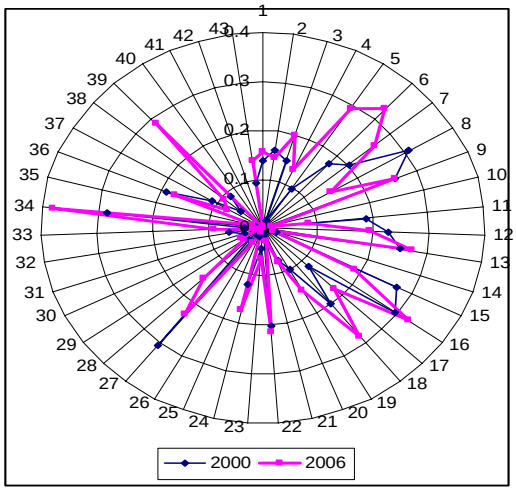

Figure 2 - Self-consumption, Romanian economy, 2000 and 2006

Source: Authors' calculations based on NIS data.

In 2006, the top three branches are: Ancillary and auxiliary transport activities, activities of travel agencies and tourism assistance (0.382); Mining of metal ores, other mining activities and mining-related services (0.326); Manufacture of basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products (0.323).

On computing the tax multiplier for the Romanian case, from the IO table the following elements were taken into account: social contributions (employers) and other taxes on production.

Tax forward and backward linkage coefficients

For *tax forward linkage coefficients*, in 2000, the first three positions were: Production and supply of electricity, steam, gas, hot water and air conditioning (0.39); Oil and natural gas extraction (0.26); Textile industry and textile products (0.23). In 2006, the first two positions remained the same, namely: Production and supply of electricity, steam, gas, hot water and air conditioning (0.31), Oil and natural gas extraction (0.3), but the third place is represented by Professional, scientific and technical activities (0.28).

Regarding *tax backward coefficients* (*tax multiplier*), in 2000 the first three positions were the following: Education (0.295); Public administration and defence, compulsory social assistance (0.29) and Health and social assistance (0.205). In 2006, the situation changes, and the only branch occupying one of the first three positions is Public administration and defence, compulsory social assistance (0.276), the other places being occupied by Rail transport (0.258) and Coal mining (0.255). The values for tax multiplier show that a change in final demand in Public administration and defence, compulsory social assistance by 1 leu determines changes in tax revenues by 0.29 lei in 2000 and 0.276 lei in 2006. For both years, the lowest value of the tax multiplier was recorded for Real estate, namely 0.009 and 0.012.

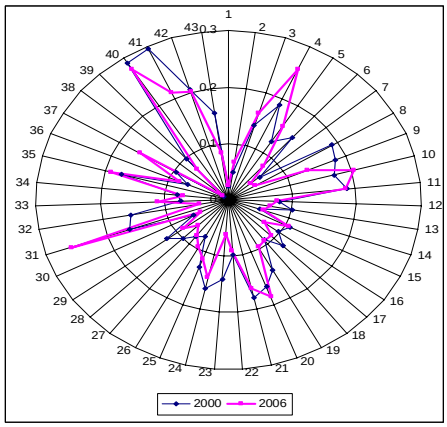

Figure 3 - Tax backward coefficients (tax multiplier)

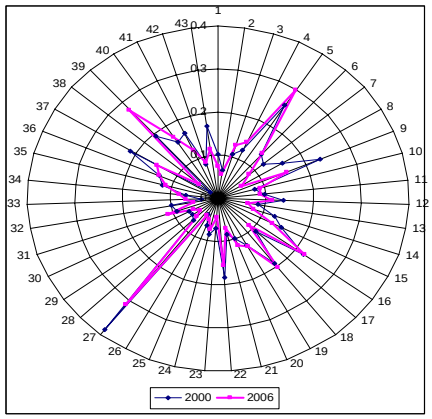

Figure 4 - Tax forward coefficients

Source: Authors' calculations based on NIS data.

Even if the Romanian economy has made some significant progress in certain branches, tax multipliers decreased, as well. Most notable increases were in Rail transport (+0.096), Coal mining (+0.069) and significant decreases were in Manufacture of beverages and tobacco products (-0.140), Other transports (-0.108).

One question arising here is why tax multipliers decrease in certain branches, in a developing economy such as the Romanian one at least in 2000-2006? How might this situation be explained?

Table 1

Classification of the tax backward coefficients and tax forward coefficients, 2000 and 2006

Branches	Coef.	Year	between 0.005 and 0.065 including	between 0.065 and 0.125 including	between 0.125 and 0.185 including
	TaxBL	2000	38,1,2,14,30,7	36,26,33,34,12,27,18,37,16, 22,28,39,13,15, 17,29,5	25,3,23,19,6,32,43, 24,31,20,10,35,21,9
		2006	38,1,7,32,8,30,14,23, 28	2,13,16,34,39,12,27,6,43,36, 29,22,17,18,19,26,15,33,25	9,24,5,3,21,37,11,20
	TaxFL	2000	38,33,26,29,2	34,25,30,23,28,10,42,21,13, 24,31,11,32,20,1,3,17,35,7,4	14,19,36,6,12,15,40, 8,41,43,22
		2006	23,29,26,32, 38,25,8,2,30,28,13	33,21,1,24,14,34,7,42,11,10, 17,31,43,12,35,20,41	15,19,3,36,6,4,37,9, 22,40
	Coef.	Year	between 0.185 and 0.245 including	between 0.245 and 0.305 including	over 0.305
	TaxBL	2000	4,11,8,42	40,41	-
		2006	35,42,10,41	4,31,40	-
	TaxFL	2000	18,39,37,16,9	5	27
		2006	18,16	39,5	27

Source: Authors' calculations based on NIS data.

The forward linkage coefficient reflects the effect that a unitary impulse of final demand has on the economic activity in a particular branch (Pavelescu, 2005). The forward linkage multipliers refer to the outputs of one branch becoming the

inputs of other economic branches and also of the taxes paid by each branch.

As in the case of TaxBL, also TaxFL decreased, most significantly for: Manufacture of beverages and tobacco products (-0.103); Textile industry and textile products (-0.076); Production and supply of electricity, steam, gas, hot water and air conditioning (-0.072).

Tax multiplying speed

Tax multiplying speed is the ratio between *A* matrix coefficients and tax coefficients. Taxation is more productive or beneficial with respect to tax multiplying speed in the case of branches' production with higher coefficients of the multiplying speed.

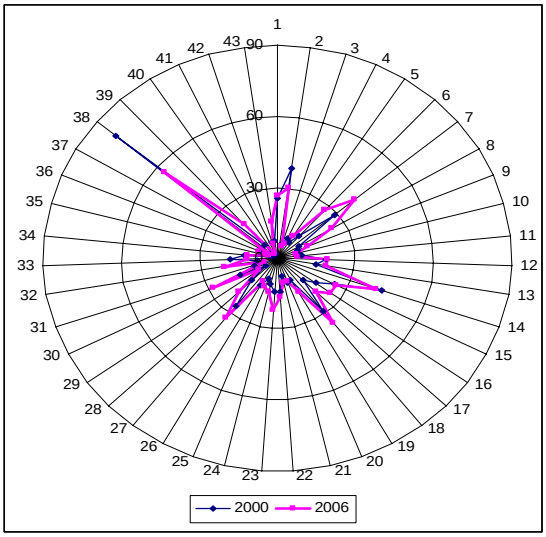

Figure 5 - Tax multiplying speed

Note: *A matrix coefficients represent the sum on columns.*
Source: Authors' calculations based on NIS data.

Taxes are sustained in 2000 by a relatively higher volume of output in branches: Real estate (80.5), Manufacture of coke products and products derived from oil processing (42.0) and Livestock and ancillary services (38.5) or have a larger tax base. In 2006, on the first three positions the following are placed: Real estate (56.7), Manufacture of coke products and products derived from oil processing (39.9) and Food industry (38.3).

Total taxes and direct taxes. The relationship with the output

In the case of total taxes T_t, the first three positions in 2000 were: Production and supply of electricity, steam, gas, hot water and air conditioning (1347.75 mil. lei); Public administration and defence, compulsory social assistance (912 mil. lei); Wholesale and retail (784 mil. lei). In 2006, the following were on the first positions: Production and supply of electricity, steam, gas, hot water and air conditioning (4099 mil. lei); Professional, scientific and technical activities (3947 mil. lei); Public administration and defence, compulsory social assistance (3585 mil. lei).

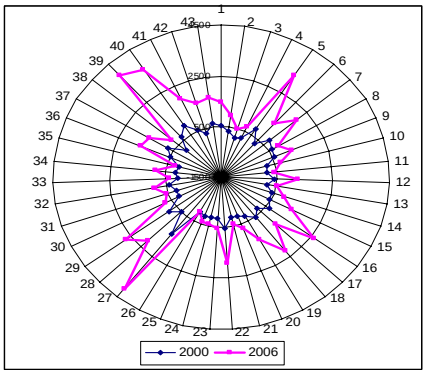

Figure 6 - Total taxes (T_t) (mil. lei)

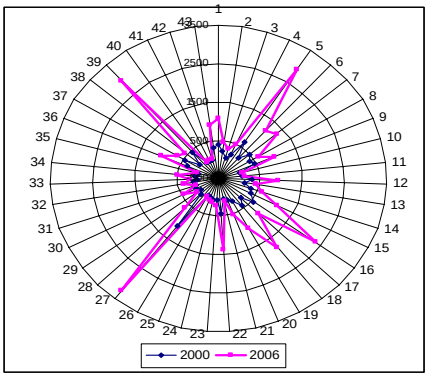

Figure 7 - Total propagation effect in other branches by the taxes from a branch (ΔT) (mil. lei)

Source: Authors' calculations based on NIS data.

The economic significance of ΔT is very important, depending on the magnitude of the indirect propagation effect of taxes, different mixes of tax policies specific for the branches of the IO model can be established and also their integration into quantitative and qualitative interdependency system.

In our case it may be noted that increased taxes in electricity, gas, water, etc. trigger important propagated effects of taxes in all the other branches of the national economy according to the "snowballing effect". This situation is explained by the fact that those branches have a "universal" vocation, meaning that they enter in direct and indirect contact with all the other branches of the economy, servicing them to various degrees. Moreover, this characteristic of those branches may be taken into consideration by the decision maker with

regard to exercising prudence when increasing the direct taxes in this field, as the danger of increasing inflation, the tax burden and diminishing solvent demand is obvious.

When ΔT has higher values, it is necessary to consider a tax cut in that branch because backward and forward activities of that branch induce higher taxes, leading to increased taxation. When ΔT is relatively low, the production of that branch may increase, as it does not induce strong backward and forward spread effects regarding taxation.

In 2000, the largest values were for: Production and supply of electricity, steam, gas, hot water and air conditioning (1070 mil. lei); Oil and natural gas extraction (639 mil. lei); Manufacture of basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products (535 mil. lei). In the second year of analysis, the branches with the highest values were: Production and supply of electricity, steam, gas, hot water and air conditioning (3220 mil. lei); Professional, scientific and technical activities (2935 mil. lei); Oil and natural gas extraction (2921 mil. lei).

The ratio of taxes to output[1] for each branch (the ratio of values on the taxes line from the IO statistical table, taxes called “direct” taxes, to the output line from the same table, by branches), is called *tax coefficient*.

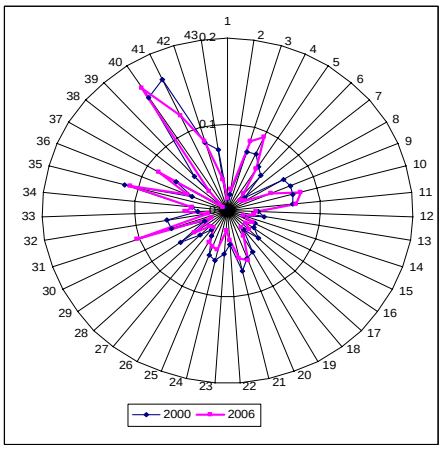

Figure 8 - Tax coefficients (taxes/output)

Source: Authors' calculations based on NIS data.

[1] The output refers only to domestic intermediates according to Eurostat Manual of Supply, Use and Input-Output Tables.

The branches with the highest tax coefficients in both years were: Postal and courier activities (0.115 and 0.109); Public administration and defence, compulsory social assistance (0.155 and 0.169); Education (0.168 and 0.121).

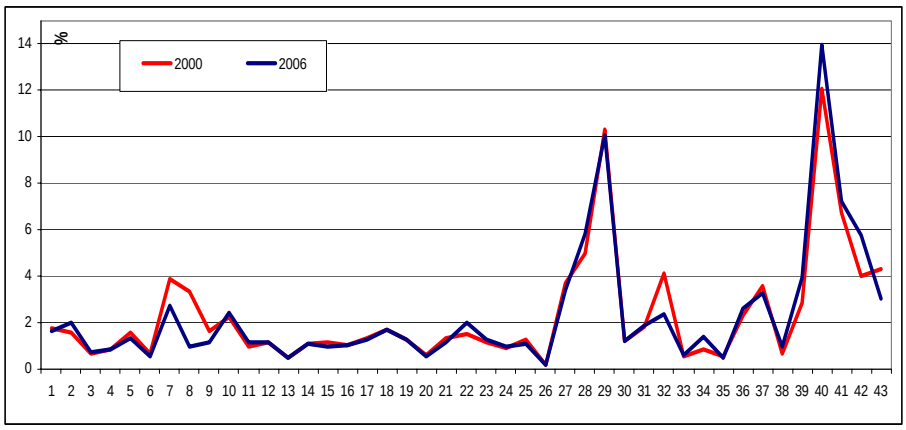

Figure 9 - Ratio of direct taxes to total direct taxes, 2000 and 2006

*Note: The ratio is T_d/total T_d*100, calculated for 2000 and 2006 – direct taxes by branches (mil. lei) / total direct taxes (mil. lei) * 100.*

Source: Authors' calculations based on NIS data.

Branches having the highest weights in the total volume of direct taxes creation for both years were: Public administration and defence, compulsory social assistance (12.1% and 13.9%); Wholesale and retail (10.3% and 10.1%); Education (6.8% and 7.2%). These branches, on one hand, are overwhelmed by taxes and, on the other, they provide a high income to the state budget and can be considered an engine for the creation of public goods and services.

4. Some final remarks and conclusions

The economy of a country involves a complex structure of linkeages between branches and various goods such as financial services, transportation and so on may be both inputs and outputs. The IO models provide an adequate framework for analysing the relations between economic branches, in terms of direct and indirect impacts of taxation as well.

By means of the IO model the impact of various tax policies of the state might be analysed, among which a special relevance is related to flat taxation or progressive taxation. Each type of tax generates complex effects on living standards of the population whose incomes vary substantially.

The analysis of tax policy effects backwards and forwards within one branch, in relation to possible changes in taxation for the respective branch, lead to the conclusion that the branches with universal vocation, servicing all the other branches of national economy (e.g. electricity, gas, water, education, public administration) are characterized by a strong tax propagation effect. Depending on objectives, macroeconomic policy makers may change taxation in those branches, provided that they quantify as rigorous as possible the (indirect) propagated effects of taxation both in terms of impact on final demand and on the living standards and of promoting and stimulating certain sectors or economic activities.

Extending the taxation research field by means of the IO model might aim not only to the aspect of how population might bear effects of increased taxation or stimulating/discouraging increase of certain economic branches, but also saving and protecting the natural capital resources by eco-taxes which currently are regarded as an alternative to the system of traditional, direct and indirect taxes.

At the same time, the IO model provides increased opportunities for fiscal policies, tax reform impact analysis in terms of flexibility and differentiation of various types of taxes.

We underline that practically the IO analysis, in matter of taxes, implies a new way of substantiating the tax measures by considering their possible effects in the short and medium run, in terms of their double condition as revenue to state budget and cost (expenditure) for taxpayers, especially under the conditions in which the complexity and level of development and diversification of the economy increases.

One of the major issues which the IO analysis may clarify is related also to the suggestions aiming to the "uniformity" or convergence (proximity) of tax systems within EU member states, as it is well known that currently in the taxation field, policies differ sensibly both quantitatively and qualitatively from one country to the other.

Starting from the total propagated effect of taxes from one branch to another it is desirable that the strategies in the taxation field consider tax policies which have low indirect effects, so that the tax burden on other branches to be bearable or not to affect their growth.

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Annex

Aggregation of the branches in the Romanian economy (authors' aggregation and NIS classification)

No.	Branches aggregated	Branch classification by NIS
1	01 Crops	01 Crops
2	02-03 Livestock and ancillary services	02 Animal husbandry, 03 Auxiliary services
3	04-06 Forestry, fishing and fish farming	04 Forestry and hunting economy, 05 Logging, 06 Fish farming and fishing
4	07 Coal mining	07 Coal mining and coal preparation (including shale schist)
5	08-09 Oil and natural gas extraction	08 Oil extraction (including related services activities), 09 Natural gas extraction (including related services activities)
6	11-17 Mining of metal ores, other mining activities and mining related services	11 Mining and preparation of ferrous ores, 12 Mining and preparation of non-ferrous ores, 13 Mining of the ores for the construction materials industry, 14 Sand and clay mining, 15 Mining and preparation of ores for chemical industry, 16 Salt mining and preparation, 17 Extraction and preparation of other non-metallic ores
7	18-25 Food industry	18 Production, processing and preserving of meat, 19 Processing and preserving of fish and fish products 20 Processing and preserving of fruit and vegetables, 21 Plant and animal oils and fats production, 22 Manufacture of milk products, 23 Manufacture of milling products, starch and starch products, 24 Manufacture of animal food products, 25 Manufacture of other food products
8	26-27 Manufacture of beverages and tobacco products	26 Manufacture of beverages, 27 Tobacco industry
9	28 Textile industry and textile products	28 Textile industry and textile products
10	29 Textile clothing industry	29 Manufacture of textile garments
11	30-31 Furs and leather garments manufacture, leather and footwear	30 Furs and leather garments manufacture, 31 Leather and footwear industry
12	32-33 Wood processing industry, cellulose and paper	32 Wood processing industry (excluding furniture industry), 33 Cellulose, paper, cardboard and other items industry

No.	Branches aggregated	Branch classification by NIS
13	34 Publishing, polygraph and reproduction of the recordings on supports	34 Publishing, polygraph and recordings reproduction on supports
14	35-37 Manufacture of coke products and products derived from oil processing	35 Coke, 36 Oil processing, 37 Processing of nuclear fuel
15	38-40 Manufacture of chemicals and chemical products	38 Manufacture of basic chemicals, 39 Manufacture of pesticides and other agrochemical products, 40 Manufacture of paints and varnishes
16	41-46 Manufacture of basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products	41 Manufacture of medicaments and pharmaceuticals, 42 Manufacture of soap, detergents, maintenance products, cosmetics, 43 Manufacture of other chemicals, 44 Manufacture of fibre, of synthetic or artificial yarn, 45 Rubber articles production, 46 Production of plastic articles
17	47-54 Manufacture of other non-metallic mineral products	47 Manufacture of glass and glass articles, 48 Manufacture of ceramic refractory and non-refractory articles, 49 Manufacture of ceramic plates and tiles, 50 Manufacture of bricks, tiles and other products 51 Manufacture of cement, lime, plaster, 52 Manufacture of concrete elements, cement and plaster, 53 Cutting, shaping and stone finishing, 54 Manufacture of other products from non-metallic mineral
18	55-59 Metallurgy	55 Siderurgy and production of ferroalloys, 56 Production of tubes, 57 Other siderurgy products, 58 Production of precious metals and other non-ferrous metals, 59 Foundry
19	60 Metallic construction and metal products	60 Metallic construction and metal products
20	61 Manufacturing of equipment for the production and use of mechanical energy	61 Manufacture of equipment for the production and use of mechanical energy
21	62-65 Manufacture of machinery, equipment, etc.	62 Manufacture of machinery for general use, 63 Manufacture of agricultural and forestry machinery, 64 Manufacture of tools-machine, 65 Manufacture of other machinery for specific use
22	67-71 Manufacture of computers, electronic and optic products and electrical equipment	67 Manufacture of machinery and household apparatus, 68 Industry of IT means and office equipment, 69 Machinery and electrical apparatus industry, 70 Equipment, radio apparatus, television

No.	Branches aggregated	Branch classification by NIS
		and communication industry, 71 Industry of medical instruments and apparatus of precision, optical and photographic, clocks
23	72 Means of road transport	72 Means of road transport
24	73-76 Manufacture of other transport means	73 Naval construction and reparations, 74 Production and repair of rail means and rolling stock, 75 Construction and repair of aircraft, 76 Production of motorcycles, bicycles and other means of transport
25	77 Furniture production	77 Furniture production
26	78 Other industrial activities	78 Other industrial activities
27	79-82 Production and supply of electricity, steam, gas, hot water and air conditioning	79 Production and distribution of electricity, 80 Gas production and distribution (excluding methane extract), 81 Production and distribution of heat and hot water, 82 Collection, treatment and water distribution
28	83 Constructions	83 Constructions
29	84 Wholesale and retail	84 Wholesale and retail
30	85-86 Hotels and restaurants	85 Hotels, 86 Restaurants
31	87 Rail transport	87 Rail transport
32	88 Other transport	88 Other transport
33	89-91 Transport via pipelines, on water and on air	89 Pipeline transport, 90 Water transport (sea, coast, large river), 91 Air transport
34	92-93 Ancillary and auxiliary transport activities, activities of travel agencies and tourism assistance	92 Ancillary and auxiliary transport activities, activities of travel agencies, 93 Activities of travel agencies and tourism assistance
35	94 Postal and courier activities	94 Postal and courier activities
36	95 Telecommunications	95 Telecommunications
37	96 Financial, banking and insurance activities	96 Financial, banking and insurance activities
38	97 Real estate	97 Real estate
39	98-101 Professional, scientific and technical activities	98 IT and related activities, 99 Research - development, 100 Architectural activities, engineering and other technical services, 101 Other services activities for enterprises
40	102 Public administration and defence, compulsory social assistance	102 Public administration and defence, compulsory social assistance

No.	Branches aggregated	Branch classification by NIS
41	103 Education	103 Education
42	104 Health and social assistance	104 Health and social assistance
43	105 Other collective services, social and personal activities	105 Other collective services activities, social and personal

Source: NIS classification.