The Romanian Financial Market and the Financial Markets from EU - A Integration Analysis

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THE ROMANIAN FINANCIAL MARKET AND THE FINANCIAL MARKETS FROM EU - A INTEGRATION ANALYSIS

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Abstract
Integration has become a second nature of Europeans.. Day-in, day-out, we experience more worldwide integration of markets and this will further develop as –in the end – it will mean real tangible benefits for all stakeholders involved. One of the most important parts of the integration process is the financial integration which could be seen as a complex process which involves institutional, functional, structural and behavioural aspects.
The aim of this paper is represented by the assessment of the financial integration degree between the Romanian financial market on the one side and the EU financial markets on the other side, analyzing all the four aspects mentioned above.
The final conclusion that could be drawn is that the Romanian financial market integration registered in the last period (especially in the period 2004-2005) a large progress which marks the "maturation" of the national financial market. Despite of these progresses, some significant divergences could be still seen and in consequences this process has to be continued with some further simulative mechanisms.

JEL classification: G15, G18, G28

Keywords: financial market integration, institutions, structures, functions, behaviours

I. Introduction

Unfortunately, measuring integration is not an easy task but a number of measures of integration have been proposed in the literature (for a review of some capital integration measures see Frankel[1992]) A common approach to analyze the degree of market integration is based on the computation of the correlation between returns of different markets (Taylor & Tonks [1989] or Le [1991]). The law of one price and the difficulties associated with the assessment of deviation is also largely discussed (see Obstfeld [1994]): two main problems could consist in the fact that the financial and the" real" prices are closely intertwined, so it is difficult to test the hypothesis of the existence of a globalizes financial market in isolation; second, it is almost impossible to identify product which are fully comparable in the various national financial markets. Having these difficulties in mind, it should be acknowledged that the degree of co-integration in financial returns around the world seems to be currently be rather large, and consistent with relatively high financial market integration (see Bordo, Eichengreen and Kim [1998[). Chen and Knez [1995] developed a measurement theory of market integration that relies directly on the concept of the law of one price in the condition of absence of arbitrage opportunities and does not depend on any particular asset pricing model. Based on the approach suggested by Chen and Knez, Juan Alyuso and Roberto Blanco [1999] computed two alternative measures of market integration in order to conclude that during the

nineties there has been an increase of the degree of market integration between stock markets. Obviously, this approach is subject to various estimation uncertainties reflecting its complexity, as noted by Kan and Zhou [1999]. By contrast, a Huizinga and Jonung [2005] study on the internationalization of asset ownership in Europe concludes that in spite of all the reforms, the process of European financial integration is far from complete. A very recent line of research proposes an alternative measure that looks at capital market integration as more of a macro problem and therefore avoids the limitations of price or ownership based measures. (S.Kalemli-Ozcen & B.E.Sarensen [2007])
Due to the large extension of this topic this paper is structured in four main parts which analyses the four aspects of integration, each part ending with its own conclusions.

II. The institutional integration

The institutional integration could be represented by the existence of some similar and compatible ruling and supervising institutions at the financial market level. This compatibility concerns:

-the existence and the formal institutional design
-the attributions and the "formal" and "informal" competences of the institutions which are implicated in the market functioning
-the "**the facto" way they are functioning**

Measuring the intrinsic characteristics of the institutions is a very difficult task and it could have only a conventional character. A qualitative approach could be based on the construction of some dummy variables which could be able to list a sum of institutional characteristics and to realise their cardinal comparison. This kind of method implies a supplementary aggregation procedure of the conventional values obtained, in a synthetic value able to let one compare them.
In order to reflect the different sides of the institutional integration the synthetic values could be obtained through the several "aggregations steps"
For instance, such an approach could, in a minimal way, to be presented as follows:

Table 1

Score	**Value**	**Observations**	**Score**	**Criteria proportion**
I. The existence and the formal institutional design				
1. **there are similar institution as nature, ruling and prudential supervising** (Yes -1 ;No-0)	1	Institution as "Securities and Exchange Commission"	0.3	
2. **There is a distinct supervising authority for the financial market** (in the both cases-2; authority only for supervising the financial sector/specialised authority for the financial market- 1; single authority in the both cases- 2	1/2	Specific differences for the financial markets from EU	0.5	
3. **The central bank (the monetary authority) is implicated in the financial market supervising** (in both of the case- 2; just in one of the cases – 1; in none of the cases – 2)	2	The European Central Bank –The European System of Central Banks – The National bank of Romania does not have formal ruling and supervising attributions for the financial market	0.2	
Criteria score: 1*0.3+1/(2)*0.5+2*0.2=1.2/(1.7)				**0.2**
II. The attributions and the "formal" and "informal" competences				
1. The ruling authority has also the supervising attributions (In both of the cases -2; just in one of the cases – 1; in none	2	The ruling and supervising authorities are cumulated	0.4	

of the cases -2)				
2. The ruling authorities is responsible for the collecting, publishing, transparency and the conformity of the issuers' information (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	This is an attribute of the ruling authority	0.2	
3. The ruling authority has instruments and mechanisms to penalize the violation of the market's norm and rules (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	The capacity of imposing the punitive measures	0.2	
4. The hierarchic subordination of the ruling/supervising authority (the same -1; different -0)	0/1	Function of the specific differences	0.2	
Criteria score :2*0.4+2*0.2+2*0.2+0/(1)*0.2=1.6/(1.8)				**0.4**
III. "The facto" functioning				
1. A pronounced instability of the norms and rules set rules (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	In both of the cases (for the European Community : The Directive for financial services - 1992, modified and completed in 2005; the euro entry, the entry of some new accountancy standards 2005; the entry of MiFID – Market in Financial Instruments Directive-November 2007)	0.6	
2. The ruling and supervising authority has frequent intervention with punitive measures in the case of rules breaking (at comparative levels -1; distinct levels -0)	0	Both less than in USA	0.2	
3. The ruling and supervision authority if frequently under some political interferences (At comparative levels -1; distinct levels -0)	1	Similar levels " de jure" and "de facto"	0.2	
Criteria score :2*0.6+0*0.2+1*0.2=1.4				**0.4**
Total score: 1.2/(1.7)*0.2+1.691.8)*0.4+1.4*0.4 = 0.8544 (0.9024)				

This final score suggests a high level of institutional integration between the Romanian financial market and the EU financial markets. Of course, the validity of such a conclusion is strictly limited by the conventional nature of such an approach and by the small number of elements and criteria taken into consideration. Plus, this methodology present a relative sensitivity to the changing of criteria's proportions and scores, so a problem of robustness rises.

Also, testing this type of integration one should take into consideration the fact that the MiFID was adopted only in three countries: Great Britain, Ireland and Romania, in the initial schedule (31 January 2007). The MiFID has multiple objectives: an increasing competition between and inside the European financial markets; the abolition of the *concentration rule* (which limits the trades at a country stock exchange) and of the *"best execution principle"*. The directive propose a high level of harmonisation with precise clauses concerning the contracts execution, the transparency of trades, the client's eligibility, the conflict of interests and the internationalisation of the stocks, bonds and derivatives trades.

This will introduce a so called *unique passport* which authorises the financial institutions to operate in the European Union based on a single agreement granted by the responsible authorities from their own country. Or, this kind of modifications will profoundly change the actual institutional scenery and will impose a radical reconsideration of the institutional integration problem.

III. The structural integration

This segment of integration aims at the similarities between the mechanism and segments of the involved financial markets. The estimation of the structural integration's level could be done using a similar methodology with the former one, used for institutional integration, taking into consideration:

- the financial markets compartments
- the financial assets taxonomy
- the trading mechanisms

In this way:

Table 2

Score	**Value**	**Observations**	**Score**	**Criteria proportion**
I. Financial market compartments				
1. The stock exchanges markets are unified (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2(1)	Function of the specific differences	0.4	
2. There is a compartment specialised in secondary financial assets in the stock/commodities exchanges (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	Only in 2007 appeared the futures on BET and BET-FI contracts, at Bucharest Stock Exchange. The Sibiu Monetary –Financial and commodities exchange is specialised in term contacts	0.5	
3. There is a odd lot segment (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	Insufficient developed on Bucharest Stock Exchange	0.1	
Criteria score :2/(1)*0.4+2*0.5+2*0.1=1.9/(1.5)				**0.5**
II. Financial assets taxonomy				
1 The all types of assets are traded (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	1	Practically the tertiary financial assets are missing from the Romanian financial markets	0.4	
2. Comparable liquidity (Yes-1; No-0)	0	Significantly inferior liquidity for the Romanian financial market	0.4	
3. Similar technical characteristics (Yes-1; No-0)	0	Sensible differences	0.2	
Criteria score :1*0.4+0*0.4+0*0.2=0.4				**0.3**
III. Trading mechanisms				
1. The same types of trades (Yes-1; No-0)	0	On Bucharest Stock Exchange the short trades are not possible	0.5	
2. Orders as :stop:, "at the limit", etc could be executed (In both of the cases -2; just in one of the cases – 1; in none of the cases -2)	2	Some differences in the way they are formulated	0.4	
3. Similar characteristics with the margin trading	0	Significant different levels	0.1	
Criteria score :0*0.5+2*0.4+0*0.1=0.8				**0.2**
Final score: 1.9/(1.5)*0.5+0.4*0.3+0.8*0.2=1.23/(1.03)				

One could notice that this high integration level is a cause of the compartments configuration because at the financial asset taxonomy and at the trading mechanisms levels there are still important divergences.

III. The functional integration

The functional integration deals with the similar dynamics of the financial markets, caused by the movements in the capital flows which appear due to portfolio substitution processes. The possibility the national investors have to include in their portfolios foreign assets determines their influences on the specific financial markets sectors.

A methodological framework one could use to test the functional sense of the Romanian financial market integration into the EU's financial markets is represented by testing the co-integration level between them and the changes in its level.

Econometrically speaking, the *co-integration represents a feature of time series. If these are non-stationary, but one could establish between them a stationary linear combination that they could be considered co-integrated.* In general, the standard approach sees the co-integration as applicable to the time series which have "unit roots". This kind of series is non-stationary at its level but stationary at its first level differences.

The methodology of co-integration testing was developed starting from the seminal article of GRANGER and Eagle [1987]. Nowadays the main methods are grouped as follows:

- the two steps EAGLE-GRANGER procedure
- the JOHANSEN procedures

Both have the problem of maintaining the temporary stability "on lung run" because under the impact of various "endogen" and "exogenous" factors could intervene a lot of changes[1].

The proposed analysis uses BET index as representative for Bucharest Exchange Market and STOXX50 index for the European financial markets[2] .The analysis period includes on daily basis, the "closing level" of the both indexes between 22.09.1997 and 10.10.2007. The source is REUTERS (2007) (data base 3000XTRA).

In order to avoid the problems caused by the changing of the "movement law"(which determines both indexes' trend evolution, especially in the BET's case) the logarithmic data were used.

The first aspect analysed, using the presented definition, is the stationarity

Table 3

Stationarity tests for the selected indexes (all analyzed period)

A) BET

a) Augmented Dickey-Fuller (ADF)

Null hypothesis: the series has a unit root

Lag length : 1 (Automatic selection based on **Hannan-Quinn**)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.820244	**0.3708**
Test critical values	-3.436857	
	-2.864302	
	-2.568293	

p *MacKinnon values (1996)

[1] Alternative measures are proposed by GREGORY and HANSEN [1996] or HATEMI [2007]

[2] The absence of the complete integration of the European Union financial markets could raise some objections against the validity of this choice. We mention that , in our opinion, the way the index is build and the financial assets included are a good argument fro its use as a *approximately satisfying* variable.

b) Phillips-Perron (PP)

Null hypothesis: the series has a unit root

Lag length: 1 (The spectral estimation method : **Spectral GLS-detrended AR**, lag selection based on **Hannan-Quinn**)

	t-Statistic	Prob.*
Phillips-Perron test statistic	-1.846218	**0.3581**
Test critical values:	-3.436857	
	-2.864302	
	-2.568293	

p *MacKinnon values (1996) .

c) **Kwiatkowski-Phillips-Schmidt-Shin(KPSS)**

Null hypothesis: the series is stationary

Exogenous variable: constant and linear trend

	LMStatistic
Kwiatkowski-Phillips-Schmidt-Shin test statistics	**53161.81**
Asymptotic critical values *:	0.739000
	0.463000
	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992)

B) STOXX50

a) Augmented Dickey-Fuller (ADF)

Null hypothesis: the series has aunit root

Lag length: 1 (Automatic selection based on **Hannan-Quinn**)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistics	-0.459391	**0.8962**
Critical values:	-3.436857	
	-2.864302	
	-2.568293	

p *MacKinnon values (1996) .

b) Phillips-Perron (PP)

Null hypothesis: the series has aunit root

Lag length: 1 (The spectral estimation method : **Spectral GLS-detrended AR**, lag selection based on **Hannan-Quinn**)

	t-Statistic	Prob.*
Phillips-Perron test statistic	-0.536744	**0.8813**
Critical values:	-3.436857	
	-2.864302	
	-2.568293	

p *MacKinnon values (1996) ..

c) **Kwiatkowski-Phillips-Schmidt-Shin(KPSS)**

Null hypothesis: the series is stationary

Exogenous variable: constant and linear trend

	LMStatistic
Kwiatkowski-Phillips-Schmidt-Shin test statistics	**33492.83**
Asymptotic critical values *:	0.739000
	0.463000
	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992)

These results (despite the existing differences between the ADF and PP tests, on the one side, and KPSS , on the other side) shows a "non-stationary" evolution between the two indexes (more clear for STOXX50).In conclusion one could formulate the problem of its co-integration.

A first step in this problem could be done by constructing of a "combined movement indicator" [CMI] able to estimate the proportion in which this kind of movement (ascendant or descendent) is found in the total observation set:

1. Constructing a counting scalar (S) following the rule:

$$S_t = \begin{cases} 1 \ for \ BET_t > BET_{t-1} \quad and \quad STOXX50_t > STOXX50_{t-1} \\ \quad or \quad BET_t < BET_{t-1} \quad and \quad STOXX50_t < STOXX50_{t-1} \\ 0 \ else \end{cases} \qquad (1)$$

2. Determining the CMI

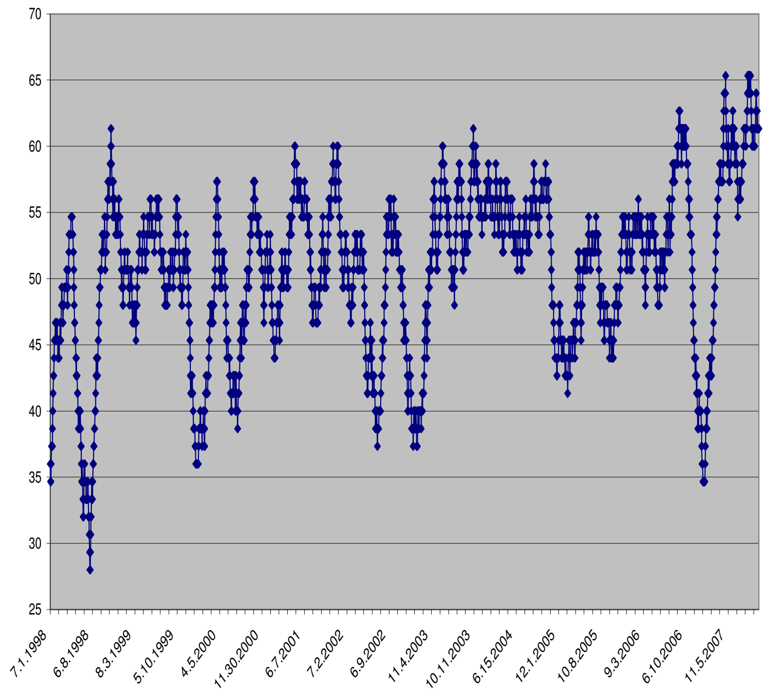
$$CMI_t = \frac{\sum_{i=t-k}^{t} S_i}{k} * 100 \qquad (2)$$

With an arbitral window, k, "long enough"

If we set k=75 (the medium length of a "trading trimester") we could obtain the results synthesised in the next graph. If we consider a reasonable "reference range" of $[65\%...70\%]$ one could notice that the indicator takes values in this range only starting with 2004-2005. During other ranges the indicator is under the minimum limit.

Graph 1

Combined movement indicator



Certainly one could notice that the use of this indicator is not equivalent with a veritable co-integration test. Despite this argument it could be very useful for a preliminary conclusion which shows significant differences in the movements of the indices, during the analyzed period.

A more substantial step in the empirical analysis of the co-integration could be done by using a JOHANSEN test for the analyzed period, with leads us to the following results

Table 4

JOHANSEN co-integration test for STOXX50 / BET (deterministic quadratic trend in data –constant and co-integration relation trend-linear trend in VAR)

Trace Test

Number of co-integration relations	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Probability****
None *	0.006565	18.73550	18.39771	0.0449
Maximum 1	0.000680	1.754291	3.841466	0.1853

Trace test points out a co-integration relation starting for a probability point of 0.05

* the hypothesis is rejected for a probability point of 0.05

** p MacKinnon-Haug-Michelis values (1999)

Maximum Eigenvalue test

Number of co-integration relations	**Eigenvalue**	Max-Eigen **Statistic**	0.05 **Critical Value**	**Probability ****
None *	0.006565	16.98121	17.14769	0.0528
Maximum 1	0.000680	1.754291	3.841466	0.1853

Max-Eigen test points out a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

This test suggests a co-integration relation between BET and the representative EU index.. Such a conclusion could be detailed taking into consideration all the possibilities of some “structural changes” appeared in the two indexes dynamics.
For example, the probability of some “breaking structure points” in its dynamics, such as the beginning of 2000 and of 2004 could be presented as follows:

Table 5

For BET:

Chow Breakpoint Test:

F-statistic	0.320146	**Probability**	0.726072
The truth-like function (log):	0.641129	**Probability**	0.725739

For STOXX50:

Chow Breakpoint Test:

F-statistic	3.770578	**Probability**	0.023166
The truth-like function (log):	7.539084	**Probability**	0.023063

One could notice that the *Chow Breakpoint test* points out the two period as structure changing periods for BET without pointing out the same thing for STOXX50. In consequence one should re-evaluate the co-integration relation, separating the period in three sub-periods: 1997-1999, 2000-2003 and 2004-2007.

Table 6

JOHANSEN co-integration test for STOXX50 / BET (deterministic quadratic trend in data -constant and co-integration relation trend-linear trend in VAR)
(1997-1999)

Trace Test

Number of co-integration relations	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Probability****

None *	0.011134	9.224904	18.39771	0.5572
Maximum 1	0.004589	2.685890	3.841466	0.1012

Trace test points out the absence of a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

Maximum Eigenvalue Test

Number of co-integration relations	**Eigenvalue**	Max-Eigen **Statistic**	0.05 **Critical Value**	**Probability****
None *	0.011134	6.539014	17.14769	0.7623
Maximum 1	0.004589	2.685890	3.841466	0.1012

Maximum Eigenvalue Test points out the absence of a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

JOHANSEN co-integration test for STOXX50 / BET (deterministic quadratic trend in data -constant and co-integration relation trend-linear trend in VAR) (2000-2003)

Trace Test

Number of co-integration relations	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Probability****
None *	0.005316	8.802110	18.39771	0.6003
Maximum 1	0.003278	3.355167	3.841466	0.0670

Trace test points out the absence of a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

Maximum Eigenvalue Test

Number of co-integration relations	**Eigenvalue**	Max-Eigen **Statistic**	0.05 **Critical Value**	**Probability****
None *	0.005316	5.446943	17.14769	0.8669
Maximum 1	0.003278	3.355167	3.841466	0.0670

Maximum Eigenvalue Test points out the absence of a co-integration relation starting for a probability point of 0.05

* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

JOHANSEN co-integration test for STOXX50 / BET (without deterministic trend in data-without constant and without trend in co-integration relation-without trend in VAR) (2004-2007)

Trace Test

Number of co-integration relations	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability**
None *	0.013398	16.76502	12.32090	0.0085
Maximum 1	0.003752	3.653693	4.129906	0.0664

Trace test points out a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

Maximum EigenvalueTest

Number of co-integration relations	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability**
None *	0.013398	13.11132	11.22480	0.0230
Maximum 1	0.003752	3.653693	4.129906	0.0664

Max-Eigen test points out a co-integration relation starting for a probability point of 0.05
* the hypothesis is rejected for a probability point of 0.05
** p MacKinnon-Haug-Michelis values (1999)

If we set k=5 the period for determine “asymmetry” and “arching” characteristics we could obtain the result shown in the next graph

Graph 2

The evolution for the distribution indicator (medium values calculated on a 75 days basis- the average dimension of a 'trading trimester')

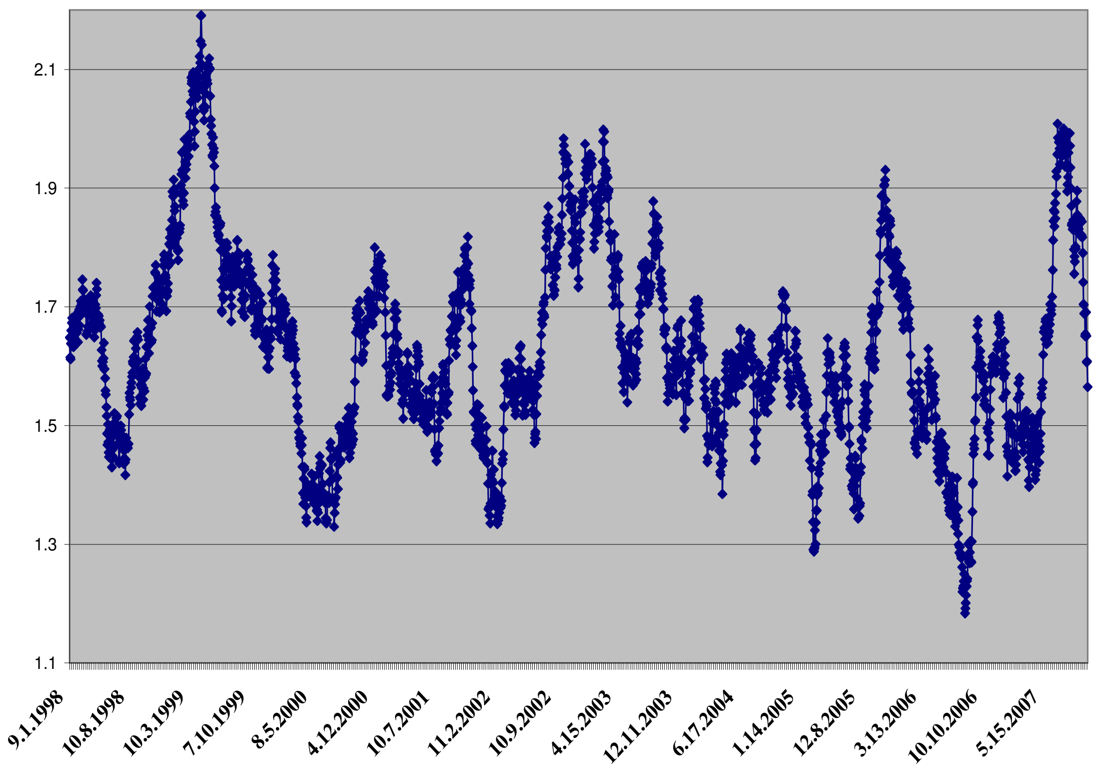


Table 7

The stationarity tests for spread (all analysed period)

a) Augmented Dickey-Fuller (ADF)

Null hypothesis: the series has a unit root

Lag length : 1 (Automatic selection based on **Hannan-Quinn)**

		t-Statistic	Prob.*
ADF test statistics		-3.276050	**0.0705**
Critical values:	1%	-3.961596	
	5%	-3.411547	
	10%	-3.127638	

p *MacKinnon values (1996) .

b) Phillips-Perron (PP)

Null hypothesis: the series has a unit root

Lag lenght: 1 (The spectral estimation method : **Spectral GLS de trended AR**, lag selection based on **Hannan-Quinn**)

	t-Statistic	Prob.*
PP test statistic		**0.0663**
Critical values:	-3.961596	
	-3.411547	
	-3.127638	

p *MacKinnon values (1996) .

d) Kwiatkowski-Phillips-Schmidt-Shin(KPSS)

Null hypothesis: the series is stationary

Exogenous variable: constant and linear trend

	LMStatistic
KPSS test statistic	**11554.27**
Asymptotic critic values *:	0.216000
	0.146000
	0.119000

*Kwiatkowski-Phillips-Schmidt-Shin (1992,)

The ADF and **PP show a small probability of unit root and** KPSS test pleads for stationarity.

If we analyse the sub-period 2004-2007, the test results become contradictory.

Table 8

The stationarity tests for spread
(2004-2007)

a)Augmented Dickey-Fuller (ADF)

Null hypothesis: the series has a unit root

Lag length : 1 (Automatic selection based on **Hannan-Quinn)**

		t-Statistic	Prob.*
ADF test statistic		-2.484932	**0.1195**
Critical values:	1%	-3.436857	
	5%	-2.864302	
	10%	-2.568293	

p *MacKinnon values (1996) .

b) Phillips-Perron (PP)
Null hypothesis: the series has a unit root
Lag lenght: 1 (The spectral estimation method : **Spectral GLS de trended AR**, lag selection based on **Hannan-Quinn**

	t-Statistic	Prob.*
PP test statistics	-2.481466	**0.1203**
Critical values:	-3.436857	
	-2.864302	
	-2.568293	

p *MacKinnon values (1996) .

c) **Kwiatkowski-Phillips-Schmidt-Shin(KPSS)**
Null hypothesis: the series is stationary
Exogenous variable: constant and linear trend

	LMStatistic
Statistica KPSS	**21455.77**
Critical asymptotic values*:	0.739000
	0.463000
	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992)

As one can see, if KPSS maintains the stationarity idea, the ADF si PP show (as we can see simple visualising the spread) that this tends to become “non-stationary”
En ensemble, one could be consider the image as contradictory. In our opinion it could be summarised by the *weak integration thesis* of the Romanian financial market with the financial market from European Union (in the functional way of course).
This image could be completed by the construction of a “impulse function” simulation able to connect the BET dynamics with the movements of the European index.
The framework for this simulation is a VEC model vector Correction Model) with the following specifications:

$$Y_t = \left[BET_t \quad STOXX50_t\right] \qquad (3)$$

The implicit hypothesis is: the European index presents a “weaker endogenity” comparing with BET due to the reduced capacity of the Romanian financial market in influencing the European ones.
The co-integration equation includes a linear trend and a constant.
The VAR’s basic stability conditions are satisfied for the entire analysis period (a considered lag):

Table 9

The roots of the characteristic polynomial (for the entire analysed period)

Root	Modulus
1.000000	1.000000
0.997136	0.997136
0.091881	0.091881
0.012567	0.012567

The VEC specification imposes a unit root

The empirical parameters associated with the co-integration relation and with the correction equation are as follows:

Table 10

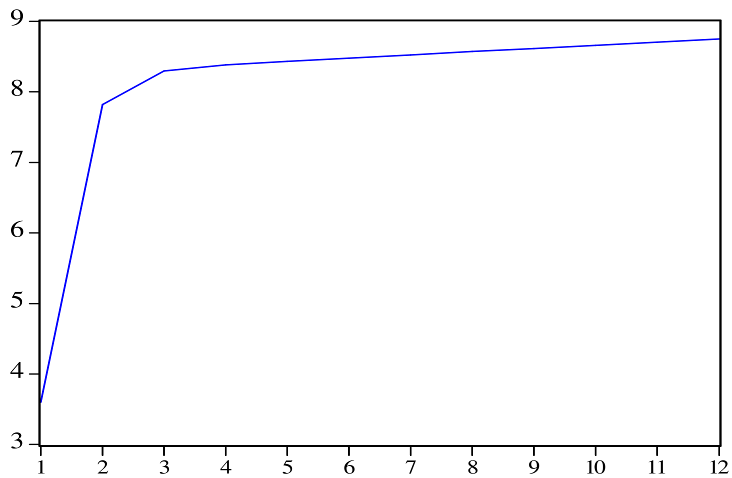
Standard erors in ( ) and *t* statistic in [ ]

Co-integration equations	The co-integration equation 1	
BET(-1)	1.000000	
STOXX50(-1)	-1.354227 (0.69094) [-1.95997]	
@TREND(1)	-3.607412	
C	6514.239	
The correction equation:	**D(BET)**	**D(STOXX50)**
	-0.000837 (0.00077) [-1.08979]	0.001511 (0.00062) [2.41697]

On this basis one could simulate the "impulse function" able to lead the cumulated BET's evolution with a unit shock in STOXX50 index (the generalised decomposition method)

Graph 3

BET response at a shock in STOXX50 (0 standard deviation-the generalised method)(the entire analysed period)



As a result, one could notice that an impulse located on the European Union financial market will induce some cumulated effects on the BET's evolution, on a trimester period, effects which will be eventually absorbed.

Also, this model allows us to estimate the impact caused by the STOXX50 perturbation over the Romanian index volatility.

Table 11

The BET's variance decomposing (the entire analysed period)

Period	Standard error	BET	STOXX50
1	59.74399	100.0000	0.000000
2	89.28177	99.81557	0.184430
3	111.5867	99.73490	0.265097
4	130.1283	99.69257	0.307433
5	146.3197	99.66572	0.334279
6	160.8701	99.64639	0.353609
7	174.1912	99.63124	0.368760
8	186.5465	99.61864	0.381357
9	198.1169	99.60772	0.392285
10	209.0328	99.59793	0.402066
11	219.3920	99.58897	0.411028
12	229.2700	99.58061	0.419388

Cholesky ordering :BET STOXX50

These results show that the BET's volatility adjustments start to manifest from the second day after the European index's shock and reach a maximal level after 12 days (approximately two trading weeks).

Re- estimation of this model for 2004-2007 leads to the following results:

Table 12

The roots of the characteristic polynomial (2004-2007)

Root	Modulus
1.000000	1.000000
0.976867	0.976867
0.052241	0.052241
-0.020603	0.020603

The VEC specification imposes a unit root

The empirical parameters associated with the co-integration relation and with the correction equation (2004-2007)

Standard erors in ( ) and *t* statistic in [ ]

Co-integration equations	The co-integration equation 1	
BET(-1)	1.000000	
STOXX50(-1)	11.29837 (3.48373) [3.24318]	
@TREND(1)	-30.26989	
C	17954.64	
The correction equation:	**D(BET)**	**D(STOXX50)**
	-0.001015 (0.00170) [-0.59683]	-0.001977 (0.00056) [-3.55925]

Graph 4

BET response at a shock in STOXX50 (0 standard deviation - the generalised method) (2004-2007)

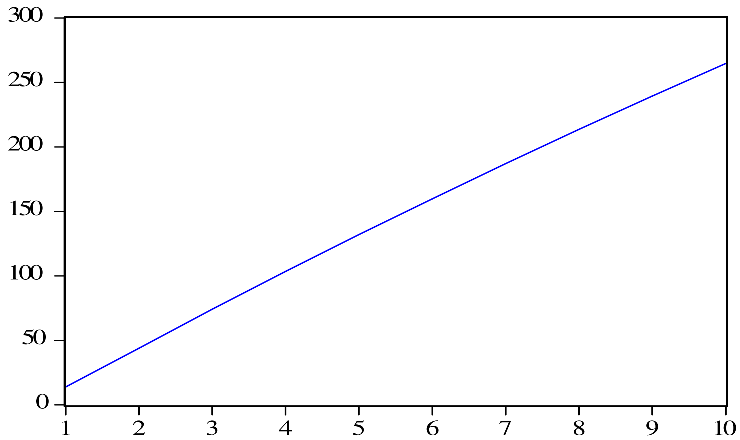


Table 12

The BET's variance decomposing (2004-2007)

Period	Standard error	BET	STOXX50
1	94.71653	100.0000	0.000000
2	142.2512	98.88838	1.111620
3	177.5409	98.59385	1.406150
4	206.7098	98.49729	1.502710
5	232.0711	98.47367	1.526331
6	254.7696	98.48342	1.516579
7	275.4695	98.51036	1.489637
8	294.5970	98.54669	1.453309
9	312.4452	98.58820	1.411798
10	329.2261	98.63246	1.367545
11	345.0987	98.67795	1.322053
12	360.1865	98.72372	1.276283

Cholesky ordering BET STOXX50

One could notice that important changes in the reverberations mechanism of STOXX shocks over the BET's dynamic occur in the last part of the analysed period. Some of the most changes concern:

- the statistic relevancy of the co-integration equation parameters and the sign and relevancy of the parameters from the correction equation
- the lack of the shocks absorption which "quasi-linear" reverberates during the two weeks of simulation
- reducing the STOXX50's volatility contribution at BET's volatility and placing its maximal level at the end of a trading week.

Summarising, the last period analysis seems to suggest two main conclusions:

- the period of time needed for visible effects became shorter

- the effect manifestation gained amplitude as we can also see form the anterior results

Plus, the VEC methodology is based on the presumption of a deterministic relation between BET and STOXX50. This relation exceeds in some points the co-integration tests framework showing that from a functional point a view, and especially in 2004-2007 period, the European Union financial markets' evolutions become a determinant of the Romanian financial market's dynamic.

Of course this co-integration analysis extension does not solve the fond limits: if one identifies a common movement tendency of a two economic variables (tendency which has no constant characteristic at the entire analysis period) this is not equivalent with an empirical demonstration of the functional character of their connections. An association like this could result from the statistic particularities of the analysed data (their non-stationary character) and not from the existence of some profound mechanisms able to connect these variables.

Plus, this kind of analysis function as a "black box" because does not have the capacity to catch "the transmission channels" used to transmit the effects generated by the dynamic's adjustment in EU's financial markets to the Romanian one. The nature of this effect cannot be seen also.

IV The behavioural integration

This particular type of integration concerns the similitude in the investing behaviour of different market operators. From the large amount of factors which could define this integration type, one could notice at least two major ones:

- the convergence/divergence in the attitude towards risk
- the anticipation forming mechanisms of the determinant market variables

In its most simple approach, one could define the risk **as the probability of obtaining a unfavourable result from an operation which modifies the economical subjects' assets structure and/or the incomes' level and composition.**

The risk concept in this definition:

- has a probabilistic feature
- has a "subjective" character linked to the way the economical subject form their anticipations concerning the potential results of their operations. These anticipation have a character partially "adaptable", because incorporate information from the past periods and partially "projective"
- has a dynamic content because its change could intervene only as a result of a current economical conjuncture configuration
- implies changes in economical subjects' assets structure and level . In this way their capacity to generate incomes in current and future period is affected. As one can see this definition include the concept of" income volatility" but is larger than it

A rigorous distinction between the "risk" and "incertitude" concept is strongly needed..

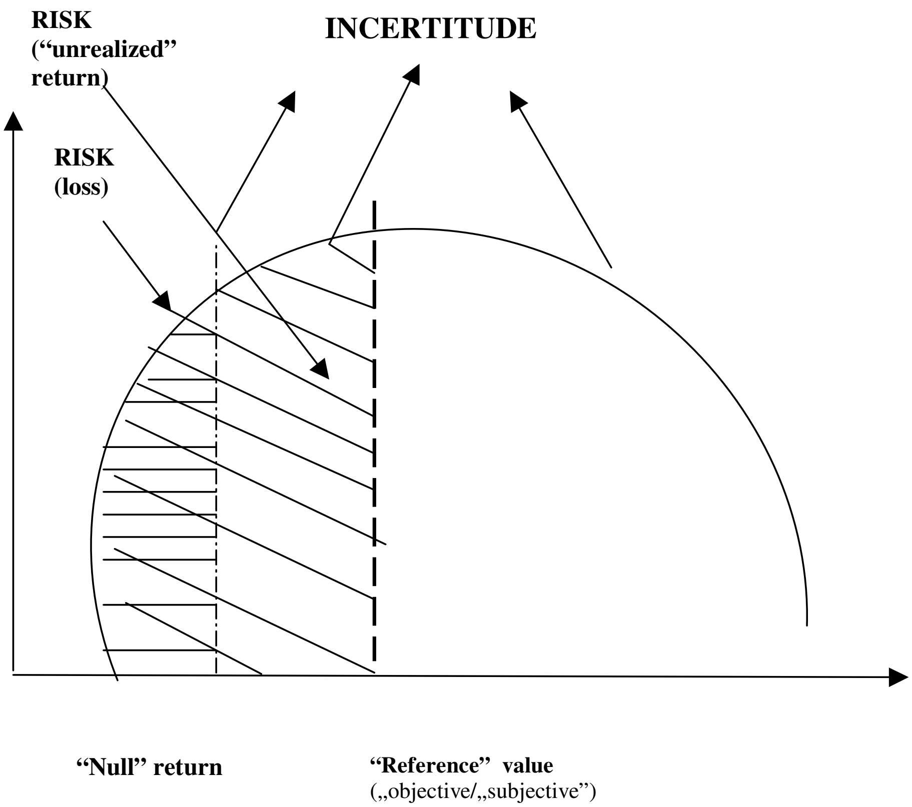
So, traditionally speaking it is considered that "an adequate risk measure should take into consideration the probability of a deviation from the expected return, but also the deviation's magnitude. The dispersion and the dispersion root – standard deviation- succeed to do this because they reflect the return rate deviation from their mean"(Stancu [1998]). One could notice that this kind of definition takes into consideration not only the negative deviations from the mean return but also the positive ones, in other words the probability of gaining more than expected. The "risk" concept cannot be associated with the "gain" concept because it is indissoluble connected with the idea of unfavourable evolution" (this is equivalent to the fact that the incertitude situation are not necessarily risk situations)

This approach needs some explanations:

1. “Risk” and “incertitude” are considered countable measures. In other words, for each of them one could attach a non-subjective” measures in order to quantify their amplitude and dynamic in a certain period of time. As a conclusion, the thesis which says that only the risk is a quantifiable variable (on probabilistic basis) is rejected.

Graph 5

Return distribution for a “risk” and “incertitude” financial placement



2. This position is more facile because we are speaking about a particular type of risk, the **risk of obtaining lower returns than “the reference value”.** But, we should not neglect that this risk is seen as a synthetic variable for different risk categories involved in the economical agents’ activity: the position we stand is that for each economical operation the finality is represented by the obtaining of a certain resources return. There is a certain “reference value” (subjective or objective) used to compare its *de facto* value.
3. This thesis could be presented in three forms:
a**) “strong” form**- the economical subjects consider exclusively the risk of an investment plan (only the values situated in the left side of the reference value).For this form one could distinguish between two other sub-forms:a.1.)the economical subjects consider only the “loss” situations (negative returns) or a.2.)the economical subjects consider both the “loss” situation and the “unrealised return” (positive returns but under the reference level)
b**)”semi-strong “form –** considers both “risk” and “incertitude”, but uses higher proportions for the risky situations. **(**the values situated at the right and at the left side of the references value are amalgamate with a higher proportion than in the first firm)

c)"**weak" form** –does not use a distinction between "risk" and "incertitude" (in the above definitions 'sense)

We consider that there is an empirical support for the semi-strong form of this approach, in this sense one could quote the *informational leverage effect:* the "bad news" about the potential return, the future sector or macroeconomic conjuncture will affect more the market prices than the "good news". In consequence, we will consider this version.

In this framework we are proposing the next methodology for risk valuation:

1. **Building a "risk values series"** $\boldsymbol{r}_t$, able to measure the effective return's position versus the reference value, in each observation:

$$r_t = \begin{cases} m_{1t} * (\eta_t - vr), & if \ \eta_t > 0 \, si \ \eta_t \le vr \\ m_{2t} * (\eta_t - vr), & if \ \eta_t \le 0 \\ m_{3t} * (\eta_t - vr), & if \ \eta_t > vr \end{cases} \tag{4}$$

$$with \ m_{2t} > m_{1t} > m_{3t}$$

2. **Building a risk "global" measure $\mathbf{R_t}$ for a k reference period** as the "Euclidian norm" of the "risk values" series for each observation:

$$R_t = \sqrt{(r_{t-k+1})^2 + (r_{t-k+2})^2 + (r_{t-k+3})^2 + ... + (r_t)^2} =$$
$$= \sqrt{\begin{matrix}[m_{it-k+1} * (\eta_{t-k+1} - vr)]^2 + [m_{it-k+2} * (\eta_{t-k+2} - vr)]^2 + ... \\ ... + [m_{it} * (\eta_t - vr)]^2\end{matrix}} \tag{5}$$

One could notice that the risk assessment is done during the process of constructing financial assets portfolios. From these considerations it cannot be seen as an "autonomous variable" and it should be treated based on the decisions used for portfolio construction. Or, a critical aspect of portfolio management is represented by the "objective function", derived from the way economical subjects treat the couple"return-risk". Speaking about the "risk profile" in a conventional way, one could distinguish between:

- *risk lover investors* who tries to maximize their return, no matter of the risk involved
- *risk hater investors* who are assuming a minimum level of risk for a smaller return
- *neutral risk investors* who are balancing the risk-return ration through a active management policy

In our opinion this approach has a very arbitrary character because practically speaking each investor considers risk and return, in individual proportions. In these conditions a very fertile framework could be describe by the **multi-periodical portfolio structure optimization,** formally described as follows:

$$\begin{cases} x_{it} \geq 0, \quad \sum_{i=1}^{A} x_{it} = 1, i = 1 \ldots A \text{ - logic restriction} \\ \sum_{i=1}^{A} \sum_{j=1}^{t} \left(c_{ij} + c^{*}{}_{it+k}\right) * x_{it} = \sum_{l=1}^{M} \sum_{j=1}^{t} \left(V_{ij} + V^{*}{}_{it+k}\right) \text{ - budgetary restriction} \\ \dfrac{\sum_{i=1}^{A} \sum_{j=1}^{t} \left(\eta_{ij} + \eta^{*}{}_{it+k}\right) * x_{it}}{\sum_{i=1}^{A} \sum_{j=1}^{t} \left(R_{ij} + R^{*}{}_{it+k}\right) * x_{it}} \rightarrow MAXIMUM \quad \text{- the objective function} \end{cases} \quad (6)$$

where :x- proportion between the financial asset *i* and the "selection universe" *A*, *t* is the current period, *c* are the buying and holding costs, V are different labour and capital incomes available for investments (including the incomes generated by the previous portfolio structures) , η is the return generated by different fix and variable income investments including their price variation too, *R* is the risk involved and * shows the anticipated level of the variables in the current period of for the next k periods.
Using the anticipation the investor made for the principal variables of their portfolio as a primary decision rule reflects their wish to preserve the optimal character of the chosen structure, for the current period and for a "at least a certain time lag" , in order to reduce the trading costs generated by frequent changes in the structure.
One could directly notice, at the global level of the financial market, the empirical "solutions" for the portfolio construction ratios (x^s) and for the current level of the other variables, if the total volume trade, the prices and market capitalisation are considered. In the next step the ex post deduction for the specific levels of the m^s parameter (which characterises the attitude towards risk) is possible, based on the following simplifications:
-the cost level is estimated only starting from the prices and ignoring any other components (trading fees, slippage, etc);
-the return is estimated using only the financial assets price variation and ignoring the fix or variable incomes as the interest or the dividends;
-the optimisation period is considered "unit period "ignoring the anticipations concerning the variables dynamic in the next periods
Based on the m^s estimated levels one could determine a *behavioural integration indicator – the "attitude toward risk"* component*, BIIAR,* for two markets A and B:

$$BIIAR_t = \frac{1}{\sum_{i=1}^{3} \left(m^s{}_t\right)_A - \left(m^s{}_t\right)_B} \quad (7)$$

Less pronounces the m^s are, smaller is the indicator value.
The direct application of this methodology is very difficult, so some simplifications which will affect the outcome are needed. But, this approach could be considered a shortcut for solving the critical problem of the <u>perceived risk level</u> (not the "objective" one as volatility, semi-variance, etc), which it is not a directly observable variable.

The economical subject anticipations about the prices evolutions, the expenses and the incomes generated by a financial investment have a mixed nature because their empiric forming mechanisms incorporates both "historical" information and available information, present in a limited rationality paradigm. Formally, these mechanisms could be described as follows:

$$x^a{}_t = \sum_{i=t-k}^{t-1} \alpha_i * (I_i) + \beta * (I_t) \quad (8)$$

where x^a is the anticipated variable level in t current period for the next periods and α / β reflect the relative importance of the information (i0 from the previous periods/current period This relation allows us to determine a *behavioural integration indicator- the "forming anticipations" component*, BIIFA, as follows

$$BIIFA_t = \frac{1}{\sum_{i=t-z}^{t-1} (\alpha_{i_A} - \alpha_{i_B})} \quad (9)$$

One could realize a way to make this indicator operational through the postulate that the effective observed level of the relevant variables includes the anticipation formulated in the previous periods. Choosing BET and STOXX as representative variable and setting : $\beta * (I_t) = \varepsilon_t$, $\varepsilon_t = \varepsilon_{t-1} + \delta$, a random walk variable with a constant and k=1,z=5 , using a Kalman filter one could estimate :

$$Index_t = \alpha_t * Index_{t-1} + \varepsilon_t \quad (10)$$

And the level of the BIIFA, on this basis

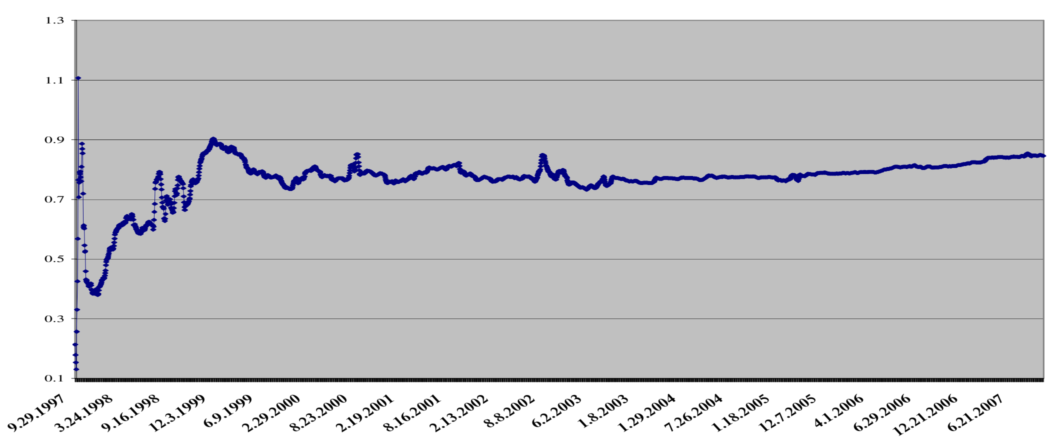
Of course this kind of procedure could be affected by the lack of a method able to estimate which part from the current evolution is a direct result of the anticipations. But we consider that this approach could be admitted if we postulate a "constant" impact of the anticipations over the implied variables 'observed level

The obtained results are presented in the next graph. One could notice that in the period 2004-2005 this indicator presents also a "structural change" point and the mechanisms of anticipations forming starts to slowly reduce.

We could say that the behavioural integration level is changing during the analyses period without outrunning the "critical mass"

Graph 6

BIIFA evolution



Summarising, one could say that a visible progress in the all components of the integration process is seen especially in the 20004-2005 period which was the staring point for national financial market's maturation. Despite of this fact there are still a lot of important divergences which have to be corrected through some stimulatory supplementary mechanisms.

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