THE ANALISIS OF THE BET-FI INDEX'S STATIC PROPERTIES

Dima, Bogdan; Barna, Flavia; Pirtea, Marilen and Nachescu, Miruna
West University of Timisoara

2007

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DIMA BOGDAN, Assistant Professor, PhD, West University of Timisoara
bogdan.dima@fse.uvt.ro
BARNA FLAVIA, Lecturer, PhD, West University of Timisoara
flavia.barna@fse.uvt.ro
PIRTEA MARILEN, Assistant Professor, PhD, West University of Timisoara
marilen.pirtea@fse.uvt.ro
NĂCHESCU MIRUNA LUCIA, Teaching Assistant, PhD candidate, West University of Timisoara
nachescu.miruna@fse.uvt.ro

Abstract:

The financial sector of the Bucharest Stock Exchange, reflected in the BET-FI index, has gone through important changes during the last few years, becoming very attractive for the individual and institutional investors. This paper's aim is to offer an analysis of the static proprieties of the BET-FI index and of the way the financial sector positioned in respect to the other sectors, as well as to the whole financial Romanian market. This will be done by a co-integration between the BET-FI index and the others indexes of the market (namely BET and BET-C).

JEL CLASSIFICATION : G14, G23

KEY WORDS: BET-FI index, distribution, informational efficiency

The properties of the business environment impose slight differences at the moment of setting an investment strategy. Identifying the investment opportunities, choosing an economic sector, evaluating the degree of institutional and structural and functional maturity of a market are aspects that must be taken into account by any investor.

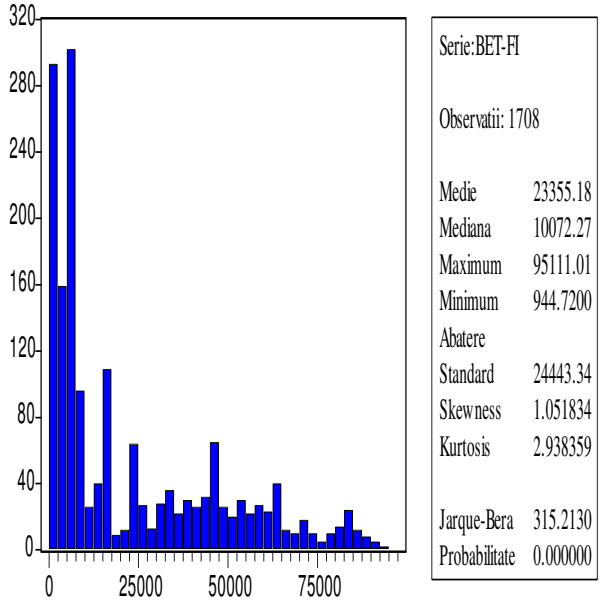
The financial sector of the Bucharest Stock Exchange (BVB), reflected in the BET-FI index, is dynamic taking into account the registered evolutions and is attractive both for the individual and the institutional investors.

This first sector index of the BVB offers to the investors a synthetic image about the evolution of the quotations of the shares issued by the financial investment companies that are transferred on the regulated market administrated by the BVB. Taking into account how the BET-FI index is calculated, it is an index of prices ponderated with the capitalising of the "free float" of the companies that are part of it.

This paper's aim is to offer an analysis of the static proprieties of the BET-FI index and of the way the financial sector positioned in respect to the other sectors, as well as to the whole financial Romanian market. This will be done by a co-integration between the BET-FI index and the others indexes of the market (namely BET and BET-C).

A first step to be taken in the analytic part that is dealing with the fundamental characteristics of the BET-FI index is represented by the identifying of the main traces of its distribution:

Graph 1: The histogram of the BET-FI index values



Source of data: REUTERS (2007)

By analyzing the distribution of the registered values of the BET-FI index during the analyzed period (31/10/2000-12/10/2007), we can identify the following aspects:

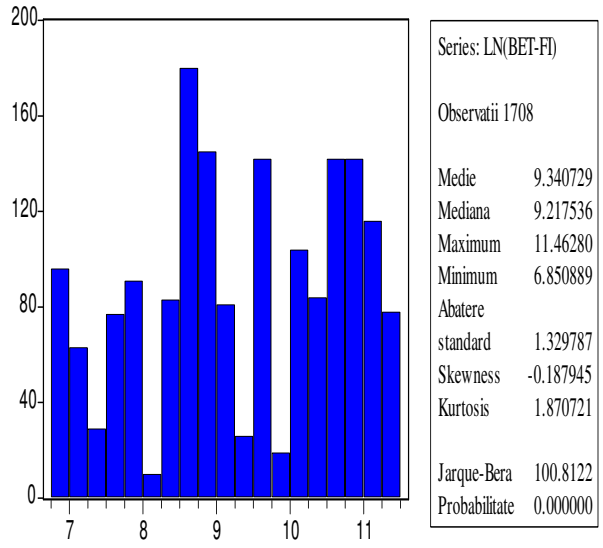
- The parameter of asymmetry of distribution *Skewness* indicates that this has a long right tail (prolonged to the right);
- The parameter of asymmetry of distribution *Kurtosis* indicates that the distribution of the index' values is peaked (prolonged to the top) (*leptokurtic distribution*);
- The *Jarque-Bera* test's statistic allows us to eliminate the normality of distribution hypothesis.

The same results are gathered for the normalised values' histogram (Graph 2). We can observe that in this case, the peaked (prolonging to the top) is less important in time while the "asymmetry to the right" is closer to the normal values. According to this analytic study we could say that the normal distribution model (log) reflects up to a certain point the characteristics of a temporal series without giving a completely satisfying description. This fact is emphasized by using other tests that can estimate the probability of registering a normal distribution of the logarithm values.

Method	**Value**	**Probability**
Lilliefors (D)	0.095937	0.0000
Cramer-von Mises (W2)	3.901968	0.0000
Watson (U2)	3.841386	0.0000
Anderson-Darling (A2)	26.71554	0.0000

Parameter	**Value**	**z-Statistic**	**Probability**
MU	9.340729	290.2970	0.0000
SIGMA	1.329787	58.42944	0.0000
The credibility function (log)	-2909.859	9.340729	
Coefficients number	2	1.329787	

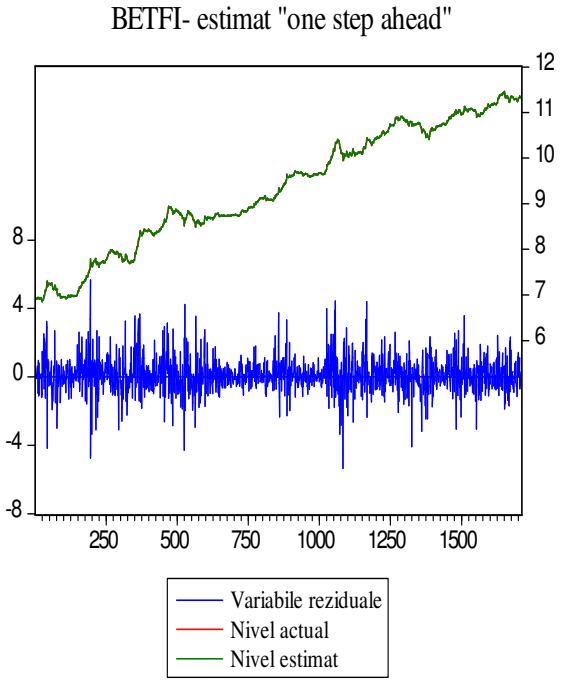
Graph 2: BET-FI index values' histogram (natural logarithm)



Source of data: REUTERS (2007)

Also, it is interesting to underline the fact that the *random walk test* for these logarithm values tends to suggest that the hypothesis of "informational efficiency" in its weak form is confirmed.

	Final level	**Root MSE**	**z-Statistic**	**Probability**
ε	11.33175	0.023105	490.4528	0.0000
Credibility function (log)	4001.555	***Akaike* informational criteria**		-4.684491
		***Schwarz* informational criteria**		-4.681304
		***Hannan-Quinn* informational criteria**		-4.683311



This global analyse must be detailed in order to identify the eventual structural changes that took place in the analysed period of time. *The importance of such a detailed analyse consists in the fact that a measure of the institutional, structural and functional degree of maturity of a market consists in the distribution of the market indexes as much as possible according to the „normal" distribution model: if the resemblance in the distribution of the market indexes to the „normal" distribution is profound, then one could say that the analysed market reached a more profound maturity of its specific mechanisms.* A useful strategy in this direction is to follow the bellow steps:

1) Build an „asymmetry index" (IA_t) for example according to the following equation:

$$IA_t = \frac{1}{N} * \frac{(skew_t)^2 + (kurt_t - 3)^2}{9} \quad (1)$$

where „N" is the number of periods that are used to calculate the distribution parameters *Skewness* and *Kurtosis*;

2) Apply a test of „structural rupture" to this index in order to identify the sub-periods where the structural changes occur.

Using $N = 250$, a sub-period of one year of transactions and using the *Chow* test on 6 such sub-periods on the „asymmetry index" built on the closing values of the BET-FI, we get the following results:

Chow's Breakpoint Test

F-statistic	1.815199	**Probability**	0.092541
(Log) Credibility function	10.90179	**Probability**	0.091459

Both reported values allow us to eliminate the zero hypothesis of the absence of structural changes in the proposed index during the analyse horizon of time. Therefore, we can presume that the distribution of the BET-FI index changed, under the impact of a certain process of functional consolidation without over-passing a certain "critical point".

In order to identify the position of the financial sector in respect to other sectors and in respect to the whole market, it is useful to perform a co-integrated analysis between the BET-FI index and the other indexes of the market (BET and BET-C). The JOHANSEN co integration test's results for the analysed period are as follows:

1.The JOHANSEN co integration test for BET-FI / BET (deterministic quadratic trend in data- constant and in the co integration relations – linear trend in VAR)

Trace Test

Number of co integration relations	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Probability****
None *	0.013122	24.28621	18.39771	0.0067
1 at the most	0.001068	1.817309	3.841466	0.1776

The ***Trace*** Test indicates a co integration relation for a trash-hold of probability of 0.05

* indicates the rejection of the hypothesis for a trash-hold of 0.05

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

Maximum Eigenvalue Test

Number of co integration relations	**Eigenvalue**	Max-Eigen **Statistic**	0.05 **Critical Value**	**Probability****
None *	0.013122	22.46890	17.14769	0.0077
1 at the most	0.001068	1.817309	3.841466	0.1776

The Max-eigenvalue Test indicates a co integration relation for a trash-hold of probability of 0.05

* indicates the rejection of the hypothesis for a trash-hold of 0.05

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

2. The JOHANSEN co integration test for BET-FI / BETC (without a deterministic trend in the data – without constant and trend in the co integration relations – without trend in VAR)

Trace Test

Number of co integration relations	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability**
None *	0.127269	106.1659	12.32090	0.0001
1 at the most	0.002648	2.028101	4.129906	0.1820

The ***Trace*** Test indicates a co integration relation for a trash-hold of probability of 0.05

* indicates the rejection of the hypothesis for a trash-hold of 0.05

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

Maximum Eigenvalue Test

Number of co integration relations	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Probability**
None *	0.127269	104.1378	11.22480	0.0001
1 at the most	0.002648	2.028101	4.129906	0.1820

The Max-eigenvalue Test indicates a co integration relation for a trash-hold of probability of 0.05

* indicates the rejection of the hypothesis for a trash-hold of 0.05

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

The co integration analysis can be completed by taking into account the registered spread between the indexes. More exactly, the more this *spread* can be described more adequately as a *random walk,* the more we can presume that the co integration relation is more intense:

$$spread_t = \varepsilon_t$$

$$\varepsilon_t = \alpha + \varepsilon_{t-1} + \delta_t \qquad (2)$$

1. Spread BET/ BET-FI

Method: Maximum likelihood (Marquardt)

	Coefficient	Standard error	z-Statistic	Prob.
α	-43.00442	17.49834	-2.457629	0.0140
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
ε	-73919.91	718.8817	-102.8263	0.0000

2. Spread BETC/ BET-FI

Method: Maximum likelihood (Marquardt)

	Coefficient	Standard error	z-Statistic	Prob.
α	-43.00442	17.79165	2.417113	0.0156
	Final State	**Root MSE**	**z-Statistic**	**Prob.**
ε	-46918.95	22005.30	2.132166	0.0330

By analysing these results, we can conclude that the existence of a co integration relation is suggested for both pairs of indexes but the empirical form of this relation is different. More exactly, the connection between BET-FI and BET-C seams to be simpler in respect to the one that prevails in the relation with BET where the mediating factors complicate the correlations that exist between the indexes.

Another aspect that needs to be taken into account regards the evolutions that took place in the *intraday* volatility of the BET-FI index, evolutions that are susceptible to show the "short-term" changes that took place in the way the index' components were transitioned. A way of reflecting this volatility can be represented by the "designing" of a "volatility indicator":

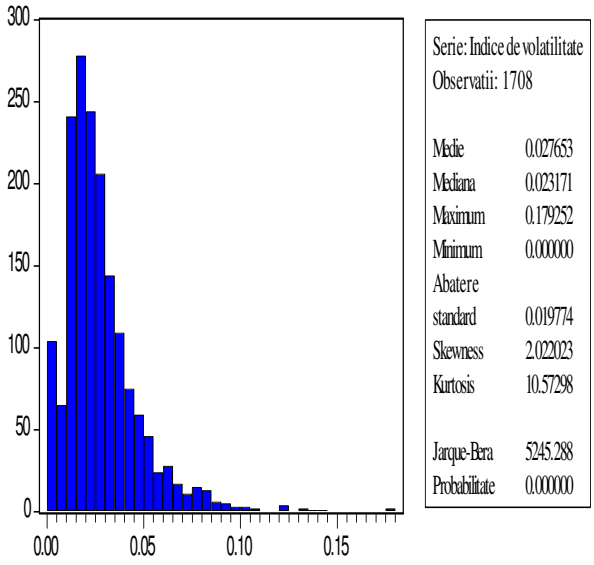
$$Vol_i = \sum_{i=i}^{K} \frac{H_i - L_i}{C_i} \qquad (3)$$

Where H, L represent the maximum (minimum) level of the index during the day and C represents the closing value of the index.

The reason for designing such an indicator is simple: the bigger the registered difference between the minimum value and the maximum value of the index during a day is, the more entitled we are to suppose that the price of the shares included in the index' structure have a bigger magnitude of the daily values. In order to see the "short term" dynamics, we do a summing up of the differences that have as reference a "short transitioning cycle".

So, by setting $K = 6$ we get the following properties of the volatility index for the analyzed period:

Graph 3: The histogram of the volatility index' values



We can observe that the distribution of the volatility index *intraday* presents characteristics that resemble with those of the index in terms of "prolonging".

The maximum values of this indicator are registered in September 2001, April and July 2004 and August 2007.

Final remarks

The analyse done in the present paper suggests the following aspects:

- The BET-FI index presents an asymmetrical distribution in terms of the main parameters that are characteristic to it. This asymmetry modifies during the considered analyse period under the impact of the evolutions that were registered in the mechanisms of the market segments of its components;
- The financial sector of the market reflected by the BET-FI index can be described „up to a point" as being „informational efficient" (in the *weak* way of the concept), but the assembly of the weak characteristics does not fully respect the demands raised by such a characterisation;
- The existing connections between the BET-FI index and the other indexes are relatively significant but present certain differences as a result of the sector asymmetry registered in the Bucharest Stock Exchange;
- The „short term" volatility of the BET-FI index registers some important mutations. During the last part of the analysed period (except August 2007) we can notice a tendency of "flatting".

Taking into account all of these results, we can conclude that the financial sector is a dynamic one and has registered important evolutions in the analysed period. Still, these evolutions cannot characterise a "maturating process" completely finalised.

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