Common Stock Index Analysis

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Abstract

The finance and economics literature on the non-linearity and chaos increases in quantity as well in quality in recent years. Studies try to find out the non-existence of the chaos in financial time series. The importance of comon stoks markets index, efficient market hypothesis, independent identically distributed. ROTX is a joint index of the Bucharest Stock Exchange and the Vienna Stock Exchange, which reflects in real time the price changes for the most representative companies traded on the Bucharest Stock Exchange. This research topic comes from the fact that chaos and efficient market hypothesis are mutually exclusive paradigms. This study is motivated from this fact. Nonlinearity and chaos theories were employed to examine the behavior of the Vienna stocks markets all share equity indices.

Key words: capital market, risk, bank regulation, regulatory acconting
J.E.L. classification: G10, G32, M41

1. Introduction

The ROTX index was launched in 2005 by the Bucharest Stock Exchange and the Vienna Stock Exchange. The price changes for the most representative companies traded on BVB are reflected in real time by the Bucharest Stock Exchange. To be included in the structure of the ROTX index, only shares issued by listed and continuously traded companies are eligible. ROTX was made after the same principles according to which CECE type indices were made. On January 1st 2002, the basic period values represented by the three currencies (RON, USD and EUR) were set at 1000 points. For entry in the ROTX index basket, the companies were selected according to the following criteria:

- market capitalization;
- liquidity;
- availability of market prices;
- sectoral representativeness;
- market participants interest.

Market capitalization and liquidity are the main criteria underlying the sorting of companies (Mink, M., 2009, No 217). Those companies with low liquidity, even if they have a large capitalization, can be eliminated from the structure of the index by the ROTX Committee. In general, only the shares traded on the most liquid market shares within the Bucharest Stock Exchange are suitable to be included in the composition of the index, being ensured, moreover, being ensured, moreover, the highest standards of dissemination of information to the market and of the analysis reports drafted by the Romanian or international brokers. The choice of shares is made on the basis of quantifiable criteria (capitalization and liquidity), but does not necessarily constitute a process of mechanical sorting of the respective companies. The inclusion or removing of companies in the index basket is founded on quantitative criteria, which is a analysis base for the Index Committee.

The ROTX index comprises a number of companies limited to the most liquid blue chip stocks that are suitable for trading derivative financial instruments. ROTX's main objective is to reflect the evolution of the share price issued by blue chip companies. As the liquidity of the traded shares increases and the Romanian capital market grows, the liquidity quality requirements will also

increase accordingly. Companies with lower market liquidity and not evolving over time will be replaced by more heavily traded shares. Regarding the determination of a predetermined number in the structure of the ROTX index, no conditions are imposed. Therefore, the number of companies is related to the future development of the Romanian capital market.

The share of individual shares in the composition of the ROTX index is determined by the market capitalization of each company, adjusted by weighting factors:

Market capitalization/ Company	=	number of shares issued	X	current market price	X	free float factor	X	representation factor

The number of shares used to determine the share of each part of the ROTX index is equal to the total number of shares listed on the stock exchange.

Free-float factor

The free-float of a company in the composition of the ROTX index is expressed as a percentage and represents the ratio between the number of shares issued and in free circulation for trading by the public and total shares issued (Forte, A., 2009, p 24).

The free-float exposed in absolute value of a company in the structure of the ROTX index is defined as the total number of shares stated by a company, from which the shares available to the company are excluded, shares of the state and other government subsidiaries, strategy investors, majority shareholders, as well as holdings of at least 5% of other types of investors, with the exception of insurance companies, pension funds, mutual funds and investment funds.

The share of each enterprise in the ROTX index is adjusted accordingly by the use of free-float factors, so that it is not possible for companies with large market capitalization but low free-float to exercise a very strong influence in the index, such as to reflect the actual investment opportunity in the shares issued by each undertaking included in the index basket.

Depending on the free float size established as defined above, the following four weighting factors are applied to each part of the ROTX index structure: 0,25; 0,50; 0,75 and 1,00 (www.kmarket.ro).

The choice of free-float factors to be used on the market capitalization of each enterprise in the index is reviewed, if necessary, quarterly by the ROTX Committee, taking into account the information provided by BVB on the composition of the shareholders. respective companies.

Calculation period and publication of the ROTX index

The Laspeyres chain index formula will be used to calculate the ROTX index. The common ROTX index is denominated in the three currencies, namely: the national currency (RON), the US dollars (USD), and the single European currency (EUR). The ROTX stock index is disseminated and calculated in real time during each trading day on the stock exchange. The opening value of the index is calculated every day from 9.00 CET (10.00 Romanian time) on the basis of the closing prices of the previous trading session according to the data communicated by Reuters, as well as the exchange rate of the national currency in EUR and USD according to information sent by Reuters to WBAG at 9.00 CET on the current day. During trading in the continuous market, the values of the ROTX index for each trading session on the Bucharest Stock Exchange are calculated in the national currency. Based on the latest available prices and the exchange rate of the national currency in EUR and US dollars, according to data communicated by Reuters to WBAG, the closing value of the index is calculated every day at 17 CET (18.00 Romanian time). Those share prices that are communicated after the closing of the trading session at BVB at 13.00 CET (14.30 Romanian time), will not be used in the calculation of the ROTX index.

Spot exchange rate used

For the calculation of the index during the trading session of the values of ROTX expressed in EUR and US dollars, the current spot exchange rates for the national currency in US dollars and EUR will be taken over from Reuters, manifested as the average of free selling and buying quotations to be used simultaneously. ROL is the Reuters code for the exchange rate for US dollars, respectively EURROL for Euro.

According to a pre-established discount program, the exchange rate will be updated every two minutes, the respective exchange rates being valid for a period of two minutes until the next update. If there is no change in the spot exchange rates transmitted by WBAG, the most recent exchange rates reported by WBAG will be used to calculate the ROTX index.

2. Literature review

There are many studies supporting the comon stoks in the literature (Kendall, 1953; Dryden, 1970; Cunningham, 1973; Brock, 1987). These studies find no evidence of chaos in macroeconomic time series in the US and Canadian markets. The studies on the United Kingdom stock market also detect the weak form market efficiency. These authors base their studies on the assumption that UK stock market price changes are i.i.d. Fama (1965) admit that linear modeling techniques have limitations as they are not sophisticated enough to capture complicated 'patterns' which chartists claim to see in stock prices. Moreover, most of the studies on the behavior of ISE market prices supported the weak form market efficiency against the existence of chaos (Kenkül, 2006; Adali, 2006).

Barnett et al. (1996) report the successful detection of chaos in the US division monetary aggregates. This conclusion is further confirmed by several authors (e.g. Hinich and Rothman 1998; Barnett and William, 2004). Furthermore, foreign exchange markets are an essential domain in which chaos has been detected (Mantegna and Stanley, 2000). Many researchers (Campbell et al., 1997; Lee et al., 1993; Bonilla et al., 2006) argue that financial market series exhibit non-linearity. The terms of many financial contracts such as options and other derivative securities are also nonlinear (Mantegna and Stanley, 2000). Therefore, a natural frontier for financial econometrics is the modeling of nonlinear phenomena (Barnett and William, 2004; Barnett et al., 1997; Barnett and Hinich, 1992).

3. Research methodology

Descriptive statistics for the observations were shown in Table 3.1 and Table 3.2. The daily returns of the ROTX composite index were calculated as the change in logarithm of closing stock market indices of successive days. Taking the first differences may not only ensure that the time series are stationary but also it is a common practice in standard econometric work to whithin the time series.

4. Findings. The construction mechanism and the calculation formula of the ROTX index in the national currency RON

$ROTX_t = ROTX_{t-1} * [\frac{\sum_{i=1}^{N}(P_{i,t} * Q_{i,t-1} * F_i * R_i)}{\sum_{i=1}^{N}(P_{i,t-1} * Q_{i,t-1} * F_i * R_i)}]$

$ROTX_t$ = the value of the ROTX index at the time interval t;
$ROTX_{t-1}$ = the value of the ROTX index at the time interval t-1;
$P_{i,t}$ = share price i in national currency at time interval t;
$P_{i,t-1}$ = share price i in national currency at time interval t-1;
$Q_{i,t-1}$ = the number of shares in the share capital of the enterprise and at time t-1;
F_i = free float factor for company i;
R_i = the representation factor for company i;
N = the number of companies included in the structure of the ROTX index.

The calculation formula for the ROTX index in US dollars USD

$ROTX_t = ROTX_{t-1} \left[\frac{\frac{1}{ROL/USD_t} * \sum_{i=1}^{N}(P_{i,t} * Q_{i,t-1} * F_i * R_i)}{\frac{1}{ROL/USD_{t-1}} * \sum_{i=1}^{N} P_{i,t-1} * Q_{i,t-1} * F_i * R_i}\right]$

$ROTX_t$ = the value of the ROTX index at the time interval t;
$ROTX_{t-1}$ = the value of the ROTX index at the time interval t-1;

ROL/USD = average selling and buying quotes available at the same time for the exchange rate of the ROL against the USD at time t, respectively t-1;
$P_{i,t}$ = share price i in national currency at time interval t;
$P_{i,t-1}$ = share price i in national currency at time interval t-1;
$Q_{i,t-1}$ = the number of shares in the share capital of the enterprise and at time t-1;
F_i = free float factor for company i;
R_i = the representation factor for company i;
N = the number of companies included in the structure of the ROTX index.

Formula for calculating the ROTX index in the single European currency EUR

$$ROTX_t = ROTX_{t-1}\left[\frac{\frac{1}{ROL/EUR_t}*\sum_{i=1}^{N}(P_{i,t}*Q_{i,t-1}*F_i*R_i)}{\frac{1}{ROL/EUR_{t-1}}*\sum_{i=1}^{N}P_{i,t-1}*Q_{i,t-1}*F_i*R_i}\right]$$

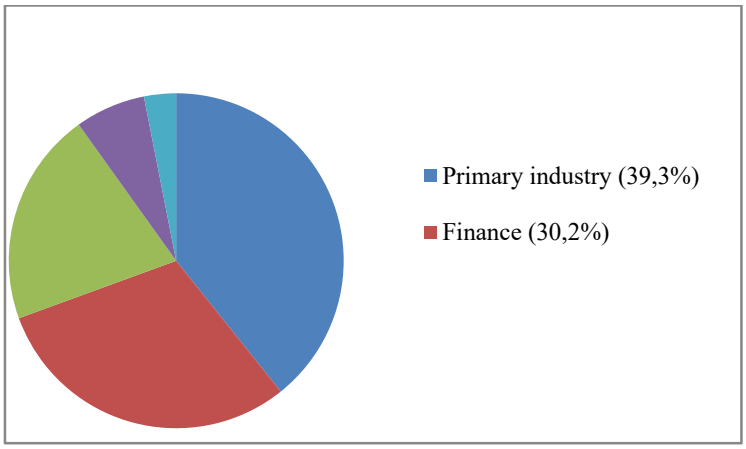
$ROTX_t$ = the value of the ROTX index at the time interval t;
$ROTX_{t-1}$ = the value of the ROTX index at the time interval t-1;
ROL/EUR = average selling and buying quotations available at the same time for the exchange rate of the national currency ROL against EUR at time t and t-1 respectively;
$P_{i,t}$ = share price i in national currency at time interval t;
$P_{i,t-1}$ = share price i in national currency at time interval t-1;
$Q_{i,t-1}$ = the number of shares in the share capital of the enterprise and at time t-1;
F_i = free float factor for company i;
R_i = the representation factor for company i;
N = the number of companies included in the structure of the ROTX index.

Table no. 1 The composition of the ROTX index on 10.05.2019

Symbol	Company	Stocks	Reference price	Free-float	Representation factor	Correction factor	%
SNP	OMV PETROM S.A.	56.644.108.335	0,3855	0,30	1,000000	1,000000	20,72
FP	FONDUL PROPRIETATEA	9.101.963.266	0,9700	0,80	0,920000	1,000000	20,55
TLV	BANCA TRANSILVANIA S.A.	4.815.083.342	2,1500	1,00	0,600000	1,000000	19,65
SNG	S.N.G.N. ROMGAZ S.A.	385.422.400	34,0500	0,30	1,000000	1,000000	12,45
BRD	BRD GROUPE SOCIETE GENERALE S.A.	696.901.518	11,6600	0,40	1,000000	1,000000	10,28
TGN	S.N.T.G.N TRANSGAZ S.A.	11.773.844	355,0000	0,50	1,000000	1,000000	6,61
EL	SOCIETATEA ENERGETICA ELECTRICA S.A.	345.939.929	10,7500	0,40	1,000000	1,000000	4,71
DIGI	DIGI COMUNICATIONS N.V.	100.000.000	24,6000	0,40	1,000000	1,000000	3,11
TEL	C.N.T.E.E TRANSELECTRICA	73.303.142	20,6000	0,40	1,000000	1,000000	1,91

Source: www.bvb.ro

Figure no. 1 Branch structure



Source: www.wienerborse.at

Figure no. 2 The evolution of the ROTX stock index in the period 2015-2018

Source: www.bvb.ro

Figure no. 3. The evolution of the ROTX stock index in the period 2015-2019

Source: www.wienerborse.at

The attached graphs show the evolution of the ROTX stock index on the Bucharest Stock Exchange, respectively on the Vienna Stock Exchange in the last four years.

As can be seen, in the first quarter of 2015, the ROTX index registered a value of 13,117.77 points. Growing slightly by the end of the year, it reached a number of 13,600.09 points. The year 2016 came with a sudden decrease for ROTX, registering 12,100.46 points, signifying a low interest of investors regarding the trading on the regulated market. As can be seen from the chart, the price of the index increased at the end of this year, registering a number of 14,133.43 points.

The year 2017 is a successful year of the ROTX index, registering high price values, reaching 16,908.82 points in May. The same represents the year 2018 for the ROTX stock index, its value of points rising to 18,395.81. These significant price increases represent a positive activity of the listed companies, in the composition of the index.

Table no. 2 Historical data of the ROTX index April 2019

Data	Open price	Day	Low	Close price	%
01.04.2019	16.819,17	17.055,42	16.819,17	17.023,87	1,24%
02.04.2019	17.031,21	17.081,21	16.987,65	17.033,18	0,05%
03.04.2019	17.039,63	17.096,81	17.017,50	17.049,81	0,10%
04.04.2019	17.056,14	17.121,15	17.056,14	17.080,05	0,18%
05.04.2019	17.080,05	17.170,89	17.072,71	17.154,19	0,43%
08.04.2019	17.161,52	17.264,44	17.161,52	17.240,86	0,51%
09.04.2019	17.240,86	17.405,31	17.240,86	17.357,89	0,68%
10.04.2019	17.360,94	17.389,44	17.336,57	17.357,39	0,00%
11.04.2019	17.364,73	17.416,10	17.318,05	17.408,76	0,30%
12.04.2019	17.408,76	17.408,76	17.272,01	17.275,18	-0,77%
15.04.2019	17.275,18	17.373,29	17.271,13	17.285,80	0,06%
16.04.2019	17.288,97	17.304,07	17.184,33	17.234,75	-0,30%
17.04.2019	17.264,10	17.295,34	17.205,82	17.279,23	0,26%
18.04.2019	17.288,54	17.347,94	17.230,93	17.291,72	0,07%
19.04.2019	17.291,72	17.440,79	17.291,72	17.438,66	0,85%
22.04.2019	17.431,33	17.561,82	17.431,33	17.561,82	0,71%
23.04.2019	17.561,82	17.585,48	17.469,67	17.483,99	-0,44%
24.04.2019	17.491,33	17.537,97	17.470,35	17.500,34	0,09%
25.04.2019	17.497,17	17.632,38	17.493,95	17.597,38	0,55%
30.04.2019	17.584,71	17.715,85	17.541,49	17.652,52	0,31%

Source: www.intercapital.ro

5. Conclusions

The ROTX index can be considered as a replicable reference index for the Romanian capital market. This index is created to form a representative reference for the Romanian capital market and to be used as a support asset for derivative financial instruments listed on a stock market, and also for structured products.

When it comes to the Stock Exchange or the over-the-counter market, investors need a benchmark that expresses the evolution of the market. For this reason, securities brokerage companies have set up their own market analysis indicators. While investors follow the evolution of stock indices, they form a suggestive image of the market they want to invest in. Approximately recent products on the Romanian market, stock indices have a large set of concepts in the countries where the capital markets appeared many years ago.

First, stock indices were set only for stocks, now there are indices that monitor the evolution of other valuables, such as bonds. The variety of stock products and the capital market has resulted in

the diversification of synthetic products, called stock indices. The indices being a fine barometer of the capital market, it helps us in comparing the performances of the national stock exchange with the European or international stock exchanges, thus being able to estimate the potential of our stock exchange compared to the big stock exchanges of the world (Acharya, 2009).

In their development, stock market indices extended from the plan of a single capital market existing in a country, to the plan of the world financial market by the emergence of world indices. Referring to Romania, the stock market took place in the interwar period, and then starting with 1995. In September 1997, the first stock index appeared, called the BET index (Bucharest Exchange Trading). In Vienna, in 1818, the shares were traded for the first time. The first joint stock company to be listed on the Vienna Stock Exchange was the National Bank of Austria. Due to the political and economic significance of the Habsburg monarchy at the time, Wiener Borse gained international recognition.

Regarding the 2 markets, there are numerous advantages in terms of companies listed on the Bucharest Stock Exchange and the Vienna Stock Exchange: increased visibility among business participants and current and potential customers; free public notoriety; determining a market value of the enterprise, much higher than in documents; increasing the trust of Romanian and foreign business partners; attracting new partners.

In addition to the other important indices of the two markets, the main objective of this paper was the description, analysis and evolution of the common stock exchange index ROTX of the Bucharest Stock Exchange and the Vienna Stock Exchange. ROTX is a common index of the two stock exchanges, which reflects in real time the price changes for the most representative companies traded on the Bucharest Stock Exchange. The ROTX index can be considered as a replicable reference index for the Romanian capital market. Although at the time it was created, it contained 15 shares in its structure, it currently consists of 9 shares. Over the 4 years, it seems that the common index has had an upward trajectory in terms of stock market investment. This means a positive activity of listed companies in the structure of the index and also a high interest of investors in trading on the regulated market.

In conclusion, (Markwat, T., 2009, p 33) stock indices have been created so that investors can make investment decisions based on complete and prompt information, enabling them to research and estimate the risks involved in financial investments made in securities listed on the stock exchange.

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