EFFICIENT CAPITAL MARKETS: A REVIEW OF EMPIRICAL WORK ON ROMANIAN CAPITAL MARKET

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ABSTRACT

The Romanian capital market has enjoyed positive developments over the recent years, reflected in the dynamics of market capitalization, turnover, turnover velocity and stock price indices of its two markets, the Bucharest Stock Exchange and the RASDAQ. However, the turnover velocity and market capitalization per GDP indicators of the Romanian capital market are unsatisfactory when compared to other capital markets from the same region.

Tests for return predictability from past returns (based on tests of serial correlation, unit root tests, normal distribution analysis and trading rules tests) and tests for seasonals in returns have been mainly used to study the Romanian capital market efficiency. The evidence regarding market efficiency on the Romanian capital market is mixed. However, an improvement at the level of the market efficiency can be noticed in the recent years, which can be associated with the aforementioned positive developments.

Keywords: Romanian capital market, efficient market hypothesis, random walk, tests for return predictability
JEL Codes: G 14, P 34

INTRODUCTION

Fama (1970) defines an *efficient* market as a "market in which prices always 'fully reflect' all available information". He argues that the allocation of the ownership of the economy's capital stock, which represents the primary role of the capital market, is ideally fulfilled if the market is efficient, because prices from such a market provide accurate signals for resource allocation.

As Fama (1991) points out, the definition above refers to a strong version of the efficient market hypothesis requiring the absence of information and trading costs. A weaker version of the efficiency hypothesis brought into attention by Fama (1991) is that of Jensen (1978), according to which "prices reflect information to the point where the

marginal benefits of acting on information…do not exceed marginal costs".

Fama (1991) highlights the existence of the joint-hypothesis problem that is generated by the fact that market efficiency can be tested only together with a model of equilibrium (an asset-pricing model). As a consequence, assigning causes for anomalous return behavior between market inefficiency and a weak equilibrium model is difficult to be achieved.

This paper reviews the empirical literature on market efficiency focused on the Romanian capital market. This is a developing market, the bases of which have been established only a few years ago in the framework of the transition to a market economy, after the fall of the Communist system in 1989. In recent years, significant progress has been recorded, reflected in the level of the main indicators of its two markets, Bucharest Stock Exchange (BSE) and RASDAQ. The favorable dynamics was interrupted in 2008 when the international financial crisis accelerated, but appears to have resumed since 2009. However, the Romanian capital market presents further development lags in comparison with other capital markets from the region (e.g., Poland).

The Romanian capital market efficiency has been studied mainly through tests for return predictability (especially through tests for return predictability from past returns and tests for seasonals in returns), but some studies also focus on rational valuation and event studies. The evidence regarding market efficiency is mixed, but a trend toward an improved level of market efficiency can be noticed. This trend can be associated with the developments that have been manifested on the Romanian capital market over the recent years.

The paper is organized as follows: section 1 contains the history of the Romanian capital market since its reopening and the main characteristics of the market, section 2 presents the tests that has been used to identify different levels of market efficiency, section 3 contains details about the empirical work on the Romanian capital market efficiency, and section 4 concludes.

I. THE ROMANIAN CAPITAL MARKET: HISTORY AND CHARACTERISTICS

The first Romanian stock exchange was opened in Bucharest in 1882 and it has been functioning until 1948 (with the only interruption during the First Word War (1914 – 1918)). In 1948, almost the entire private property was nationalized by the Communist system, leading to the disappearance of the stock exchange products.

After 1989, the year of the anti-Communist revolution, economic reforms for the transition to a market economy have been launched in Romania. In the framework of these reforms, efforts to rebuild the capital market have been made since 1992, which led to Law no. 52/1994 on transferable securities and stock exchanges. This Law has offered a basis for creating the main institutions of the Romanian capital market: the Romanian National Securities Commission (CNVM), the Bucharest Stock Exchange, depository companies, registrars and professional associations.

The trading activity on the BSE was resumed on November 20th 1995. After completing the mass privatization process in 1996, an electronic OTC market was opened to ensure the institutional framework for trading a very large number of shares (from more than 5,000 companies) widely distributed to the public (about 16 million individuals, about 70 % of the total population of Romania). This market, similar to the US NASDAQ, called RASDAQ, was officially opened in September 1996.[1]

An important change at the level of the institutional framework of the two markets occurred in 2006, when the merger of the two markets, BSE and RASDAQ, was completed, and the BSE was authorized as market operator by the CNVM. Since that year, the BSE has been managing the two markets.

Shares have maintained their overwhelming importance in the total trading value of the BSE and RASDAQ in spite of efforts for extending the portfolio of traded instruments.[2] Thus, in 2008, the weight of share transactions in the total BSE trading was of 97%, while the weights of transactions with other instruments were almost insignificant (2.3% for bonds, 0.5 % for rights and 0.2 % for futures).

At the end of 2008, the general trends of the BSE and RASDAQ were reflected by 9 indices. The price evolution on BSE was reflected by 3 indices focused on blue chip companies (BET, BET-XT and ROTX), two sector indices (BET-FI and BET-NG), and one composite index (BET-C). The price dynamics of RASDAQ-listed companies could be followed with the help of three indices: RASDAQ-C, RAQ-I and RAQ-II.

The main figures of the BSE and RASDAQ markets since their start in 1995 and 1996, respectively, are summarized in Table 1 (for BSE) and 2 (for RASDAQ) from Appendix 1. As it can be seen, the number of companies listed on BSE has increased from 9 companies at the end of 1995 to 69 companies at the end of 2009. At the same time, over the time

[1] The name of RASDAQ has been RASDAQ Electronic Exchange since 2003.

[2] The expansion of the portfolio of instruments traded on BSE started in 2005 with the introduction of rights, which was followed by the introduction of futures on BET and BET-C in 2007. In 2008, the BSE introduced new instruments: government bonds, shares issued by an international company, unit funds and futures on single stocks and currencies.

span 1997 – 2009, the number of companies traded on RASDAQ has decreased from 5,367 to 1,561 companies, as a consequence of the low degree of interest for a great part of the companies initially traded.

The market capitalization of BSE has recorded an upward trend until 2007. In 2008, when the international financial crisis extended to the Romanian capital market, the market capitalization of BSE decreased 53.9 %, to 16.3 billion USD from 35.3 billion USD in the previous year. A similar trend can be noticed at the level of turnover, which attained its peak (5.7 billion USD) in 2007 and decreased 50.2 % in 2008 to 2.8 billion USD. In 2009, the market capitalization rose to 27.4 billion USD, but turnover maintained its downward trend, reflecting delays in the recovery of the investors' confidence in the context of the uncertain economic outlook.

The dynamics recorded on RASDAQ, from the point of view of market capitalization and turnover, have been similar to those recorded on BSE. It must be pointed out that 2001 represents a turning point for the two markets, because since that year the values of market capitalization and turnover of the BSE have been higher than the corresponding values of the RASDAQ market. At the end of 2009, the market capitalization of RASDAQ represented only 15 % of the BSE market capitalization, while the RASDAQ turnover was only 11 % of the BSE turnover.

The two market indicators, turnover velocity and market capitalization per GDP, reveal interesting conclusions when they are followed from the first trading year on the BSE until the end of 2009. Turnover velocity, an indicator for the market liquidity computed as turnover per market capitalization, had recorded a negative trend over the time span 1997 – 2004, which was followed by an upward movement until the end of 2008. It can be noticed that the values of this market indicator for BSE have remained below 21 % since 2000, in spite of the progress recorded at the level of turnover and market capitalization. Such a level is unsatisfactory and signals low market liquidity. As a comparison, it can be pointed out that over the 2000 – 2008 period the minimum value of this market indicator for the Warsaw Stock Exchange (WSE) was of 40.97 % (in 2004) - a value almost double than the maximum value of this indicator for the BSE, 20.9 % (recorded in 2000).[3]

The market capitalization per GDP has recorded a continuous increase until 2006, when it arrived at the maximum value, 22.8 %. This favorable trend signals an increased importance of the BSE market for the Romanian economy. However, over the entire period analyzed the value of this market indicator has remained unsatisfactory, suggesting a low

[3] The velocity turnover of the WSE is computed based on data from the WSE Fact Book 2004 and WSE Fact Book 2008.

importance of the BSE for the Romanian economy. To illustrate the low level of this indicator, we can compare its value with the value of this indicator for the Warsaw Stock Exchange (WSE) at the end of 2006, 60 %, an almost triple value.[4]

The sector analysis of market capitalization and turnover based on data from 2009 indicates the overwhelming importance of the financial intermediation sector on the BSE (see Table 3 below). Thus, this sector claims 70.4 % of the market capitalization and about 76.9 % of the total turnover. The mining and quarrying sector presents the second capitalization on BSE (17.9 % of total market capitalization) but its weight on BSE turnover is much smaller (only 7.6 % of total market capitalization). There are several economic sectors which are not represented on BSE in accordance with their importance in the real economy (for example, electricity, gas and water supply, the weight of which on the BSE market capitalization is of only 1.2 %) or are not even present (e.g., the communication and information technology sectors). As a consequence, BSE investors cannot completely diversify their portfolios to reflect the structure and dynamics of the Romanian economy (Ciobanu et al., 2008).

Table 3. Main indicators by sector for issuers listed on BSE

Sector	Market capitalization as at 31.12.2009 (million USD)	Market capitalization (%)	Turnover in 2009 (million USD)	Turnover (%)
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	36.1	0.1	13.2	0.8
Construction	138.8	0.5	25.6	1.5
Electricity, gas and water supply	335.8	1.2	22.3	1.3
Hotels and restaurants	69.8	0.3	2.6	0.2
Mining and quarrying	4,859.9	17.9	128.3	7.6
Financial intermediation	19,127.2	70.4	1,298.4	76.9
Manufacturing	1,915.1	7.0	170.6	10.1
Transport, storage and communication	691.6	2.5	27.5	1.6

Sources: 2009 BSE Monthly Bulletins and own calculations

The period 1995 - 2001 has been unfavorable for BSE stock prices. Over that period, both of the main indices, BET and BET-C, have presented negative dynamics. However, in 2001, the BET index change was positive, which

[4] The value is computed based on data from the WSE Fact Book 2008 and the internet website of Poland's Central Statistical Office.

announced the beginning of a favorable dynamics (see Table 1 from Appendix 1). Since 2001, BSE stock prices have entered into a favorable period until 2007, reflected in two-digit annual increases of the two BSE indices. Over this period, the BSE market benefited from favorable economic developments and the expected accession of Romania to the European Union (which finally happened in 2007). The financial crisis was strongly reflected on BSE stock prices in 2008, when the BET and BET-C indices decreased by 74 %. In 2009, a positive correction of BSE stock prices ensued due to the possible overreaction to negative news manifested in the previous year and expectations of economic recovery. This dynamics was reflected in an increase of 57.1 % of the BET index and 33.4 % of the BET-C index.

A joint analysis of BSE stock indices returns with those of indices of other stock exchanges (see Table 4 below) reveals an increased correlation of BSE stock prices with those of other stock exchanges from the same region and from developed countries.[5] This correlation has increased continuously until 2008. In the next eight months of 2009 the correlation decreased but, for almost all the capital markets included in the analysis (with the exception of the US capital market), it remained above the 2007 level.

Table 4. Correlation coefficients between daily returns of indices

Index		BUX	PX	WIG	SOFIX	FTSE 1000	DAX	CAC 40	ATX	DJIA	S&P 500
BET	2004	0.02	-0.03	0.01	0.03	0.02	0.01	-0.02	-0.03	-0.06	-0.06
	2005	0.09	0.28	0.11	0.03	0.12	0.06	0.05	0.01	0.01	0.05
	2006	0.12	0.11	0.14	0.14	0.09	0.08	0.08	0.15	0.05	0.08
	2007	0.32	0.35	0.31	0.20	0.27	0.30	0.30	0.39	0.38	0.39
	2008	0.56	0.73	0.60	0.45	0.57	0.56	0.55	0.64	0.40	0.43
	2009	0.48	0.60	0.59	0.35	0.50	0.49	0.49	0.54	0.12	0.15
BET-C	2004	-0.02	-0.09	0.00	-0.12	0.01	0.01	-0.02	0.00	-0.08	-0.07
	2005	0.09	0.28	0.09	0.02	0.11	0.05	0.04	0.00	0.00	0.04
	2006	0.12	0.11	0.13	0.14	0.08	0.08	0.08	0.13	0.04	0.08
	2007	0.33	0.36	0.32	0.22	0.29	0.32	0.31	0.43	0.43	0.43
	2008	0.57	0.75	0.61	0.48	0.57	0.54	0.54	0.64	0.41	0.45
	2009	0.47	0.62	0.57	0.38	0.50	0.48	0.48	0.54	0.15	0.18

Note: 1. In 2009, the period analyzed was January–August 2009;

1. For computing the correlation coefficients with DJIA and S&P 500, the returns of these indices from day t have been translated to day t+1.

Sources: http://www.intercapital.ro/intercapital_start/intro.php and own calculations.

[5] In this analysis, the returns of the following indices of stock exchanges from the same region are included: BUX (from the Budapest Stock Exchange), PX (from the Prague Stock Exchange), WIG (from the Warsaw Stock Exchange), Sofix (from the Sofia Stock Exchange) and ATX (from the Vienna Stock Exchange).

The increased correlation of price movements from the BSE with those from other stock exchanges could be associated with the growing presence of foreign investors. They have been attracted on BSE by favorable outlook of the Romanian economy and high expected returns. Over the period 2000 – 2009, foreign investors, although they have not dominated the BSE transactions, have accumulated BSE stocks every year with the exception of the years 2001 and 2008. The presence of foreign investors on BSE has been beneficial, because this could be associated with positive dynamics of market liquidity, stock valuations, corporate governance, financial education, and market efficiency.

As pointed out in academic studies, the Romanian capital market has been characterized by additional negative aspects during its recent history. Thus, Dragotă and Mitrică (2004) and Dragotă et al. (2009) raise the issue of noise traders. These negatively affect the market efficiency because they act principally based on emotions rather than on information and, thus, lead to stock prices that do not fully reflect the available information. Other negative aspects noticed are related to a limited application of corporate governance principles and an unsatisfactory protection of minority shareholders (Dragotă et al., 2009).

There are academic studies that present an optimistic view on the future of the Romanian capital market. In particular, Dragotă et al. (2009) point out improvements at the level of the market's performance and the Romanian investors' ability to valuate assets. Also, Heininen and Puttonen (2008) argues that the anomalous calendar effects become less present on the Romanian capital market (and on capital markets of other Central and Eastern Europe - CEE - countries which had economies in transition), possibly due to "the EU accession, the growing awareness of the importance of standards of corporate governance, gradual integration with the developed markets or else purely to controversial procedures of market participants".

In summary, rebuilding the Romanian capital market after the fall of the Communist system has been followed by positive developments. However, in some cases, the speed of these developments could be assessed as unsatisfactory, especially when compared to the developments recorded on other capital markets from the same region. Although the financial crisis has been reflected negatively on the Romanian capital market indicators, the subsequent dynamics of the market and its increased maturity encourage a positive view regarding its future.

II. Theoretical Background on Testing the Capital Market Efficiency

Fama (1970) stresses that "all empirical research on efficient markets has been concerned whether prices 'fully reflect' particular subsets of available information". He describes the dynamics of the empirical work

as follows. The initial studies were focused on *weak form tests*, in which the only subset of information studied is the history of prices or returns. Within these tests, a great part is represented by the tests of the *random walk* hypothesis.[6] When extensive tests seemed to support efficiency at this level, the studies turned their focus on *semi-strong form tests,* which analyze the adjustment speed of prices to publicly available information, other than past prices or returns. Finally, *strong form tests* have emerged. These tests focus on the existence of a monopolistic access of any investor or group to any information relevant for prices.

The empirical studies that tested the *weak form* of market efficiency, reviewed by Fama (1970), use a diversity of investigation tools, such as: serial correlation tests, runs tests, tests for the profitability of different trading rules and distributional evidence.

Related to the *semi-strong form tests*, Fama (1970) points out that available evidence is limited to a few major types of events. Such events are stock splits, annual earnings announcements, announcements of discount rate changes by the Federal Reserve Banks, large secondary offerings of common stock and new issues of stock. The approach of Fama et al. (1969) to study the effect of stock splits on the prices of securities relies heavily on the market model. In this model, the abnormal behavior associated with the event is reflected in the regression residuals for the months surrounding the split. Variants of this method of residual analysis have been used by others to analyze the effects of different types of public announcements.

Regarding the *strong form tests*, Fama (1970) reveals that the monopolistic access to information had been documented only in the case of corporate insiders and specialists. Fama (1970) contends that the major theoretical (and practical) problem in using the tests for the performance of mutual funds is: "the development of a 'norm' against which performance can be judged".

Fama (1970) sustains that "there is no important evidence against the [efficient market] hypothesis in the weak and semi-strong form tests…and only limited evidence against the [efficient market] hypothesis in the strong form tests".

Several years after the publication of his previous review, Fama (1991) reviews again the market efficiency literature. In this review, empirical studies that focus on capital market efficiency are divided into three categories: *tests for return predictability*, *event studies* and *tests for private information*. For the semi-strong form and strong form tests,

[6] As Fama (1970) remembers, the random walk model consists of two assumptions: 1) the successive price (or return) changes are independent, and 2) the successive price (or return) changes are identically distributed.

changes in their title (to event studies and respectively tests for private information), not in their coverage, are proposed. In addition to studies on the forecast power of past returns included in the tests for the weak form of the efficient market model described by Fama (1970), the tests for return predictability include the following: 1) studies on forecasting returns with variables such as dividend yields, earnings-price ratios, and term-structure variables, 2) studies on cross-sectional return predictability, and 3) tests for seasonals in returns and the excessive volatility of security prices.

Fama (1991) notices a recent emergence of tests that study the predictability of returns for longer horizons (while the earlier tests focus on daily, weekly, and monthly returns). Returns for longer horizons are taken into consideration in the framework of 1) tests that focus on the forecast power of past returns, as those of De Bondt and Thaler (1985), Poterba and Summers (1988), and Fama and French (1988a) and 2) tests that focus on forecasting returns with variables other than past returns, as those of Fama and French (1988b), and Campbell and Shiller (1988).

Event studies, especially those on daily returns, provide the "cleanest" evidence on market efficiency according to Fama (1991). He stresses that the results of the event-study literature focused on corporate finance issues indicate that "on average, stock prices adjust quickly to information about investment decisions, dividend changes, changes in capital structure, and corporate-control transactions".

The tests for return predictability generated the strongest controversy regarding market efficiency according to Fama (1991). He shows that the new research obtained results similar with the ones of the early research, that favor the predictability of daily and weekly returns based on past returns. These indicate the autocorrelation of returns, but with reliable small values. In contrast to these results, the new research on longer horizon stock returns from past returns reveals a strong autocorrelation, but under the circumstance of low statistical power. Fama (1991) finds evidence for the predictability of returns for short and long horizons from dividend yields, earnings-price ratios, default spreads of low over high-grade bond yields, term spreads, and the level of short-term interest rates.

Efficient market hypothesis have also been connected to the idea of rational fundamental valuation. If prices fully reflect all available information it would be expected that they also reflect rational fundamental valuations. However, Summers (1986) argues that the evidence found in many studies that efficient market hypothesis cannot be re rejected does not mean that financial assets prices reflect rational fundamental valuations. Rather, it means that the tests used have relatively little power in the case of certain types of market inefficiencies.

In fact, as Summers (1986) mentions, the market valuations can present large and persistent errors.

An explication for the deviations of the prices from fundamental rational values is the market influence of the "noise traders".[7] Since the decisions of noise traders do not reflect rational valuations, the prices of the assets from the markets which are significantly influenced by noise traders, do not reflect rational valuations.

III. ROMANIAN CAPITAL MARKET EFFICIENCY: A REVIEW OF EMPIRICAL WORK

Capital market efficiency has attracted a great interest from the part of academics, reflected in a large bulk of literature accumulated on this topic. Testing the market efficiency is mostly carried out on developed capital markets, but developing capital markets are also the object of such tests. The Romanian capital market is the focus of several empirical studies that test the market efficiency hypotheses; we comprise below some of the most relevant ones.

According to our review, most of the tests for market efficiency on the Romanian capital market are tests for return predictability. Only a small number of event studies and no test for private information have been identified. This finding is explained by the fact that, as long as only some of the recent tests for return predictability provide evidence that support the market efficiency, the tests from the other two categories are less relevant.

A. Tests of Return Predictability for Short Horizons from Past Returns

Dragotă and Mitrică (2001) analyze the dynamics of six stocks listed at the first category of BSE between April 9th 1998 and October 10th 2000; these stocks have had the best liquidity on the market. Various traditional methods for testing market efficiency are used: a graphical study of returns, serial correlation tests, unit root tests, a normal distribution analysis and filter rules. It is concluded that the weak form of efficiency is not present on the Romanian capital market.[8] Despite the inefficiency of the market, obtaining excess returns is uncertain because of the lack of liquidity.

[7] The classification of the investors in arbitrageurs and noise traders can be encountered in Shleifer and Summers (1990).

[8] The study focuses on short-term because the long history necessary for a relevant long-term correlation study was not available for the Romanian capital market when the empirical study was performed.

Taking into account all the specific circumstances present on the Romanian capital market (namely the lack of liquidity, the absence of short sell transactions and the high brokerage fees), Dragotă and Mitrică (2004) raise the issue of the adaptability of standard tests to this market.

All the aforementioned circumstances adversely affect the results of the market efficiency tests. This negative influence can be observed, for example, in the case of the filter rule tests. The filter rule considers an increase of the asset's price over the chosen filter as a signal for buying the asset and covering the short sell position. Conversely, a decrease of the price under the chosen filter is a signal for selling the stock and short selling it. In the framework of the lack of liquidity, the large transactions (including those made in the framework of diverse trading strategies like the filter rule), as opposed to the small ones, are transparent on the market and, as a consequence, the possibility for achieving excess returns is diminished. Supplementary, the absence of short sell transactions makes the filter rule less relevant, because the return of a filter rule should be adjusted with the cost of opportunity of the funds borrowed for implementing such a trading strategy. Finally, the high brokerage fees can negatively affect the results of the filter rules, especially when the filters are set at low levels that generate a higher number of transactions. It should be mentioned that Dragotă and Mitrică (2004) obtains excess returns for filter rules only by applying brokerage fees up to 2 %, while on the market they can be up to 8 %.

Todea (2002) tests the weak form of market efficiency on a sample consisting of ten companies listed on the first category of the BSE. These companies are monitored over the time span between October 16th 1997 and December 21st 2000. More exactly, he tests whether the stock price returns fulfill cumulatively two requirements: a) they are stationary (tested with the Dickey-Fuller test), and b) they are serially uncorrelated (tested with the Ljung & Box test). The results of the study indicate that the first requirement is met by all ten stocks, while the second one is confirmed only by eight stocks.

Todea (2002) concludes that for the eight stocks that meets the two requirements the best stochastic modeling is the MA(0) model, implying that the best predictions are the sample means of the empirical data. However, for an analyst that seeks systematic abnormal returns, the mean prediction provides no utility. The reason is that prices and, hence, sample means, are available to all market participants. In the case of two stocks that are serially correlated, the possibility to use autoregressive prediction models is revealed; however, there is a lack of power due to the low value of the autocorrelation coefficients.

Harrison and Paton (2004a) study the effect of the GARCH specification in testing market efficiency in Romania (and the Czech

Republic). For the Romanian capital market, their sample includes BET daily observations from the period between January 1st 2000 and September 16th 2002.

When a GARCH model is used, the coefficient on lagged returns of the model is positive and statistically significant (p-value = 0.005). Thus, future returns can be predicted with the help of past returns - a sign of market inefficiency. However, in the case of GARCH-t model - appropriate for the Romanian stock market because of the positive excess kurtosis of returns - the coefficient on lagged returns is smaller in absolute value and in significance (p-value = 0.062). Therefore, at a 5 % significance level, the market efficiency hypothesis is not rejected in the case of GARCH-t model, while the hypothesis is rejected in the case of the GARCH model. The tests for calendar effects, which were also implemented by adding to the models dummy variables, do not lead to evidence that supports the existence of these effects on the two capital markets.

In a study that encompasses a larger period (from mid-1997 to September 2002), Harrison and Paton (2004b) use a GARCH model on daily data of stock price index and model the disturbances to allow for "fat-tails". They find that the lagged stock price index represents a significant predictor of the current stock price index and they interpret this fact as a strong evidence for the inefficiency of the BSE. However, the inefficiency level appears to decrease over time and evidence for the existence of market efficiency after January 2000 is identified.

Hansanov and Omay (2007) test the efficiency of eight transition stock markets, among which the Romanian one, by testing whether the stock price indices contain a unit root.[9] Stock price indices are monitored for the period December 1996 – December 2005. [10]

According to Hansanov and Omay (2007), finding of a unit root implies that stock prices follow a random walk, and thus, are efficient in the weak form. There are applied two widely used unit root tests (the augmented Dickey-Fuller - ADF - and Phillips-Perron - PP - tests), which do not take into account the nonlinearity in the series. The results of both tests indicate that Romanian stock price index series (as well as all the other stock markets but Russian and Chinese stock price index series) contain a unit root - a finding that supports the market efficiency in the weak form. Using the nonlinear unit root test of Kapetanos et al. (2003), the null hypothesis of a unit root for the Romanian stock price index (as well as for the Chinese, Polish, and Russian ones) is rejected, which

[9] The transition stock markets analyzed, other than that of Romania, are Russian, Chinese, Bulgarian, Czech Republic, Hungarian, Polish, and Slovakian stock markets.
[10] For Romania, the Datastream total market index is used.

implies that the market is not efficient in the weak form. The results of the nonlinear unit root test are more relevant for the markets analyzed by Hansanov and Omay (2007) taking into account the evidence according to which stock prices on these markets are characterized by slow reversion to long-run equilibrium levels.

Dragotă et al. (2009) analyze the returns of 18 stocks listed at the BSE first category and of the Romanian capital market indices.[11] The stocks and indices are monitored from their listing (respectively the indexes construction) date to the end of 2006. Dragotă et al. (2009) focus on the weak form efficiency, according to which all of the past prices information is incorporated into the current price and, consequently, there could not be obtained systematic abnormal returns based on historical information on prices. The investigation on the weak form of the efficient market hypothesis is based on the following tests of the random walk hypothesis: the Cowels-Jones test, the runs test and the Multiple Variance Ratio – MVR – approach.

The MVR test for random walk hypothesis (assuming on a first case homoskedasticity and on the second case heteroskedasticity) shows that this hypothesis cannot be rejected for the most stocks. As a result, the returns cannot be predicted based on information about past stock prices. On the basis of these results, Dragotă et al. (2009) conclude that the weak form of the efficient market hypothesis cannot be rejected.

B. **Tests of Return Predictability for Long Horizons from Past Returns**

Pele and Voineagu (2008) analyze market efficiency using a model for decomposing the stock return into two components:

1. A systematic factor - an autoregressive process, that can be regarded as the return due to the macroeconomic environment (that acts on medium and long term);

2. A non-systematic factor - a stationary zero mean process, which represents the influences due to some random factors (which act on short term).

The investigation tools applied to BET index daily returns (from September 19th 1997 to January 9th 2007) modeled in this way are the following: the unit root test (ADF test), autocorrelation coefficients, a normal distribution analysis and the Ljung & Box test.

Pele and Voineagu (2008) find that the autoregressive parameter has a positive value, but less than one, the return variation is only slightly

[11] The return does not include the dividend yield because it is considered that dividends paid by the Romanian companies are at a very low level that allows investors to neglect them.

explained by the estimated model ($R^2 = 0.07$) and the influence of the non-systematic factor is significant. Based on these facts, they conclude that the long-term stock price dynamics are influenced, to a large extent, by the action of "some punctual, short term and non-general factors". As a consequence, they cannot reject the weak form of the efficiency hypothesis taking into account the fact that even if the autoregressive process is stationary it has little influence on stock return.

C. Tests for Seasonals in Returns

Heininen and Puttonen (2008) and Hourvouliades and Kourkoumelis (2009) appeal to tests for seasonals in returns for studying market efficiency for groups of similar capital markets, among which the Romanian one.

Heininen and Puttonen (2008) study the presence of seasonal effects on daily stock price indices of twelve CEE countries monitored over the period from January 1st 1997 to February 29th 2008.[12] The analysis is made both on the whole period mentioned and separated on three sub-periods (1997 – 2000, 2001 – 2004, and 2005 – 2008).

For every one of the four calendar effects studied, Heininen and Puttonen (2008) run a classical linear regression model with the logarithmic return of the index (monthly return in the case of the MOY effect and daily return in the case of other effects) as the dependent variable and dummy variables as independent variables.[13] There are dummy variables for every trading day of the weak in the case of DOW effect, for every month of the year in the case of MOY effect and for every of the last eight trading day of the month and the first eight trading days of the next month in the case of TOM effect. In the case of DOW and MOY effects, the statistically significant effects detected with the help of the aforementioned regressions are further analyzed with similar regressions that have one dummy variable less, namely that corresponding to the

[12] The eleven stock markets analyzed other than that of Romania are those of Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, Slovakia, and Slovenia.

[13] The seasonal effects analyzed are the following: 1) day-of-the-week (DOW) effect, according to which the distribution of stock price returns is not identical for all days of the weak; for example Monday effect refers to the returns of this day are negative or significantly lower relative to the returns of the other days of the weak; 2) month-of-the-year (MOY) effect, according to which there are months, such as January, that deliver superior stock returns relative to other months of the year; 3) turn-of-the-month (TOM) effect, which supposes that at the beginning of the month there are recorded statistically significant abnormal returns; and 4) Halloween effect, according to which returns in the November-April period are higher than those from the May-October period and could offer a better return than that of a buy-and-hold strategy followed throughout the entire year.

effect identified.[14] The TOM effect is tested directly with a regression model using a dummy variable that takes the value 1 if the day is within the TOM period (from the last day of the month to the fourth day of the next month).

For the Halloween effect, there is only one dummy variable used that takes value 1 if the trading day is from the period November – April and 0 otherwise. Furthermore, the annual returns of the Halloween strategy are compared with those of a buy-and-hold strategy.[15]

Regarding DOW effect, Heininen and Puttonen (2008) conclude that analyzed countries do not provide consistent evidence for any significant daily patterns because the identified DOW effects are not robust to different time periods and they are not maintained on the long-term (with the only exception in the case of Slovenian capital market). The conclusion about MOY effect is similar: even though some monthly patterns exist, they are not present over the whole period examined, disappearing due to EU accession or controversial market procedures of participants.

Heininen and Puttonen (2008) identify evidence, for a few capital markets including Romanian's one (the other ones being those of Croatia, Hungary, Poland, Russia and Slovenia), that stock returns are predictable based on TOM effect. There is not, however, evidence for the existence of the Halloween calendar pattern in the Romanian capital market (but are obtained such evidence for the capital markets of Czech Republic, Estonia, Latvia, Lithuania and Russia).

Hourvouliades and Kourkoumelis (2009) examine the day-of-the-week effect during the contemporary financial crisis. For this purpose, they select five stock markets, among which that of Romania (and those of Greece, Turkey, Bulgaria, and Cyprus). To identify the effect of the financial crisis, the tests are applied to each sub-period of the sample: the up market sub-period (January 2003 – November 2007) and the crisis sub-period (December 2007 – January 2009).

Statistical tests for equality of means (F-test), medians (x^2 and Kruskall Wallis tests), and variance (Bartlett, Levene and Brown-Forsythe tests) are applied by Hourvouliades and Kourkoumelis (2009) for each trading day of the week, for each sub-period of the sample. The F-test is applied on the linear regression with daily index returns (BET return in the case of Romanian stock market) calculated based on their logarithmic

[14] For example if a stock or index presents a Monday effect (Monday's returns are significantly negative), then: 1) the intercept is expected to be negative and statistically significant; 2) the coefficients of the regression, that indicate the difference between the Monday's return and the return of the each other day, should be statistically significant; and 3) F-value of the regression should be statistically significant.

[15] According to Halloween strategy a market portfolio is bought at the beginning of November and sold at the end of April to invest in risk-free assets.

difference as dependent variable and dummy variables for each trading day of the weak as independent variables. The other tests are applied on the daily index returns grouped on each trading day of the weak.

In the case of the Romanian stock market, the results of the tests indicate that day-of-the-week effects are not present in either of the two sub-periods. However, during the crisis sub-period, the calendar effect is more noticeable in the Romanian stock market, a trend opposed to those from the more mature stock markets of Greece and Turkey.

D. Tests for Cross-Sectional Return Predictability

Tudor (2009) studies, on 50 BSE-listed companies, the relationship between stock returns and the variables investigated by Fama and French (1992), namely: beta, size, leverage, book-to-market equity, and earnings-price ratios.

The results of the empirical study indicate that beta does not explain the stock returns. However, the regression of abnormal stock returns on size, leverage, book-to-market equity, and earnings-price ratios show that the last mentioned two variables are statistically significant (at 5 % level). When a regression of abnormal stock returns on only the two variables, namely book-to-market equity and earnings-price ratios, is performed, these variables maintain their statistical significance (at the 5 % level). These findings (based on data starting from January 2000) are interpreted as evidence for the explanatory power on returns of the two variables.

To out-of-the-sample test the validity of the before presented results, a portfolio selection model (used for computing expected returns) is built based on the coefficients of the regression of abnormal stock return on book-to-market equity and earnings-price ratios. 15 stocks with the highest expected returns in mid-February 2007 are included in an equal-weighted portfolio. In the following year (February 2007 – February 2008) the actual return of the portfolio is monitored. Because the actual return of this portfolio was of +49.3 %, while the BET-C index was down 8.92 %, Tudor (2009) states that the efficient market hypothesis is rejected and an informed investor can obtain better returns than other BSE investors.

Tudor (2009) concludes that "over the analyzed period the Romanian stock market was not efficient". At the same time, she emphasizes that the insufficient data do not allow her to check whether the selection model is able to consistently provide superior investment results.

E. Tests for Rational Fundamental Valuation

Dragotă et al. (2006) analyze the differences between stock prices and their intrinsic values. For this purpose, five financial investment companies listed on BSE are analyzed over the period from 2002 to 2005. The intrinsic values of these companies are estimated as the present values

of their portfolios - comprising deposits and monetary instruments, bonds, shares of opened funds, BSE and RASDAQ-listed stocks, stocks of closed banks and other stocks of unquoted companies.[16] Based on the significant and persistent differences between market capitalization of the financial investment companies and their intrinsic value, it is concluded that the Romanian capital market can be inefficient.

F. Event Studies

Ciobanu et al. (2008) apply the event study technique to classify investors' reaction to unexpected information (favorable/unfavorable surprises) as consistent with: 1) the Overreaction Hypothesis (OH), 2) the Uncertain Information Hypothesis (UIH), or 3) the Efficient Market Hypothesis (EMH). The investor reaction is deducted from the daily return of two indices (BET and BET-C), recorded during a 30-day post-event window. These returns are monitored starting April 16th 1998 for the BET-C index and January 4th 1999 for the BET index, until July 9th 2007. A number of 24 economic and political surprises are identified for BET and 21 surprises for BET-C, out of which 22 positive events and 23 negative events.

In the case of the BET index, after the arrival of unexpected news, significant price reversals are identified, price movement consistent with OH.[17] In the case of the BET-C index, an upward trend is detected after favorable surprises, result consistent with UIH.[18] These patterns allow the investors to develop contrarian trading strategies to earn abnormal returns. However, after unfavorable surprises, an immediate downward adjustment in the BET-C index is noticed. This reaction is consistent with EMH because it shows that stock prices incorporate quickly and correctly the information.

VI. CONCLUSIONS

In recent years, positive developments have been recorded on the Romanian capital market, reflected in the evolution of market capitalization, turnover, liquidity and stock price indices of BSE and

[16] The results of this study are heavily influenced by the valuation methodology used, which included an estimation of the present value of unquoted companies, estimation associated with a high degree of uncertainty regarding the right results.

[17] The Overreaction Hypothesis (OH), proposed by DeBond and Thaler (1985), suggests that investors, due to emotion, initially overreact to unexpected information. Then, after the favorable surprises, the trend of security prices is downward, while after unfavorable surprises, the price movement is upward.

[18] The Uncertain Information Hypothesis (UIH) suggests that unexpected information increases the uncertainty and risk in stock markets, leading initially to prices lower than the fundamental values. Then, the trend of a security price is an upward one.

RASDAQ. Although these positive developments were interrupted in 2008 - when the international financial crisis extended on the Romanian capital market - they appeared to be resumed in 2009. However, the Romanian capital market has maintained some of its main indicators, namely turnover velocity and market capitalization per GDP, at unsatisfactory levels compared to those of other capital markets from the same region.

The Romanian capital market efficiency has been studied mainly through tests for return predictability, but some studies also focused on rational fundamental valuation and event studies. The tests of market efficiency on the Romanian capital market have been carried out in the context of some aspects of this market less favorable, such as the relative short recent history of the BSE and the lack of liquidity.

Generally, the early tests for return predictability for short horizons from past returns provide evidence that does not sustain the existence of the weak form of the efficient market hypothesis. Thus, the studies of Dragotă and Mitrică (2001), Harrison and Paton (2004b), and Hansanov and Omay (2007) conclude that the Romanian capital market is not efficient. Additional evidence that does not sustain the market efficiency in the weak form is provided by Dragotă et al. (2006), who focus on rational fundamental valuation.

Evidence not consistent with the efficient market hypothesis is also provided by the event study of Ciobanu et al. (2008) in the case of BET index returns and, after favorable surprises, in the case of BET-C index returns. Furthermore, testing for seasonals in returns Heininen and Puttonen (2008) find the existence of the turn-of-the-month effect on the Romanian capital market, which is not consistent with the efficient market hypothesis. Finally, Tudor (2009), whose approach for testing efficient market hypothesis can be classified as a test for cross-sectional return predictability, rejects the efficient market hypothesis**.**

Evidence in the favor of the weak form of the efficient market hypothesis is provided by two early tests for return predictability for short horizons from past returns, namely Todea (2002) and Harrison and Paton (2004a). More recent, the test for return predictability for long horizons from past returns of Pele and Voineagu (2008) and the event study of Ciobanu et al. (2008), in the case of BET-C index returns after unfavorable surprises, provide evidence in the favor of the weak form of the efficient market hypothesis.

The most recent published empirical studies on efficient market hypothesis, the test for return predictability of Dragotă et al. (2009) and the tests for seasonals in returns of Hourvouliades and Kourkoumelis (2009) also reveal evidence in accordance with the efficient market hypothesis.

In summary, the evidence regarding market efficiency on the Romanian capital market is mixed, but the results of the most recent empirical studies indicate a trend toward an improved level of market efficiency. This favorable trend can be associated with the positive developments that have been manifested on the Romanian capital market over the recent years.

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Appendix 1

Table 1. Bucharest Stock Exchange main characteristics over the period 1995 – 2009

Year	No. of trading days	No. of companies	Turnover (mil. USD)	Market capitalization (mil. USD)	Turnover velocity (%)	Market capitalization/ GDP (%)	BET	BET change (%)	BET-C	BET-C change (%)
1995	5	9	1.0	100.4	1.0	0.3	-	-	-	-
1996	84	17	5.3	60.8	8.7	0.2	-	-	-	-
1997	207	76	263.6	632.4	41.7	1.9	714.16	-	-	-
1998	255	126	213.6	357.1	59.8	0.9	259.01	-63.7	373.44	-
1999	253	127	89.5	316.8	28.3	0.9	186.98	-27.8	219.63	-41.2
2000	251	114	86.9	416.0	20.9	1.1	159.09	-14.9	166.26	-24.3
2001	247	65	132.0	1,228.5	10.7	3.1	181.1	13.8	129.96	-21.8
2002	247	65	213.7	2,717.5	7.9	5.9	370.85	104.8	274.8	111.4
2003	241	62	302.2	3,710.2	8.1	6.2	498.11	34.3	355.36	29.3
2004	253	60	748.2	11,937.6	6.3	15.7	1149.43	130.8	830.39	133.7
2005	247	64	2,672.7	18,184.8	14.7	18.4	1609.2	40.0	1064.9	28.2
2006	248	58	3,514.5	28,204.0	12.5	22.8	2332.03	44.9	1622.27	52.3
2007	250	59	5,680.6	35,326.0	16.1	20.7	3047.87	30.7	2304.24	42.0
2008	250	68	2,828.1	16,272.6	17.4	8.2	784.13	-74.3	595.55	-74.2
2009	250	69	1,696.7	27,455.7	6.2	17.2	1232.04	57.1	794.7	33.4

Sources: www.bvb.ro and own calculations.

Table 2. RASDAQ main characteristics over the period 1996 – 2009

Year	No. of trading days	No. of companies	Turnover (mil. USD)	Market capitalization (mil. USD)	Turnover velocity (%)	Market capitalization/ GDP (%)	RASDAQ-C	RASDAQ-C change (%)
1996	38	1,561	1	310	0.3	0.9	-	-
1997	247	5,367	386	1,505	25.7	4.4	-	-
1998	255	5,496	419	789	53.0	1.9	716.2	-
1999	254	5,516	242	984	24.6	2.8	867.9	21.2
2000	251	5,382	144	803	18.0	2.2	689.0	-20.6
2001	247	5,084	94	1,073	8.7	2.7	829.1	20.3
2002	247	4,823	127	1,812	7.0	3.9	1,051.9	26.9
2003	241	4,442	124	2,411	5.1	4.1	1,280.4	21.7
2004	253	3,998	183	2,794	6.6	3.7	1,779.2	39.0
2005	247	3,683	371	2,662	13.9	2.7	1,759.0	-1.1
2006	246	2,420	305	4,118	7.4	3.3	2,355.8	33.9
2007	250	2,019	1,770	10,031	17.6	5.9	4,628.6	96.5
2008	250	1,753	639	4,308	14.8	2.2	2,071.2	-55.3
2009	250	1,561	188	4,233	4.4	2.6	2,239.5	8.1

Sources: www.bvb.ro and own calculations.