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Full Length Research Paper

Information asymmetry and risk factors for stock returns in a post-communist transition economy: Empirical proof of the inefficiency of the Romanian stock market

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The purpose of this study is to investigate various forms of market efficiency on Bucharest stock exchange. Using monthly data for a six years period (2002 to 2008) for 60 companies listed on the Romanian stock market, the study investigated the empirical validity of Fama's (1970) efficient market hypothesis (EMH) in two directions: first, the relationship between stock returns and company-specific financial ratios is investigated; secondly, the subject of information asymmetry is empirically tested and an answer to the following question is provided: Are foreign investors better informed than the domestic ones and continually achieve higher rates of return on the Romanian stock market? To serve our purpose, a battery of econometric tests is employed. Results document that there are some risk factors that drive Romanian stock returns and also that information seems not to reach all investors equally as stated by EMH. Similar to other small emerging markets, the Romanian capital market seems to be primarily driven by foreign investors, which consistently manage to outperform the overall market. In addition, the time effect is significant on the Romanian market, and the two-way fixed effects model (TWFM) that allows for the intercept to vary both across companies and in time provides the optimum specification for explaining future stock returns on the Bucharest stock exchange.

Key words: Market efficiency, information asymmetry, firm-specific factors, panel regressions, Romanian stock market.

INTRODUCTION

The subject of a stock market's efficiency has critical importance for portfolio managers (for example, pension funds, mutual fund, asset management companies, insurance funds etc) as, on an inefficient market, the combination of information proved to impact future returns into a portfolio selection model will lead to higher profits on their investments. One important aspect of a market's inefficiency consists therefore in the empirical documentation of risk sources for stock returns, thus suggesting the existence of some explanatory factors for future stock returns which, if found, can be incorporated in a portfolio selection model that may achieve above-market returns.

This paper investigates the efficiency of the Romanian stock market by analyzing the explanatory power of both firm specific ratios (partial research results have been presented to the international conference ICFA'10, Vouliagmeni and included in the proceedings book as Tudor (2010) and foreign investors' purchases on future stock returns. If the study finds significant risk sources for returns, this implies that constructing a stock portfolio on Bucharest stock exchange that incorporates these sources will achieve above-market rates of return, which is a contradiction to Fama's efficient market hypothesis. Also, if foreign investors seem to be better informed than the domestic ones and continually achieve higher profits constitutes proof of information asymmetry, which is another contradiction to EMH.

LITERATURE REVIEW

The previous literature on the efficiency of Romanian capital market is rather scarce, while the subject of firm-specific risk sources or foreign investors' position constitutes a novelty. Dragota and Mitrica (2004) conduct standard tests of market efficiency and conclude that the Romanian stock market is inefficient, although transaction costs and temporary lack of liquidity do not allow earning excessive returns, while Tudor (2009) examines the relationship between stock returns and firm-specific ratios using annual data on the Romanian stock market for the period 2002 to 2008 and documents that both book-to-market equity and earning-price ratios are important risk factors on the Romanian stock market.

On the other hand, many international empirical studies have documented the existence of other risk factors on stock returns, in addition or instead of the CAPM's systematic risk, although, such an investigation is rather new for the Romanian stock market.

One of the pioneer findings was the size-effect documented by Banz (1981). He found that average returns of stocks with low market equity (ME) are too high given their beta and returns of stock with high ME are too low given their beta. Subsequently, many other studies confirmed the negative relationship between firm size and stock returns on different markets (Ziemba, 1991) in Japan, Levis (1985) in U. K. and Brown et al. (1983) in Australia, Keim (1983) in US, Lau et al. (2002) for Singapore and Malaysia, Pandey (2001) for the Malaysian stock market). Handa et al. (1989) argue that the size effect is sensitive to the return measurement intervals used for beta estimation and suggest that betas be estimated with annual returns. Lakonishok and Shapiro (1986) study the historical relationship for the period 1962 to 1981 between stock market returns and the following variables: beta, residual standard deviation (or total variance), and size and show that when January returns are eliminated, the size variable loses its statistical significance.

Another inconsistency of the CAPM, documented first by Bhandari (1988) is the positive linear relationship between stock returns and financial leverage. Leverage is a proxy of financial risk, and therefore, is conceivable to be related to the expected stock return. Nonetheless, under the CAPM, the market beta would incorporate financial risk as well.

Another risk factor for returns was discovered by Basu (1977) who sorted common stocks after their E/P ratio (Earning per Share/ Price per share) and showed that future returns for stocks with higher E/P exceed expected returns computed with CAPM. Subsequent studies show that high E/P (low P/E) stocks still explain stock returns when size and market beta are included in the tests (Basu, 1983; Peavy and Goodman, 1983; Jaffe et al., 1989).

Next, Stattman (1980), Rosenberg et al. (1985) found a positive relationship between stock returns on the US market and their B/M ratio (book value/market value). Pontiff and Schall (1998) and Chan et al. (1985 and 1991) or Chan and Chen (1998) documented this relationship also for the Japanese stock market. Capaul et al. (1993) found evidence in support of this relationship for four European stock markets and for the Japanese one.

Fama and French (1992) show that size and B/M ratio combine to capture the cross-sectional variation in the average stock returns associated with market beta, size, leverage, BE/ME and E/P ratios, while beta does not help explain the cross-section of US average stock returns. Same authors (1998) confirm the same risk sources for returns on twelve non-US major markets and also on emerging markets. As they later state (2004), all these findings are evidence that the contradictions of the CAPM associated with price ratios are not sample specific. Other empirical studies investigated the same relationships using different time periods and different measures for beta. Dennis et al. (1995) confirm Fama and French (1992) findings and Kothari et al. (1995) and also Wang and DiIorio (2007) show that size and B/M ratio are important risk sources. Daniel and Titman (1997) show that the market beta has no explanatory power for stock returns even after controlling for size and B/M ratio. Lakonishok and Shapiro (1984) also find an insignificant relationship between beta and stock returns and significant relationship between stock returns and firm size. Jagannathan and Wang (1996) employed a conditional CAPM, where they allowed for betas and risk premiums to adjust and this model performed well in explaining expected returns.

Finally, the subject of information asymmetry between domestic and foreign investors is controversial and brought mixed empirical results. While Dvorak (2005), Choe et al. (2001) and Hau (2001) showed that foreigners are at disadvantage respectively on the Indonesian, Korean and German markets, Seasholes (2000), Grinblatt and Keloharju (2000) and Froot and Ramodarai (2001) found foreigners to be better informed in Taiwan, respectively Finland and on a cross section of 25 countries.

As mentioned earlier, this paper investigates in both the subject of the relationship between expected stock returns and firm-specific risk factors and the information asymmetry between domestic and foreign investors. If such connections are empirically documented, it can be concluded that the Romanian stock market is inefficient during the sample period.

DATA AND METHODOLOGY

This study includes the analysis all the companies that have been listed on Bucharest stock exchange (BSE) during the period January 2002 to March 2008. De-listed companies (whether as a cause of bankruptcy or by own choice) have not been excluded from the study, trying to avoid in this way survivorship bias. The newly listed stocks during the considered period (by IPO or by

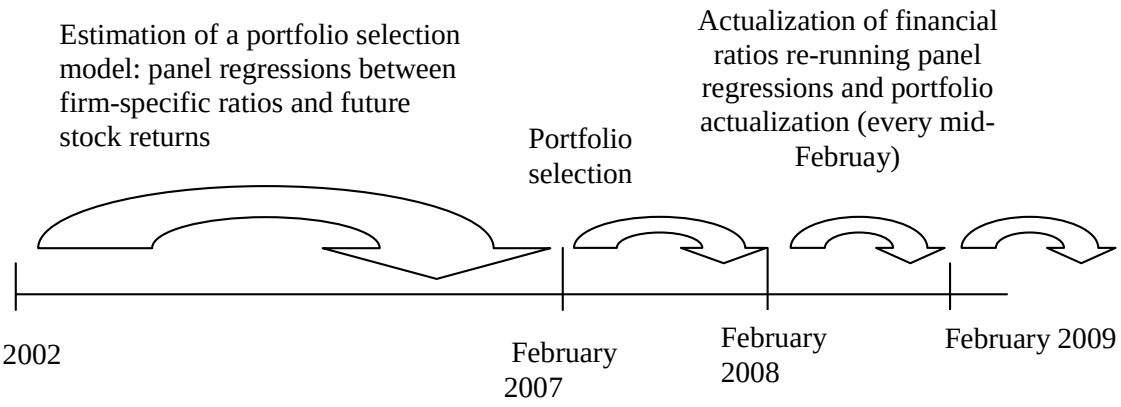

Figure 1. Reflects this methodology.

transfer from another market) are included in the analysis from the time they entered the market. In this way, the study has included 62 stocks in the analysis. Future returns are annual logarithmic returns computed as the future annual change in market value, from the moment of current financial data release, till before the moment when new information is published the following year. In this way, we investigate the relationship between financial ratios in year t and stock returns in year t+1. The methodology is repeated each year, ratios are actualized when new information is released and the market value of each stock from that moment till the publication of new annual information is followed (Figure 1). Further, after the dataset is collected, we employ panel data regressions to investigate the explanatory power on future stock return of market beta and six firm-specific ratios (size, E/P ratio, financial leverage, B/M ratio, ROA and ROE).

For the first two years of the study (2002 and 2003, respectively) the date of financial disclosure by the listed companies is considered to be December 31 of each year, as the actual date is not known. In the case of year 2002 for example, financial ratios are computed at year end and the relationship between these ratios and stock returns for the following year (January 2003 to December 2003) is investigated. Beginning with year 2004, the actual date of financial information release is known (for the most part of the companies, this date is February 15 of each year, or few days prior to this date). Nevertheless, for simplification purposes the study considers this date to be February 15 for all companies in the data set. To make sure that the impact of the new financial information is captured by the future period returns, rather than the same period returns, the study start computing returns for the t+1 period a few trading days after February 15.

In addition, for the same purpose, current-period returns calculation ends a few trading days prior to February 15, to make sure that the current information release is not included in current stock returns for companies who release this information earlier than February 15. The study considers that this does not significantly affect the results, (a previous study, that is, Tudor (2009) included 50 Romanian companies to develop a portfolio selection model based on risk factors proved to impact stock returns) as the study employ annual data in the study and the bulk of information is still captured in our analysis. In other words, after the new information is released in mid February, the current financial ratios are computed for all stocks that have been traded on BSE during the year prior to the current financial data publication.

As mentioned before, the study investigate the impact on future returns of CAPM's beta and also of financial leverage (logarithmic annual change of total assets/book equity or A/B), firm size (logarithmic), the earnings-to-price ratio (E/P), the book-to-market equity ratio (logarithmic annual change - B/M), the return-on-assets ratio (ROA) and return-on-equity ratio (ROE). E/P ratio is zero for negative values and in exchange a dummy E/P is employed which takes the value zero when E/P is positive and value 1 when E/P is zero. In addition, the study introduce another potential impact factor in the analysis which reflects the annual net position of foreign (a previous study, that is, Tudor (2009) included 50 Romanian companies to develop a portfolio selection model based on risk factors proved to impact stock returns), investors (FRGN) on the Romanian stock market (purchases-sales), but the relationship that was study in this case is contemporary. In other words, the study is interested in whether stock returns grow when foreign investors are net buyers and decrease when foreigners are net sellers. One small market like the Romanian one, non-residence have usually more financial power and also experience, which could be reflected in higher returns. It is an intuition that the study want to test empirically.

Finally, in the case of E/P, A/B, B/M, ROA and ROE the study remove the influence of extreme values by eliminating the 5% smallest and highest of the observations and setting them equal to the next smallest/highest observation in the sample. For the estimation of security beta, we employ weekly observations for the stocks listed on the Romanian stock market during the period January 14, 2000 to March 14, 2008. The only condition for a stock to be kept in the study was to have at least two years of trading history. Betas are derived from weekly logarithmic changes in the prices of stocks over a prior period of 3 years. Where three years of data are not available, the study use a smaller time period, but, as mentioned before, never less than two years. The composite market index, BET-C is the proxy for the market. Securities betas are therefore, estimated using OLS, as the slope in the regression equation which is run for each individual company:

$$R_{it} = a_i + b_i R_{mt} + e_i \quad (1)$$

Where:

b_i is the beta estimate for company *i*, employing methodology presented in section;
Rit is the weekly return on stock *i* computed as $\ln(P_{it}/P_{it-1})$ where P_{it} is the stock price level for stock *i* in the last trading day of week *t*, and R_{mt} is the weekly return of the market index in week *t*, computed similarly as $\ln(BET\text{-}C_t/BET\text{-}C_{t-1})$.

The regression is run each year on three (or less) prior years of data concomitantly to the moment of actualization of the six financial ratios (mid-February). In mid February of each year we

therefore, have an estimate for security beta using weekly observations of stock returns and the market composite index during a prior three years period. The relationship between this estimate of beta and future annual stock returns is further investigated in various multifactor models.

The study therefore, employ monthly data and compute six financial indicators for each of the 60 listed companies as well as the net position of foreign investors during a period of six years. The complete dataset will contain a total of 30240 monthly observations on which different panel regression models will be calibrated.

EXPLANATORY FACTORS OF ROMANIAN STOCK RETURNS – A GENERAL-TO-SIMPLE APPROACH

The restricted regression model (the intercept and slopes coefficients are constant both across companies and in time)

The study proceeds to estimate the multivariate regression for the period January 2002 to June 2008 assuming that the intercept is constant both across individuals and in time.

The study estimates therefore, the equation (Appendix I, Panel A):

$$Y_{i_{t+1}} = \beta_1 + \beta_2 X_{2_{i,t}} + \beta_3 X_{3_{i,t}} + ... + \beta_9 X_{9_{i,t}} + u_{i,t} \quad (1)$$

Where *i* is the cross-section identifier (individual stock), *t* is the time identifier (month), X1…9 are the nine

*D*1,*i* is 1 if the observation belongs to the first cross-section identifier (ALR – Alro Slatina) and 0 otherwise;

independent variables, or risk factors and *u* are the model's residuals.

Results show that the explanatory power of the earnings-price ratio is the highest (1.89 significant at 1%), with financial leverage, beta, foreigners' trades and book-to-market equity also playing a statistically significant role in explaining stock returns. On the other hand, company size, ROA and ROE ratios do not have a statistically significant effect. While the overall significance of the regression is significant at 1%, the R squared is rather small (21%).

The fixed effects (FEM) or least-squares dummy variable (LSDV) regression model (different intercepts across firms, but constant slope coefficients)

Nonetheless, as the study investigate 60 different companies during a six years period, not taking into account any differences between individual companies, as well as any difference in their time evolution may very well distort the true relationship between expected stock returns and risk factors. Indeed, the afore-mentioned assumptions are highly restricted. The next step is therefore, to consider the differences between the cross-section identifiers in our pool data (individual companies). In order to accomplish that, we let the intercept vary across cross-sectional units, but still assume that slope coefficients are constant across companies and also over time.

This is the fixed effects model (FEM) or the the least-squares dummy variable (LSDV) regression model:

$$Y_{i_{t+1}} = \alpha_1 D_{1,i} + \alpha_2 D_{2,i} + ... + \alpha_{60} D_{60,i} + \beta_2 X_{2_{i,t}} + \beta_3 X_{3_{i,t}} + ... + \beta_9 X_{9_{i,t}} + u_{i,t}, \quad (2)$$

Where: *D*2,*i* is 1 if the observation belongs to the second cross-section identifier (ALT – Altrom SA) and 0 otherwise; and so on.

The study introduced therefore in the equation 60 dummy variables (one for each stock) in order to compute explicit values for each company. In this way we have eliminated the common intercept, which means that the regression is run through the origin at this point. From the results (not presented), the study notice that all individual cross-section effects are statistically different from zero, although there are not important differences between their values. In order to confirm their statistical equality, the study conducts a Wald test for the null hypothesis that all individual cross-section effects are equal to one another. As expected, the test fails to reject H_0, so we conclude that individual effects seem not to be significant for the dataset. Nevertheless, the results show an increase in the R^2 (which could be due to the increased number of repressors), but also a slight improvement of the adjusted R^2, which may suggests that the second model may in fact do a better job in explaining variation in Romanian stock returns. To confirm this finding, the study conduct a restricted F-test (Gujarati, 2004) which is not statistically significant (F=1.16) and therefore, confirms that the restriction of a constant intercept seems to be valid. Also, both information criteria (Akaike and Schwartz) document that the FEM model does not perform better than the restricted one. Cross-sectional effects seem therefore not to be present in our pool data, which signifies that firm-specific factors are not determinants of future stock returns on the Romanian market, but rather the Romanian stocks are under the influence of more important determinants with

Table 1. Results of the two-way fixed effect model with HCCM.

	A/B	BETA	B/M	Size	E/P	E/P Dummy	ROA	ROE	Foreign trades
Coefficient	0.144	-0.082	0.039	-0.441	0.653	-0.156	0.01	-0.00	0.6186
Standard error	0.035	0.041	0.032	0.39	0.266	0.051	0.00	0.002	0.1246
t-stat	4.07*	-2.01**	1.23	-11.29*	2.44**	-3.05*	2.67*	-1.67***	4.9647*

R^2: 0.643253; Adjusted-R^2: 0.464880; S.E. Regression: 0.386435; F: 3.606216*; DW: 2.066923; AIC: 1.199234; SC: 2.292969. * Significant at 1%; ** Significant at 5%; *** Significant at 10%.

generalized impact on the market.

Time effects model (TEM): Different intercept across time periods (but constant across individuals) and constant slope coefficients

The next step is to allow for the relationship between expected returns and independent factors to vary in time. Intuitively, we expect time-effects to be present, as the Romanian economy underwent significant changes from one year to another during the considered period.

The model that we try to fit to our dataset will be:

$$Y_{i_{t+1}} = \lambda_1 D_1 + \lambda_2 D_2 + ... + \lambda_{65} D_{65} + \beta_2 X_{2_{i,t}} + \beta_3 X_{3_{i,t}} + ... + \beta_9 X_{9_{i,t}} + u_{i,t}; \quad (3)$$

where *D*1*i* is 1 for the observation in the first estimation period (month January 2003) and 0 otherwise; etc. the study have dropped the common intercept again and it estimate explicit values for each year (Panel C in Appendix I).

As expected, time-specific coefficients seem quite diverse in size and sign. Although, time-effects are not individually significant, the Wald test confirms that they vary across periods. Also, the restricted F-test (13.65) documents that the increased R-squared is significant, so it can be concluded that the time-effects model performs better than the restricted one. In addition, the adjusted R squared increased considerably and both Akaike info criterion and Schwartz criterion improved (decreased). The study therefore, concludes that time-effects should be considered in a regression model.

The two-way fixed effects model (TWFEM): The intercept varies across time and companies, but slope coefficients are constant

After the study have seen that individual company effects are not significant, while year-effects are indeed present, it prevent the situation where our model could be mis-specified due to the fact that both individual and time-effects are not taken into account together.

This is the two-way fixed effects model, in which we combine Models 2 and 3:

$$Y_{i_{t+1}} = \alpha_1 D_{1,i} + \alpha_2 D_{2,i} + ... + \alpha_{60} D_{60,i} + \lambda_1 D_1 + ... + \lambda_{65} D_{65} + \beta_2 X_{2_{i,t}} + \beta_3 X_{3_{i,t}} + ... + \beta_9 X_{9_{i,t}} + u_{i,t} \quad (4)$$

The study document a further increase in the R-squared (which is also significant at 5% according to the restricted F-test, signifying that the two-way fixed model performs better than the time-effects model) and also the improvement of the adjusted R-squared. In addition, standard errors of the slope coefficients have decreased and as a consequence their statistical significance has increased. The study decides that this latter model has the most suitable specifications and both firm effects and year effects should be included together when explaining returns.

Correcting for heteroskedasticity: White's Heteroskedasticity-consistent covariance matrix

Finally, the study considers the possibility that our models may be mis-specified due to the presence of heteroskedasticity in the dataset. Also, the standard errors of the estimates and therefore their t-statistics would be incorrect in this situation. These relationships between residuals can be exploited to obtain more efficient estimators. The study therefore, correct for possible heteroskedasticity by estimating the correct standard errors and t-ratios with HCCM (White's Heteroskedasticity-consistent covariance matrix (White, 1980). The study prefers this approach instead of using the weighted least squares procedure.

This will be the model specification the study employ in the investigation of risk factors on Bucharest stock exchange common stocks (Table 1). It is obvious that, while the slope coefficients remain the same, their standard errors decrease significantly. As a consequence, the statistical significance of all explanatory variables increases and all but one factors (all except B/M ratio) help explain returns on the

Table 2. Results of multiple regression models where the least significant explanatory variable is successively dropped.

	A/B	B	B/M	Size	E/P	E/P Dum.	ROA	ROE	FRGN	R-sq	Adj. R-sq	F	AIC	SIC
Coeff	0.12	-0.07		-0.46	0.84	-0.16	0.013	-0.005	0.62	0.64	0.468	3.68*	1.19	2.26
t-stat	4.14*	-1.82		-13.69*	3.82*	-3.26*	2.73*	-3.10*	4.98*					
Coeff	0.10			-0.53	0.78	-0.22	0.02	-0.004	0.63	0.625	0.475	4.18*	1.31	2.33
t-stat	3.94*			-18.83*	4.33*	-4.65*	4.29*	-2.09**	5.12*					
Coeff	0.10			-0.53	0.69	-0.21	0.01		0.71					
t-stat	4.03*			-19.00*	3.94*	-4.54*	3.81*		5.34*	0.624	0.477	4.24*	1.31	2.31
Coeff	0.12			-0.51	1.10	-0.22			0.72	0.62	0.475	4.26*	1.31	2.30
t-stat	4.44*			-18.46*	8.20*	-4.60*			5.46*					
Coeff				-0.50	1.06	-0.20			0.66	0.615	0.470	4.25*	1.32	2.29
t-stat				-18.03*	7.77*	-4.19*			4.87*					
Coeff				-0.46	1.18				0.67	0.610	0.467	4.25	1.32	2.28
t-stat				-17.67*	8.70*				6.03*					

* Significant at 1%; ** Significant at 5%; *** Significant at 10%.

Romanian stock market. The statistical significance of the firm size is the highest, followed by foreigners' trades and financial leverage. On the other hand, E/P ratio has the most powerful impact on stock returns (0.65); significant at 5%, followed by foreigners' trades (0.61) and size (there is a negative relationship between company size and future stock returns of -0.44). ROA and ROE have only a small influence on stock returns (0.012 and -0.003), although, this relationship between the two ratios and stock returns has statistical significance. Surprisingly, the relationship between beta and returns is not only negative (-0.08), but also significant at 5%.

Further, the study continue the general-to-simple strategy by successively eliminating factors with the least impact on stock returns, while keeping unchanged all other specifications in the pooled regression model (Table 2). The study try to find the optimum combination of return factors that have the most powerful combined effect on Romanian stock returns.

As seen earlier, the explanatory power of the regression when all eight explanatory variables are included together is 64.32% (with the adjusted -R squared = 46.48%). After the book-to-market equity ratio is excluded, the decrease of the R^2 is minor and the adjusted R^2 even improves (to 46.81%). In addition, the coefficients and t-statistics of the three most important risk factors (size, foreigners' trades and E/P ratio) become more important when we eliminate B/M ratio from the model. The relationship between size and future returns is negative and equals -0.46, while E/P ratio and FRGN have a strong positive impact on stock returns (0.84, respectively 0.62), both coefficients being significant at 1%. Thus, E/P and size appear to capture the effect of B/M ratio.

The coefficients of financial leverage (A/B ratio) and beta are the only ones that slightly reduce when B/M is removed, but they keep their statistical significance unchanged. All coefficients are significantly different from zero at 1% significance level factors except for beta, whose slope coefficient is significant at 5%.

Further, beta is dropped from the equation and the adjusted-R squared continues to improve (47.59%). The elimination of beta also brings a significant increase in both the coefficient and t-statistic of the company size factor (t = -18.83) and FRGN factor (t = 5.12), while the slope coefficient of the E/P ratio reduces to 0.78, but its t-stat also increases. The positive relationship between A/B and returns continues to reduce with the elimination of another factor (now equals 0.10), while the negative impact of E/P dummy on returns increases. Even though still significant at 1%, respectively 5%, the explanatory power of both ROA and ROE is unimportant (slope coefficients close to zero in both cases). At this point, all slope coefficients, even those whose value has decreased, keep their statistical significance at 1%, except for ROE, whose coefficient is now significant at 5%. Dropping ROE from the regression does not change R^2, improves adjusted R^2 and the impact and t-ratio of size continues to increase (-0.53 with a t-stat of -19.00). The slope coefficients of the other remaining explanatory factors remain unchanged or decrease, but their impact on returns is significantly different from zero at 1% in all cases. With the further elimination of ROA, the increase of the coefficient and t-stat of E/P ratio is remarkable (the slope increases from 0.69 to 1.10, while t stat increases from 3.94 to 8.20). This is not surprising, since ROA and E/P ratio contain indeed similar information. Also, both the coefficient and t-stat of the financial leverage ratio improve, whilst the impact and t-stat of size slightly reduce, but still remain important. The impact of foreigner's trades remains important and somewhat constant across different model specifications. All remaining factors have explanatory power on returns. Financial leverage continues to have the least important

Table 3. Univariate two-way fixed effects with (HCCM).

	A/B	BETA	B/M	Size	E/P	ROA	ROE	FRGN
Coefficient	0.07	-0.05	0.16	-0.46	1.24	0.016	0.004	0.91
std error	0.02	0.04	0.01	0.02	0.14	0.003	0.001	
t-stat	2.51**	-1.07	8.37*	-16.87*	8.32*	4.69*	2.74*	7.85*
R^2	0.501	0.542	0.526	0.588	0.524	0.508	0.502	0.569

* Significant at 1%; ** Significant at 5%; *** Significant at 10%.

impact on returns and is dropped next from the model. At this point the explanatory power of the regression reduces, as well as the slope coefficients and t-ratios off the three remaining explanatory variables. Finally, size, FRGN and E/P ratio, the three most important risk factors on returns combine to capture 61.04% of the variation in stock returns and their coefficients are significantly different from zero at 1% significance level; t-statistics are, respectively, -17.67, 6.03 and 8.70. There is hardly any impact on the explanatory power of the regression between the model that includes all eight risk factors and the final step when only company size, foreigner's trades and E/P help explain stock returns. R^2 reduces from 64.32 to 61.04%, whilst the adjusted R^2 which corrects for degrees of freedom even improves from 46.48 to 46.71%.

Univariate regression models

In the end, the study present the estimates of the two-way fixed effects univariate regressions of stock return (dependent variable) and each of the explanatory variables - financial leverage, unadjusted beta, B/M ratio, size, E/P ratio, ROA, ROE and FRGN (Table 3). Results show that the slope coefficient of the size factor is, as expected, negative (-0.46) and highly significant (t - statistics = -16.87). In addition, its explanatory power (R^2 = 58.85%) is the highest. Stocks of low capitalization firms seem to earn higher returns on Bucharest stock exchange. E/P ratio has an important positive impact on stock returns (slope coefficient of 1.24 with t-ratio of 8.32) and explains 52.42% of the variation of stock returns. Similarly, FRGN strongly influences stock returns (slope coefficient = 0.91, with a R^2 of 56.96%). Beta is the only factor whose coefficient is not different from zero at classical significance levels, while financial leverage, ROA and ROE have a positive but very small relationship with returns. When used alone in explaining stock returns, the impact of B/M ratio is positive (0.16) and highly significant (t-ratio = 8.37).

Conclusions

The two-way fixed effects multiple regression model with HCCM reveals that all but one of the nine risk factors presumed to explain future stock returns (all except B/M ratio) have indeed explanatory power on returns on the Romanian stock market. The statistical significance of the firm size is the highest, and persistently remains the highest when variables are dropped from the regression, even in the univariate setting. The negative relationship between size and returns varies in the interval [-0.53;-0.44], depending on the different number of variables used in the model. The small-firm effect seems therefore to be present on Bucharest stock exchange. E/P ratio has the most powerful impact on stock returns (ranging from a minimum of 0.65 in the multivariate model to a maximum of 1.24 when E/P is the only risk factor) and the positive relationship between E/P and returns remains statistically significant through different regression models.

Similarly, the net trading position of foreign investors on Bucharest stock exchange (purchases-sales) has a strong contemporary relationship with common stock returns. This implies that foreigners are net buyers when stock returns are positive and net sellers when the market has a negative trend. It can be concluded that information asymmetry is a phenomenon found on the Romanian stock exchange and is therefore, a sign of market inefficiency. Most of the variation in stock returns is captured by size, FRGN and E/P ratio together. B/M ratio, although, significant in the univariate regression, loses its significance in the multivariate setting. There does not exist a significant simple relation between stock returns beta. The slope coefficient of beta is always slightly negative, but statistically not different from zero. Market beta, alone or together with other explanatory variables, does not help explain stock returns on the Romanian stock exchange. ROA and ROE have also little impact on returns and their information is captured by the E/P ratio.

Finally, the study has documented that the time effect is significant on Bucharest stock exchange, as a result of different and continually changing economic conditions in the country during the considered period. Also, the two-way fixed effects model (which allows for the intercept to vary both across individuals and in time) provides a better explanation of the future stock returns on the Romanian market.

The study concludes that the findings rejects Fama's efficient market hypothesis on two directions: first, we

have documented that there are some firm specific financial ratios that have a strong impact on future stock returns; secondly, it appears that information does not reach all investors equally, as stated by EMH, and foreign investors consistently outperform domestic investors and the market in general. Therefore, it can be stated that the Romanian capital market seems to be primarily driven by foreign investors, a finding which is not unusual for a small post-communist market. An informed investor could therefore identify significant risk sources for returns and achieve superior rates of return on Bucharest stock exchange. In conclusion, we find that for the analyzed period the Romanian stock market was not efficient. Nevertheless, as all emerging markets, BSE has a very short history and we must draw attention on the short set of trading data available to financial analysts.

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Appendix I. Dependent variable annual stock returns.

Independent variable	Coefficient	Standard error	t-Statistic
Panel A: The restricted regression model (All coefficients assumed constant across cross-sections and time)			
Beta (-1)	0.15	0.09	1.71***
A/B (-1)	0.09	0.05	1.68***
B/M (-1)	0.11	0.06	1.79
Size	0.01	0.02	0.78
E/P (-1)	1.89	0.68	2.75*
E/P dummy (-1)	-0.05	0.12	-0.46
ROA (-1)	0.01	0.01	1.09
ROE (-1)	-0.00	0.00	-0.75
FRGN	0.63	0.08	2.42*
Panel B: FEM (Different intercepts across firms, but constant slope coefficients)			
Beta (-1)	0.15	0.09	1.71***
A/B (-1)	0.09	0.05	1.68***
B/M (-1)	0.11	0.06	1.79
Size	0.01	0.02	0.78
E/P (-1)	1.89	0.68	2.75*
E/P dummy (-1)	-0.05	0.12	-0.46
ROA (-1)	0.01	0.01	1.09
ROE (-1)	-0.00	0.00	-0.75
FRGN	0.63	0.08	2.42
Panel C: TEM (Different intercept across time periods (but constant across individuals) and constant slope coefficients)			
Beta (-1)	0.15	0.09	1.71***
A/B (-1)	0.09	0.05	1.68***
B/M (-1)	0.11	0.06	1.79
Size	0.01	0.02	0.78
E/P (-1)	1.89	0.68	2.75*
E/P dummy (-1)	-0.05	0.12	-0.46
ROA (-1)	0.01	0.01	1.09
ROE (-1)	-0.00	0.00	-0.75
FRGN	0.63	0.08	2.42
Panel D: TWFEM (The intercept varies across time and companies, but slope coefficients constant)			
Beta (-1)	-0.08	0.11	0.72
A/B (-1)	0.14	0.19	0.75
B/M (-1)	0.03	0.06	0.52
Size	-0.44	0.65	0.67
E/P (-1)	0.65	0.38	1.71***
E/P dummy (-1)	-0.15	0.22	-0.68
ROA (-1)	0.01	0.01	1.09
ROE (-1)	-0.00	0.00	-0.75
FRGN	0.61	0.24	2.54*

*Significant at 0.01; **significant at 0.05; ***significant at 0.1.