9. PRICE RATIOS AND THE CROSS-SECTION OF COMMON STOCK RETURNS ON BUCHAREST STOCK EXCHANGE: EMPIRICAL EVIDENCE

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Abstract

This paper tests the relationship between above market returns and beta, size, leverage, book-to-market equity and earning-price ratios for the Bucharest Stock Exchange common stocks. Results from cross-sectional regressions document that both book-to-market equity and earning-price ratios are important risk factors on the Romanian stock market, while, contrary to the CAPM, the relationship between stock returns and beta is insignificant, even when beta is the only explanatory variable. In addition, a portfolio selection model based on the two factors whose explanatory power on stock returns has been previously attested seems to perform well on out-of-sample data.

Keywords: cross-sectional regressions, risk factors, portfolio selection, Bucharest Stock Exchange

JEL Classification: C21, C31, C51, C52

Literature review

The early empirical studies on the Sharpe-Linter-Mossin's CAPM investigate at least one of the following three aspects of the expected return-beta relationship. First, the expected return of a risky asset is linearly related to its beta coefficient and no other factor has an impact on its expected return. Second, the market risk premium should be positive. Third, the expected return on assets which are uncorrelated with the market equals the risk free rate.

Sharpe and Cooper (1972) found a positive relationship between systematic risk and the rate of return on individual assets, but this relationship was not completely linear. Other authors have computed beta for portfolios rather than for individual assets (see, for example Blume (1970), Friend and Blume (1970) or Black, Jensen and Scholes

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(1972)). In the latter paper, the authors documented a positive relation between mean excess return and beta coefficient for portfolios, as stated by CAPM, although alpha (the intercept) exceeded the risk free rate. This finding (alpha higher than the risk free rate) is also supported by other studies, both earlier and recent ones, like Douglas (1968), Miller and Scholes (1972), Blume and Friend (1972), Fama and MacBeth (1973), Stambaugh (1982) or Fama and Frenh (1992). In their 1973 paper, Fama and MacBeth found evidence in support of the CAPM after analyzing the American stock market before 1969. Nevertheless, other authors showed that the positive linear relationship between return and beta was disappearing in recent periods - see Reinganum (1981), Lakonishok and Shapiro (1986), Fama and French (1992).

Unlike Fama and French (1992), who computed betas with monthly returns, Kothari, Shanken and Sloan (1995) computed betas with annual returns and found a positive relationship between expected return on an asset and its beta coefficient. 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. Grundy and Malkiel (1996) found that beta was an important risk factor in periods of declining markets, that is, in fact, when it matters, said the authors.

Reilly and Wright (2004) investigated the risk-adjusted performance for 31 asset classes using a very broad index as a proxy for the market, and their results validated the CAPM.

Tudor (2008) investigates the explanatory power of beta for the Romanian stock market using a stochastic model for returns similar to the one employed by Fama and MacBeth (1973) and concludes that beta does not help explain future stock returns on the Romanian Stock Market.

Another category of empirical studies deals with discovering other important risk sources, besides systematic risk, which may help explaining returns of risky assets. After 1970, many empirical studies found evidence that many other factors are important risk sources for expected return on individual assets. All these findings are evidence against CAPM, which states that only market matters for explaining returns.

One of these factors whose power as a risk source was investigated is the skewness coefficient. A positive linear relationship between expected return and skweness was documented by Kraus and Litzenberger (1976), Sears and Wei (1988) and Lim (1989).

Another prominent contradiction of the CAPM is the size effect of Banz (1981). He found that average returns on stocks with low market equity (ME) are too high given their beta and returns on stock with high ME are too low, given their beta.

Bhandari (1988) found a positive linear relationship between return and financial leverage.

Basu (1977) 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.

Stattman (1980), Rosenberg, Reid and Lanstein (1985) found a positive relationship between stock returns on the US market and their BE/ME ratio (Book Equity/Market Equity, the inverse of Price/Book Value ratio).

Chan, Hamao and Lakonishok (1991) documented this relationship also for the Japanese stock market. Capaul, Rowley and Sharpe (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 BE/ME combine to capture the cross-sectional variation in the average stock returns associated with market beta, size, leverage, BE/ME and E/P ratios. Moreover, their study shows that beta does not help explain the cross-section of average stock returns for the 1963-2000 period.

Fama and French (1993) also try a multifactor model, with the following three factors: the market return, the return on a portfolio of small stocks minus the return of a portfolio on big stocks (SMB), and the return on a portfolio with high BE/ME minus the return on a portfolio with low BE/ME (HML). The three factor model is rejected at traditional significance levels, but it can still capture a fair amount of the variation in expected returns.

Fama and French (1998) found that the same ratios which were found to be risk factors on the US market have the same explanatory power on stock returns on twelve non-US major markets and also on emerging markets. As they state in their 2004 paper, "The Capital Asset Pricing Model: Theory and Evidence", all these findings are evidence that the contradictions of the CAPM associated with price ratios are not sample specific.

Chen, Roll and Ross (1986) used macro variables and market indices as factors and found that industrial production and inflation surprises are priced factors, while the market index might not be.

Mateus (2004) investigates the importance of global risk factors and their impact on stock returns for 13 EU accession countries, including Romania, using both unconditional and conditional asset-pricing tests during the 1997–2002 period and concludes that global instrumental variables have higher predictive power than the local variables in the case of Romania.

This paper is concerned with the investigation of the explanatory power of the same price ratios as the ones employed by Fama and French (1992) on the cross section of stock returns on Bucharest Stock Exchange. An analysis of the impact of price ratios on stock returns has not been previously done for the Romanian listed stocks, at least to the author's knowledge.

Preliminary: Data and methodology

We include in our analysis all the companies that have been listed on Bucharest Stock Exchange (BSE) during the period January 2002-March 2008. The de-listed companies (either as a cause of bankruptcy or by own choice) have not been excluded from the study, trying to avoid in this way selection bias. The newly listed stocks during the considered period (by IPO or by transfer from another market) are included in the analysis from the time they entered the market. The only condition for a stock to be kept in the study was to have at least two years of trading history. In this way, we have included 50 stocks in the analysis. Returns are logarithmic and computed as a change in capitalization or market value of the company from time t to time $t+1$, reflecting all capital adjustments during this period.

All financial ratios are computed annually, after all companies have published their annual financial results as requested by law. For the first two years of the study (2002 and 2003, respectively) this date is considered to be December 31 of each year, as the actual date is not known at this point. Beginning with the year 2004, the actual date of financial information release is considered (for the most part of the companies this date is February 15th of each year).

After the new information is released in 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. Further, logarithmic returns are computed as the future annual change in market value, from the moment of current financial data release, till the moment new information is published the following year. For example, with new financial data on 2002 publicly released (the moment of publication is considered to be December 31st, 2002), we compute current financial ratios for each stock and further compute logarithmic returns after we follow the change in market value of the companies during the year 2003 (till new financial information is released on December 31st, 2003). In this way, we investigate the relationship between financial ratios in year *t* with stock returns in year *t+1*. The methodology is repeated each year, ratios are updated when new information is released and the market value of each stock from that moment till the publication of new annual information is followed.

In the end, from each individual rate of return we subtract the market return (represented by the rate of return of the Romanian stock market's composite index BET-C[1]). We make this adjustment in order to eliminate any macroeconomic influence on all the stock market as a whole. The result, which we will call abnormal return, or above-market return, is the stock return we use in the study for each stock. In this way, we are interested in how much of the above market return of a stock is explained by the considered financial ratios. In addition, the smallest and the highest 5% of the observations are equalized with the next smallest/highest observation, in order to remove the influence of extreme values. Performing simple and multiple regressions on this data, we investigate the explanatory power of the price ratios analysed by Fama and French (1992), such as size, BE/ME, leverage (Assets/Book Value – A/BE) and E/P (which is in fact 1/Price Earning Ratio, but is still relevant when the company reports losses). More precisely, the explanatory factors are the rate of change of the above mentioned financial ratios (computed, as in the case of stock returns, as the logarithmic growth).We use the first seven years of data for estimating a portfolio

[1] *CAPM states that an asset's expected return depends on its beta with regard to the market portfolio of* all *risky investments available to investors. The problem with empirical investigations is that in practice we cannot see this theoretical market portfolio (Roll, 1977) and, therefore, the authors employ different indices as a proxy for the true market portfolio. For US, the usual proxy is the S&P 500 index, but other proxies, such as NYSE Composite Index or Wilshire 5000 index are sometimes used. The general idea is that this market indices employed as proxies for the market should be broad (should include many securities). For the Romanian stock market, we chose the composite index BET-C to represent the market portfolio, as BET-C includes all stocks traded on the Bucharest Stock Exchange and is, therefore, more suitable to proxy the true market portfolio in comparison to the official index BET (which only includes the 10 most liquid stocks from the BSE).*

selection model based on the risk sources whose influence on stock returns has been previously documented and keep the last year (February 2007-February 2008) for testing the validity of this model on out-of-sample data.

Beta estimation

Before investigating the power of the price ratios as risk sources, we must analyse the explanatory power of the systematic risk on the Romanian stock market (the only risk source in the CAPM). In order to accomplish that, we estimate security betas with simple linear regressions, using weekly logarithmic asset returns as the dependent variable (as mentioned before, the individual returns are above market, or abnormal returns) and weekly logarithmic return of the BET-C index (as the proxy for the market) as the independent variable. We consider an eight years period in the beta estimation (January 2000-March 2008) and exclude both de-listed companies and companies that do not have a sufficient trading history.

As mentioned before, in the whole analysis we try to remove the influence of extreme values by removing both the smallest and the highest 5% of the observations and equalizing it with the next observation.

The following linear regression is then run:

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t} R_{BET-C,t} + \varepsilon_{i,t} \,,$$

where *t* refers to week *t* in the 2000-2008 time period.

Testing the power of beta as a risk source on BSE

Further, in the investigation of the beta coefficient as a risk factor on the Romanian stock market we employ a methodology similar to Fama and MacBeth (1973), using the above market returns on assets. Each week, the cross-section of returns on stocks is regressed on variables hypothesized to explain the expected returns.

The following cross-section regression model is employed:

$$R_{it} = \hat{\gamma}_{1t} + \hat{\gamma}_{2t}\hat{\beta}_{i,t-1} + \hat{\gamma}_{3t}\hat{\beta}^2{}_{i,t-1} + \hat{\gamma}_{4t}\bar{s}_{i,t-1}\left(\hat{\varepsilon}_i\right) + \hat{\eta}_{it}$$

The factor β_i^2 is included to test linearity and $s_i(\varepsilon_i)$ represents all non-systematic risk. The disturbance term $\hat{\eta}_{it}$ is assumed to have zero mean and to be independent of all other variables in the model.

The results of the multiple regression equation are presented in Table 1 for the null hypothesis that all gamma coefficients jointly equal zero versus the alternative hypothesis that at least one of the gamma coefficients differs from zero.(H_0: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$; H_a: $\gamma_1 \neq 0$, $\gamma_2 \neq 0$, $\gamma_3 \neq 0$, $\gamma_4 \neq 0$).

Table 1

Sample statistics from multiple regressions of above market stock returns on β, β^2 and $s_i(\varepsilon_i)$: January 2000-February 2008

F	Significance F				
2.47139	0.06229				
	Slope	**t Stat**	**P-value**	**Lower 95%**	**Upper 95%**
γ_1	0.79790	10.01613	0.00000	0.64102	0.95478
γ_2	-0.17822	-0.84446	0.39920	-0.59384	0.23740
γ_3	0.01170	0.08802	0.92993	-0.25000	0.27340
γ_4	-1.38783	-1.19319	0.23390	-3.67838	0.90272

Note: Statistically significant values at a 0.05 significance level are bolded.

The F-test for the null hypothesis that all gamma coefficients jointly equal zero is not statistically significant for a 95% confidence interval, (see also that the p-value exceeds 0.05), so we cannot reject the null hypothesis that all gamma coefficients are zero. The t-tests also show that all slopes (gamma) in the multiple regressions are not statistically different from zero at a 0.05 level (except for gamma 1, the intercept in the equation). One should also note that the intercept exceeds significantly the risk free rate and is statistically significant for a 95% confidence interval. It is important to note that, when interpreting t-tests on data that deviates from normality, upward-biased probability levels lead to biases toward rejection of the hypotheses of the CAPM, with the exception of the expected-return – risk assumption. Therefore, when we cannot reject a null hypothesis under the assumption of data normality, that hypothesis is farther from rejection when the usual “thick-tails” of return distributions are considered (for more details see Fama (1965), Blume (1970) or Fama and MacBeth (1973)). This is the reason why we are not concerned with empirical properties of asset returns in this paper.

In order to detect any changes during the considered time period, we conduct the same analysis for annual intervals. The same regression equation is run on these annual intervals, and the results are displayed in Table 2.

Table 2

Sample statistics from multiple regressions of above market stock returns on β, β^2 and $s_i(\varepsilon_i)$: annual intervals

2001-2000					
F stat	***Significance F***				
0.38510	0.76465				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	0.00850	1.26819	0.21641	-0.00531	0.02231
γ_2	0.00364	0.40754	0.68708	-0.01475	0.02203
γ_3	-0.00401	-0.79518	0.43400	-0.01440	0.00638
γ_4	0.04580	0.57518	0.57031	-0.11819	0.20979

2002-2001					
F stat	***Significance F***				
0.08865	0.96562				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	0.76920	1.93834	0.06395	-0.04810	1.58650
γ_2	-0.04493	-0.07045	0.94439	-1.35839	1.26853
γ_3	-0.04156	-0.13639	0.89261	-0.66913	0.58601
γ_4	1.84848	0.45967	0.64973	-6.43364	10.13059
2003-2002					
F stat	***Significance F***				
3.46197	0.03133				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	**0.88223**	**3.63500**	0.00126	0.38237	1.38208
γ_2	22.45337	1.02064	0.31720	-22.85507	67.76181
γ_3	-799.32888	-0.55496	0.58385	-3765.76016	2167.10240
γ_4	0.80495	0.28535	0.77773	-5.00490	6.61480
2004-2003					
F stat	***Significance F***				
1.01576	0.40232				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	**0.55501**	**3.08036**	0.00497	0.18393	0.92609
γ_2	-18.92558	-1.11098	0.27715	-54.00993	16.15878
γ_3	2405.29797	1.53005	0.13856	-832.38410	5642.98004
γ_4	0.49321	0.15312	0.87953	-6.14073	7.12715
2005-2004					
F stat	***Significance F***				
2.42741	0.08911				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	**1.20642**	**6.38590**	0.00000	0.81733	1.59551
γ_2	**12.90410**	**2.19570**	0.03761	0.80022	25.00798
γ_3	453.86697	1.25215	0.22210	-292.65215	1200.38610
γ_4	**-8.10987**	**-2.41364**	0.02345	-15.02996	-1.18978
2006-2005					
F stat	***Significance F***				
4.73425	0.00528				
	Slope	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
γ_1	**1.07862**	**4.69495**	0.00002	0.61802	1.53922
γ_2	2.79577	1.36743	0.17715	-1.30328	6.89483

γ_3	-11.13403	-1.18452	0.24139	-29.97909	7.71103
γ_4	**-8.26424**	**-2.68111**	0.00971	-14.44408	-2.08441
2007-2006					
F stat	***Significance F***				
1.80557	0.15762				
	Slope	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
γ_1	**0.57941**	**3.75670**	0.00044	0.26992	0.88890
γ_2	2.60659	1.74211	0.08740	-0.39581	5.60900
γ_3	-8.63692	-1.25307	0.21579	-22.46794	5.19409
γ_4	4.20347	1.67934	0.09909	-0.81927	9.22620

NOTE: Statistically significant values at a 0.05 significance level are bolded.

It is worth mentioning that the F-test is statistically significant at the 0.05 level in only two of the eight analyzed years (in 2002-2003 and 2005-2006). These are the only cases when H_0 can be rejected.

The t-test for gamma 2, the coefficient that we are most interested in (the only one that must be statistically significant, as stated by the CAPM) is significant in just one year at the 0.05 level (during 2004-2005), while the t-test for gamma 3 (which represents any non-linear relationship between beta and return) is never statistically significant and for gamma 4 (which represents the influence of non-systematic sources of risk) is statistically significant in two years (2004 and 2005, respectively). If CAPM were right, we would have found significance only for gamma 2 (the linear relationship between systematic risk and return), while the power of the other factors in the multiple regression (represented by gamma 3 and gamma 4) in explaining the return on BSE should have been insignificant. However, as seen earlier, our results do not support any of the CAPM hypotheses tested on the Bucharest Stock Exchange; the few cases when we found support for the considered hypotheses are too isolated and could be accidental. Moreover, the intercept is always statistically significant at the 0.05 level (with the exception of the first year of study) and its value is significantly higher than the risk free rate, from this point of view being closer to Black's version of CAPM.

We further consider the beta coefficient as the only risk source and want to investigate if in this case we find a linear relationship between security beta in period *t-1* and return in period *t*. We consider the following simple regression equation both for each year in the period and for the whole time interval:

$$R_{i,t} = \alpha_{i,t} + \gamma_{i,t}\beta_{i,t-1} + \varepsilon_{i,t}$$

The results document that the slope of the equation (the gamma coefficient) is never statistically significant at a 0.05 level (see Table 3). We can conclude that beta is not a risk source on the BSE and, therefore, CAPM cannot be applied to the Romanian stock market.

Table 3

Sample statistics from regression of above market stock returns (dependent variable) on β (independent variable): annual intervals and whole period

Year	slope (γ)	t-statistics	p-value
2001	-0.00186	0.00330	-0.56355
2002	0.00064	0.00263	0.24165
2003	-0.00389	0.00202	-1.92886
2004	0.00464	0.00372	1.24817
2005	0.05580	0.02989	1.86698
2006	0.04321	0.02352	1.83754
2007	0.01732	0.01779	0.97349
All period (7 years)	-0.122905	0.111951	-1.097850

The power of price ratios in explaining stock returns on the BSE

After concluding that beta has no explanatory power on returns, we proceed to test the power of some price ratios as risk sources on the BSE. We consider the same ratios investigated by Fama and French (1992), whose explanatory power on different markets has been repeatedly proved in many empirical studies. We want to test their power on the Romanian stock market as well.

The factors are:

- Size (the market value of the company);
- The growth rate (logarithmic) of the Book Value/Market value ratio (lnBE/ME);
- Financial leverage (computed as logarithmic growth of assets on equity – ln(A/BE); and
- E/P (Earning per Share/Price per Share) ratio - the inverse of the price multiplier ratio, which is still relevant when the company reports losses).

We run the following cross-section regression (results are presented in Table 4):

$$R_i = \hat{\gamma}_0 + \hat{\gamma}_1 X_1 + \hat{\gamma}_2 X_2 + \hat{\gamma}_3 X_3 + \hat{\gamma}_4 X_4 + (\hat{\varepsilon}_i)$$

where: X_1 – 1/PER or E/P;

X_2 – ln(BE/ME);

X_3 – ln(A/BE);

X_4 – Size;

Gamma 1, 2, 3, and 4 show the linear relationship between these factors and the security returns, while gamma 0 is the intercept in the regression equation. If they are found to be significant, then the price ratios are risk sources and help us explain returns on the BSE.

We notice that unlike the analysis of beta as a risk factor the results show that both E/P ratio and ln(BE/ME) are sources of risk and their correspondent slopes (gamma 1 and gamma 2, respectively) are statistically significant for a 95% confidence interval (see that gamma 1 is 0.54145, while gamma 2 equals 0.129 and both values are significant at the 0.05 level). Our results are so far in range with the findings of Fama and French (1992). The F test for H_0: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ versus H_a: $\gamma_1 \neq 0$, $\gamma_2 \neq 0$, $\gamma_3 \neq 0$, $\gamma_4 \neq 0$ is also significant at the 0.05 level, which allows us to reject the null and accept that at least one of the independent variables of the regression is a factor of risk on the BSE.

In what the γ_3 coefficient is concerned, the slope of the leverage ratio, the conducted t-test does not allow us to reject H_0. The financial leverage of a company does not help to explain returns on the Bucharest Stock Exchange. The same is the case of the company size, the slope of which (gamma 4) is not statistically significant at the 0.05 level. The Romanian stock market differs from the American one in this case and does not associate high returns to smaller companies (companies with low market value).

Table 4

Sample statistics from the regression of the above-market stock returns (dependent variable) on Size, BE/ME, Leverage and E/P

F stat	Significance F				
18.87185363	1.37943E-13				
independent variable	slope	t Stat	P-value	lower 95%	upper 95%
γ_0	-0.45047	-1.41501	0.15830	-1.07745	0.17650
1/PER	0.54145	**2.69823**	**0.00744**	0.14625	0.93666
ln(BE/ME)	0.12996	**5.33830**	**0.00000**	0.08201	0.17790
ln(A/BE)	-0.00800	-0.23481	0.81455	-0.07511	0.05911
ln(ME)	0.02857	1.68913	0.09243	-0.00474	0.06189

NOTE: Statistically significant values at a 0.05 significance level are bolded.

Construction, estimation and testing of a portfolio selection model on the BSE

We hold the only two factors whose explanatory power was proven earlier as independent variables in a new regression model. We will then have:

$$R_i = \hat{\gamma}_0 + \hat{\gamma}_1 X_1 + \hat{\gamma}_2 X_2 + (\hat{\varepsilon}_i)$$

where: X_1 – ln(BE/ME),

X_2 – 1/PER,

and gamma 1 and gamma 2 attest the linear relationship between these two factors and the security returns (the slopes); gamma 0 is the intercept.

The F-test exceeds the critical value and is, therefore, statistically significant at a 0.05 level, which is also supported by the small p-value. As above, we have H_0: $\gamma_1 = \gamma_2 = 0$ versus H_a: $\gamma_1 \neq 0$, or $\gamma_2 \neq 0$. The null can be rejected at 0.05 significance level, so we can conclude, as expected, that at least one gamma coefficient differs from zero and, therefore, that at least one of the independent variables in the equation is a risk factor on the BSE.

Table 5

Sample statistics from the regression of the above-market stock returns (dependent variable) on BE/ME and E/P

F stat	Significance F	
4.399248	0.013474	
	slope	t Stat
Independent variable	0.025271	0.597327
ln(BE /ME)	0.006771	2.391714
1/PER	0.591896	2.83838

Note: The statistically significant values at a 0.05 significance level are bolded.

The t-test for the two slope coefficients proves that both gamma 1 and gamma 2 are significant at the chosen significance level, which means that BE/ME and 1/PER ratio are risk sources on the BSE. In addition, the linear positive relationship between 1/PER and return has increased from 0.54 to 0.59 when we decreased the number of independent variables, while the positive relationship between ln(BE/ME) and return decreased substantially (from 0.13 to 0.006) when factors have been excluded from the model.

Further, we want to test the validity of our results on out-of-sample data. We position ourselves in February 2007 (when new information has arrived and we could conduct all the above regression models). Our study leads us to develop, as seen before, the following portfolio selection model:

$$E(R_i) = 0.025271 + 0.006771 * (\ln(BE/ME)) + 0.591896(1/PER)$$

After constructing our portfolio with the above equation, we follow its evolution during the following year (till February 2008, when the new financial information release would direct us to update our selection model) and compare it with the evolution of an index-tracking portfolio. We want to see if our study allowed us to develop a selection model that could “beat” the market.

At this time (February 2007), however, we consider that we do not know the next year’s results (*ex ante* portfolio selection), and in this way we avoid the so-called look-ahead bias.

We chose to include 15 assets in our portfolio. The number of assets is chosen intuitively, as all mechanisms behind the portfolio construction are not our focus in this paper (15 out of 61 securities traded on the BSE at the time of the portfolio formation are considered to capture all the benefits of diversification).

We will keep the securities with the highest expected return computed with our selection model in mid-February 2007. Table 6 shows these securities, along with their expected return (*E(Ri)*) and the actual return during February 2007-February 2008.

Each security has equal weighting in our portfolio. Our investigation is not concerned with the construction of the best possible portfolio, but rather with showing whether a selection model could help to achieve ”better than market” results.

Table 6

The portfolio constructed with the selection model for February 15th, 2007, and its evolution the following year (till February 14th, 2008)

Symbol	Expected Return ($E(R_i)$)	Actual Return (ln)
EXC	0.120939	0.631112
ART	0.111382	0.544835
BRM	0.110813	0.270365
PTR	0.100632	0.922261
ALR	0.088177	0.436215
MECF	0.083991	0.871839
TEL	0.081008	-0.36681
OLT	0.080725	0.908965
SNO	0.080412	0.421594
ARS	0.073853	0.04652
BRK	0.071917	0.571741
CMF	0.070033	1.149906
VNC	0.065414	0.189242
SNP	0.063346	-0.2537
EFO	0.060791	1.052361

In this way, we find that the portfolio selected with our own model had an annual return of 49.3% during February 15th, 2007-February 14th, 2008, while the composite index BET-C had a negative evolution of -8.92% during the same period. We find that we easily managed to construct a portfolio the evolution of which was significantly better than the market as a whole. Therefore, the selection model seems to hold when applied to out-of-sample data.

Conclusions

We can report that two easily computed ratios, book-to-market equity and EPS/P have consistent explanatory power on stock returns on the Bucharest Stock Exchange. Our results are in range with the findings of other empirical studies, which found the same two ratios to be important risk factors on other international capital markets. An easily constructed equal weighting selection model which considers the two factors can help achieve significantly better results than an index-tracking strategy. Unlike the significant influence that these two ratios have on stock returns, the cross-section regressions attest that beta shows no power to explain returns on the Romanian stock market, not even when used alone. Also, unlike the results of Fama and French (1992), financial leverage and company size have no impact on stock returns on the BSE. The two main relationships that we encountered, namely the positive impact of book-to-market equity and EPS/P on stock returns, together with the total lack of explanatory power of beta are proofs that the Capital Asset Pricing Model fails when applied to the Romanian stock market.

In addition, the fact that a portfolio selection model based on fundamental analysis of listed stocks helps in identifying the stocks that will bring a significant above-market rate of return constitutes an indication that the Romanian stock market is inefficient. In our case, a rigorous financial analysis allowed us to identify and include in an easily constructed equal-weighted portfolio the stocks that have the most powerful relationship with the two price ratios with an impact on future returns. Our portfolio achieved a one-year rate of return of 49.3%, significantly higher than the general evolution of the market, which had a decreasing trend during the same period (-8.92%). We conclude that our finding rejects Fama's efficient market hypothesis[2] and an informed investor can achieve better results on the Bucharest Stock Exchange. In conclusion, over the analyzed period the Romanian stock market was not efficient. Nevertheless, as in all emerging markets the BSE has a very short history and we must draw attention on the short set of trading data available to financial analysts. In our case, the few years of trading data available do not allow us to repeat the methodology and investigate whether our selection model can consistently bring superior investment results.

Authors have found two explanations to the empirical failure of the CAPM (see Fama and French, 2004). A first one is given by the behaviorists, who affirm that stocks with high ratios of book value to market price are stocks of companies that have fallen on bad times, while low B/M ratios characterize growing firms. If an investor is sorting firms on book-to-market ratios he will overreact to good and bad times. Because investors over-extrapolate past performance, this will lead to stock prices that are too high for growth (low B/M) firms and too low for distressed (high B/M, so-called value) firms.

Another explanation is based on the many unrealistic assumptions of the CAPM. Indeed, the assumption that beta constitutes the only risk factor of an asset is unreasonable. In reality, investors care about many variables, both macroeconomic and company-specific, and make their investment decisions accordingly. This is why multifactor asset pricing models that identify and incorporate these priced factors (like in our paper) do a better job in explaining asset returns.

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