

MULTIFACTOR ASSET PRICING ANALYSIS OF THE BALTIC STOCK MARKET

Raimonds Lieksnis*

Riga Technical University, Latvia

Abstract. *This study investigates whether the Fama–French three-factor asset pricing model is applicable for explaining cross-sectional returns of stocks listed in the Baltic stock exchanges. Findings confirm the validity and economic significance of the three-factor model for the Baltic stock market: only investors who chose to invest in value stocks during the reference period achieved positive returns by matching or beating the returns of the stock market index. The monthly returns of 8 Latvian, 13 Estonian and 27 Lithuanian company stocks are analyzed for the time period from June 2002 till February 2010 by the methodology presented in Davis, Fama, and French (2000). Cross-sectional multivariate regression is calculated with stock portfolios representing the book-to-market and capitalization of companies as independent variables along with the stock market index. The study concludes that these three factors in the three-factor model are statistically significant, but, in line with earlier studies, regression intercepts are significantly different from zero and the model is not statistically confirmed.*

Key words: *Fama–French three-factor model, asset pricing, Baltic stock market, value and growth investing, cross-sectional stock returns*

1. Introduction

The Baltic stock exchanges have experienced a period of rapid changes over the last several years. First, they were acquired by the Scandinavian OMX Group which was subsequently taken over by the US giant NASDAQ. The exchanges have become part of the world's largest stock exchange company – the NASDAQ OMX Group with over 3 700 listed companies. It delivers trading, exchange technology and public company services across the globe. Today, all three Baltic stock exchanges and central depositories (except the Central Securities Depository of Lithuania) are mostly or fully owned by NASDAQ OMX, creating a single Baltic stock market. As of June 2010, 36 Baltic public companies are listed in the Baltic Main list, and 54 companies comprise the Baltic Secondary list. However, despite their higher profile, the exchanges continue to face a low turnover and the lack of new listings. One of the ways to overcome this problem and increase the popularity of equity investing among both institutions and individuals in the Baltic

* *Corresponding author:*

Faculty of Engineering Economics and Management, Riga Technical University. 11 Skolas St., Riga, LV-1010, Latvia;
e-mail: raimonds.lieksnis@rbs.lv

countries is to implement research about profitable methods to invest in shares listed in the Baltic stock exchanges. This study aims to extend the knowledge about the ways to make profitable long-term investments in the Baltic equity markets.

There are two basic approaches to making decisions about investing in shares of individual companies. These approaches are a fundamental analysis of a company's financial characteristics and a technical analysis of its stock price history. Although some researchers still support the validity of the technical approach to investing, the majority of scientific research in the world today are devoted to improving the methods of the fundamental approach. However, this important area of research is still undeveloped in the Baltic States, and very few studies exist to cover important areas of asset pricing – the field of finance which deals with uncovering the fundamental factors that affect the price of financial assets – stocks, bonds, and derivatives. In particular, no comprehensive and up-to-date study exists, to the best of author's knowledge, to analyze the impact of the two most popular factors affecting cross-sectional returns of stocks – size and value/growth measures. Together with the general riskiness of a security in the well diversified stock portfolio measured by its beta, these three factors form the Fama–French three-factor model which is prominently featured in the latest edition of the leading US investing textbook (Bodie et al., 2009: 423). There are only two published studies which deal with these factors in the Baltic stock market context. Lyn and Zychowitz (2004) analyzed the monthly total returns of the stock market indices of 13 East European markets, including those of the Baltic States, in relation to their market beta against the world equity index, liquidity measure (market turnover divided by market capitalization), market average earnings-to-price ratio, market average book-to-market ratio, as well as the average dividend yield in each market. The results showed a statistically significant beta for the book-to-market ratio. The study made no cross-sectional factor analysis for individual countries or securities. Devyžis and Jankauskas (2004) collected a sample of stocks and their returns with a minimum market capitalization of 50 million USD from Central and Eastern Europe to include only companies which are recognized by international investors. Only one Latvian, 8 Lithuanian, and 3 Estonian companies made it into this sample. Weekly prices from January 1998 to October 2003 were used. Multivariate regression was calculated, with the market-to-book ratio, P/E ratio, trading frequency measure, share turnover velocity measure, and market capitalization as independent variables. The chosen model lacked the stock market index as an important factor in the standard factor model specifications, so the obtained results were not statistically significant and the regression R^2 did not exceed 5%. However, the authors showed the economic significance of the book-to-market factor by comparing two portfolios: one portfolio was rebalanced each quarter by including 10 companies with the highest ratios, and the other was rebalanced with the same number of companies with the lowest ratios. Companies with the highest book-to-market ratios (value stocks) outperformed the other

portfolios by achieving many times the return of the latter over the reference period. As we can conclude, neither of the studies addresses the applicability of the Fama–French three-factor model to the Baltic stock market, and the aim of this study is to fill this gap in the financial research of the Baltic financial markets.

Despite its shortcomings, the capital asset pricing model (CAPM) remains one of the most widely accepted theories in the asset pricing area of modern finance, which in turn provides scientifically tested tools to equity investors. The classical, one-factor CAPM postulates that the expected return of any stock depends on its beta or regression slope coefficient against return of the stock market index. It was developed in 1960s by William Sharpe (Sharpe, 1964) and John Lintner (Lintner, 1965). The basic version of the CAPM makes several simplifying assumptions (Bodie et al., 2009: 280): all investors plan for an identical holding period, their investments are limited to a universe of publicly traded financial assets, investors pay no taxes and transaction costs, all investors are rational mean-variance optimizers, and all investors analyze securities in the same way and share the same economic view of the world. The one-factor model has not performed well in the extensive empirical tests done by numerous researchers and was finally replaced by another, more advanced, three-factor Fama–French asset pricing model first presented by Eugene Fama and Kenneth French in 1993 (Fama, French, 1993). This model states that, in addition to the market index, the expected stock returns also depend on the size of a company measured by its market capitalization as well as its book-to-market ratio (ratio of a company's book value of equity to its capitalization). Practical implications for equity investors from empirical tests of the model are the following: investors should prefer companies with a high book-to-market ratio ("value stocks") and smaller companies for their investments. This model was showed to be economically significant, i.e. investors can make excess returns by following the proposed investment strategy. However, econometric tests of the three-factor model in Fama and French (1993) proved inconclusive – the F-statistic of the Gibbons, Ross, and Shanken (1989) test (GRS test) which formally tests the hypothesis that all regression intercepts are jointly equal to 0, was rejected at a 5% significance level. Despite this drawback, the model was universally accepted to explain cross-sectional variations in stock returns. A newer study by Chou, Chou and Wang (2004) tests the three-factor model using the same methodology and data sources as in Fama and French (1993), but the time periods are 1982–2001 and 1990–2001. It shows a diminishing effect of size and book-to-market ratio as predictive factors for US stock returns in recent years. A study by Barry, Goldreyer, Lockwood, and Rodriguez (2001) extends the analysis of applicability of the three-factor model to the emerging stock markets. Monthly data for 1985–2000 for stocks of 35 emerging countries are analyzed by sorting the stocks into 25 portfolios based on the relative book-to-market ratio and both relative and absolute capitalization. Eastern Europe is represented by the Czech Republic, Hungary, Poland, Russia, and Slovakia. Relative

measures are used to control for differences in accounting systems and the general size of the companies of the wide sample of emerging countries (the values of factors are scaled to the average for each stock market). The authors find that the significance of the book-to-market factor is robust to the removal of extreme values and employment of both parametric and nonparametric tests. However, the capitalization factor is not robust to the removal of extreme values, and it is not present when the absolute rather than relative capitalization of companies is measured. Most multivariate regression intercepts are still statistically significant, so the study rejects the multivariate three-factor model in line with the earlier research. However, differences in mean returns for the extreme portfolios are large: the SL portfolio yields 2.26% and BL yields -0.2%, while the SH portfolio achieves 5.16% mean monthly return and BH yields 2.11% per month (for portfolio definitions, see the next part).

Following the introduction of the three-factor model, a search for more factors to explain cross-sectional stock returns continued. In subsequent years, two additional factors were discovered – stock price momentum by Jegadeesh and Titman (1993) and stock liquidity by Pastor and Stambaugh (2003). This study aims to test the three-factor model, using the methodology of Davis, Fama and French (2000) and comparing the results with this study. Two additional factors are left for future research.

2. A model for explaining cross-sectional stock returns

Fama and French (1993) proposed to measure the size factor in each period as the differential return on small capitalization firms versus large capitalization firms. This factor is usually called SMB (for “small minus big”). Similarly, the other factor is typically measured as the return on firms with high book-to-market ratios minus that of firms with low ratios, or HML (for “high minus low”). Therefore, the Fama–French three-factor asset pricing model can be specified as

$$r_{jt} = \alpha_j + \beta_j r_{mt} + s_j \text{SMB}_t + h_j \text{HML}_t + u_{jt}, \quad t = 1, 2, \dots, T, \quad (1)$$

where SMB and HML are returns on value-weighted, zero-investment, factor-mimicking portfolios for capitalization and book-to-market ratio, r_{jt} is portfolio excess returns over the risk-free rate, and r_{mt} is the excess return of the stock market index. According to the arbitrage pricing model, if the three relevant factors fully explain asset returns, the intercept of this regression should be zero. This hypothesis is jointly tested using the GRS F-statistics mentioned before. Fama and French (1993) constructed 25 stock portfolios based on size and the book-to-market ratio. The Baltic stock market has a limited number of stocks, which is too small to form such a large number of portfolios, so a more recent study by Davis, Fama, and French (2000) was chosen as a reference for methodology and a comparison of results. This study uses the same equation (1), but employs only

nine value-weighted stock portfolios, and it analyses a sample of monthly returns for all NYSE, Nasdaq, and AMEX listed stocks from 1929 to 1997, excluding financial firms, transportation firms, and utilities. Stocks are sorted each June on their June market capitalization to the three size groups (small, medium, or big; S, M or B). They are also independently sorted into the three book-to-market ratio groups (low, medium, or high; L, M, or H) based on their previous year's book-to-market ratios. The size premium, SMB, is constructed as the difference in returns between the smallest and the biggest size portfolios, and HML in each period is the difference between the highest and the lowest book-to-market ratio portfolios. A broad market index was used as a proxy for market return, and the return on 1-month US Treasury bills was used as a proxy for the risk-free return. The regression results for the time period from 1963 to 1997 are summarized in Table 1.

TABLE 1. Results of three-factor regressions, Davis, Fama and French (2000)

Portfolio	Average excess return	Alpha_j (t-stats)	Beta_j (t-stats)	S_j (t-stats)	h_j (t-stats)	R ²
SL	0.54	-0.22 (-3.31)	1.06 (60.47)	1.22 (39.87)	-0.1 (-4.51)	0.96
SM	0.89	0.03 (0.71)	0.97 (74.53)	1.02 (52.41)	0.31 (13.82)	0.98
SH	1.04	0.04 (1.27)	0.99 (75.12)	1.03 (64.49)	0.62 (25.86)	0.98
ML	0.56	-0.02 (-0.33)	1.07 (71.73)	0.58 (27.08)	-0.24 (-9.73)	0.96
MM	0.77	0.02 (0.31)	1.00 (64.36)	0.48 (22.6)	0.3 (11.22)	0.95
MH	0.96	0.03 (0.53)	1.05 (69.16)	0.55 (28.08)	0.63 (24.23)	0.96
BL	0.45	0.1 (2.89)	0.99 (91.73)	-0.15 (-8.92)	-0.32 (-16.53)	0.98
BM	0.54	-0.04 (-0.7)	0.99 (55.19)	-0.19 (-6.91)	0.25 (8.53)	0.91
BH	0.7	-0.13 (-2.59)	1.04 (76.64)	-0.01 (-0.36)	0.69 (28.53)	0.94

Source: Davis, Fama, and French (2000).

As we can see from Table 1, all of the book-to-market ratio and market index related slope coefficients are statistically significant at a 5% level of significance, but only eight of the nine size-related slope coefficients are statistically significant (marked in bold). In line with earlier research, there are some statistically significant (three of nine) intercepts. However, the regression R² is extremely high, and we can see important differences between average excess returns: small company portfolios (SL, SM, SH) yield an average

of 0.82% monthly return, but big company portfolios (BL, BM, BH) yield only 0.56%. Similarly, high book-to-market ratio company portfolios (SH, MH, BH) yield an 0.9% average excess monthly return, but low book-to-market ratio portfolios (SL, ML, BL) yield only 0.52%. Besides, the small, high book-to-market ratio company portfolio (SH) produced the highest average returns of 1.04% per month. This confirms the economic significance of the three-factor model.

A number of researchers have tried to explain why, besides betas, the size and book-to-market ratio are important factors in explaining cross-sectional stock returns. Risk-based explanations state that the HML and SMB factors contain important information about future economic conditions by which small and high book-to-market ratio companies are affected to a greater extent and therefore investors are compensated for bearing additional risk. Liew and Vassalou (2000) show that returns on HML and SMB portfolios seem to predict GDP growth and thus may in fact capture some aspects of the business cycle risk. Behavioural explanations make the case that the value premium is a manifestation of market irrationality. Investors overreact by bidding up prices of growth companies, and subsequently dumping them as the expected continuation of growth does not materialize. A direct evidence supporting this extrapolation error is provided by Shleifer et al. (1997). These authors examine the value and growth stock performance when actual earning figures are released to the public. They conclude that growth stocks underperform the value stocks surrounding these announcements.

3. The data and empirical results

The capitalization and book values as well as monthly stock prices of up to 8 Latvian, 13 Estonian, and 27 Lithuanian companies with acceptable liquidity (measured by the minimum number of stock sales transactions of 600 deals per year) for the time period from June 2002 to February 2010 were obtained from the NASDAQ OMX website.¹ Financial companies were excluded from the sample in line with Fama and French (1993). Table 2 summarizes the descriptive statistics of the collected sample in comparison with the sample used in the emerging markets study by Barry, Goldreyer, Lockwood, and Rodriguez (2001). In order to compare capitalizations, statistics for the Baltic stock markets were converted from EUR to USD using the average exchange rate over the reference period. As we can see from Table, 2 the sample of the Baltic stocks used for this study does not contain extreme values in terms of book-to-market ratios, unlike the sample used in the study by Barry et al. (2001). The sample used in this study is also comparable with samples for other Eastern European countries in terms of company capitalizations, the average capitalization for the Baltic States being comparable with that of such countries as the Czech Republic and Slovakia. Comparable book-to-market

¹ NASDAQ OMX Stock Exchange website <http://www.nasdaqomxbaltic.com>.

and capitalization figures for the Baltic stock market sample were achieved by filtering out extremely illiquid stocks with a few trades and thus avoiding nontrading bias in the subsequent cross-sectional regression analysis. The nontrading bias (as defined in Damodaran, 2002: 187) arises because the returns in nontrading periods are zero (even though the market may have moved up or down significantly in those periods). Using these nontrading periods, returns in the CAPM-type model regression analysis reduce the correlation between stock returns and factor returns and betas for the analyzed factors. Removing illiquid stocks from the sample allows controlling for this bias.

TABLE 2. Descriptive statistics for Baltic and Eastern European markets

Market	Average BE/ME	Min BE/ME	Max BE/ME	Average cap, million \$	Min cap, million \$	Max cap, million \$
Baltics	1.44	0.14	11.19	151.35	1.00	1,291.58
Czech Rep	2.14	(0.26)	33.33	198.24	0.38	5,111.53
Greece	0.53	0.00	6.25	530.03	6.04	15,162.81
Hungary	0.85	0.08	5.56	387.51	2.54	9,643.34
Poland	0.7	0.04	7.69	310.22	5.04	12,815.11
Portugal	0.76	0.00	8.33	526.70	5.57	15,785.15
Russia	7.23	0.01	100	1,481.01	2.92	35,307.54
Slovakia	3.88	(33.33)	50	60.01	0.47	552.39
Turkey	0.4	(0.11)	5.88	559.21	1.55	15,392.49

Source: Barry, Goldreyer, Lockwood, and Rodriguez (2001), author's calculations.

In line with the reference study (Davis, Fama, and French, 2000), four portfolios were created: high book-to-market ratio, big capitalization companies (BH portfolio), high book-to-market ratio, small capitalization companies (SH portfolio), low book-to-market ratio, big capitalization companies (BL portfolio), and low book-to-market ratio, small capitalization companies (SL portfolio). Sorting was done using the median capitalization and book-to-market ratio as a cut-off variable. Portfolios were rebalanced each June in line with their book value and capitalization at the end of the previous year (an older capitalization number than the one used in the reference study was used here because only the annual figures were available from the NASDAQ OMX website). The size premium, SMB, is constructed as a difference in returns between the small and the big capitalization stock portfolios, and HML in each period is a difference between the high and the low book-to-market ratio stock portfolios. Table in Appendix 1 summarizes the sample of companies included in the four portfolios (the reference year is the year the portfolio was established, i.e. year 2002 portfolios are formed from sorting results in June 2002 and stay active until May 2003). As we can see, the number of the available pool of companies in the first year is very small, which is explained by the lack of company annual reports in the exchange website for this period. As the time progresses,

more companies are listed and more reports become available. Regression in line with equation (1) was performed with the OMX Baltic Benchmark index used as a proxy for the stock market index. The Euro Overnight Index Average rate, or the EONIA rate, was chosen as a proxy for the risk-free rate. It is computed with the help of the European Central Bank as a weighted average of all overnight unsecured lending transactions undertaken in the interbank market, initiated within the euro area by the contributing banks. The regression results are summarized in Table 3.

TABLE 3. Results of three-factor regressions for the Baltic stock market, 2002–2009

Portfolio	Average excess return	Alpha _{<i>j</i>} (t-stats)	Beta _{<i>j</i>} (t-stats)	s _{<i>j</i>} (t-stats)	h _{<i>j</i>} (t-stats)	R ²
SL	-0.58	-1.17 (-3.07)	0.92 (21.16)	0.70 (11.16)	-0.39 (-6.46)	0.88
SH	1.77	-0.76 (-1.71)	0.95 (18.58)	0.87 (11.7)	0.80 (11.37)	0.86
BL	-0.54	-0.98 (-2.12)	0.95 (18.63)	-0.13 (-1.76)	-0.21 (-2.94)	0.82
BH	1.44	-1.17 (-3.07)	0.92 (21.16)	-0.30 (-4.67)	0.61 (10.29)	0.85

Source: author's calculations.

As we can see from Table 3, all the book-to-market ratio and market index related slope coefficients are statistically significant at the 5% level of significance (marked in bold), but only three of the four size-related slope coefficients are statistically significant. In line with Davis, Fama, and French (2000); there are some statistically significant (three of four) intercepts. The regression R² is smaller than in the reference study, which can be explained by the shorter time period of available returns and a smaller number of stocks. Small, high book-to-market ratio company portfolios (SH) produced the highest average returns of 1.44% per month. The overall return impact of the investing value is much more pronounced in the Baltic case in comparison with the US stock market, as investors who chose to invest in the low book-to-market ratio companies lost money in the reference period, as evidenced by negative average excess returns for portfolios BL and SL (Table 3).

4. Conclusions

The three-factor Fama–French asset pricing model is fully applicable to the Baltic stock market. Investors should regularly follow the book-to-market ratios and relative capitalization of companies to make profitable investments in stocks, rebalancing their portfolios at least once per year. The table in the Appendix shows that only three companies (Linās, Ditton pievadķēžu rūpnīca, and Latvijas balzams, marked bold) were part of the

winning SH portfolios in all portfolio rebalancing instances. The study controlled for the nontrading bias, but did not control for the survivorship bias as no information was available about the delisted companies in the OMX website. We can draw the following main conclusions from the study:

1. Capitalization and book-to-market ratio are very significant factors to consider when investing in the Baltic stock markets. As shown in Fig. 1, 10,000 EUR invested in June 2002 in each of the four portfolios yielded completely different amounts in February 2010: SH – 31,002 EUR, BH – 12,023 EUR, BL – 3,685 EUR, SL – 3,614 EUR. Only the investors that invested in small value stocks with high book-to-market ratios (SH portfolio) made money in this period and managed to outperform the market index (OMXB). The portfolio of big value stocks (BH) did as well as the market index, but the two portfolios containing small and big growth stocks with low book-to-market ratios (BL and SL) significantly underperformed the market.
2. In line with the results obtained by Barry et al. (2001), the book-to-market ratio is a more economically significant factor than capitalization to explain cross-sectional returns for Baltic stocks. The average excess return of BH and SH portfolios is positive (1.606% versus -0.557% for BL and SL portfolios), the difference between the two averages being 2.183%. However, the average excess return of BH and BL portfolios is 0.903% and 1.195% for SL and SH, so small capitalization stocks outperformed large capitalization stocks only by 0.292% per month.

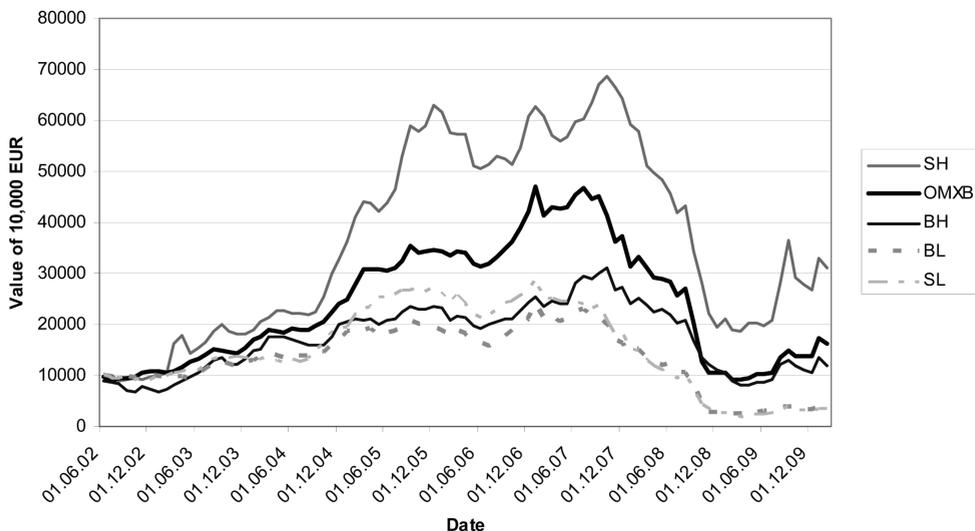


FIG. 1. Value of 10,000 EUR invested in June 2002, four factor portfolios and market index.

Source: author's calculations.

3. The results of the study confirm the original results of Davis, Fama and French (2000) that, although the 3-factor model produces a good approximation of reality, it is not statistically acceptable, and regression alphas are statistically significant. Thus, the search for the best cross-section factor model for equity market may be continued.

REFERENCES

- Barry, C.B., Goldreyer, E., Lockwood, L., Rodriguez, M. (2001). **Robustness of size and value effects** in emerging equity markets. *Emerging Markets Review*, Vol. 3, Issue 1, pp. 1–30.
- Bodie, Z., Kane, A., Marcus, A.J. (2009). *Investments*. 8th ed. New York: McGraw-Hill/Irwin.
- Chou, P.H., Chou, R.K., Wang, J.S. (2004) On the cross-section of expected stock returns: Fama–French ten years later. *Finance Letters*, Vol. 2, Issue 1, pp. 18–22.
- Damodaran, A. (2002). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*. University edition. New York: John Wiley and Sons.
- Devyžis, L., Jankauskas, G. (2004). Explaining the cost of equity in central and Eastern Europe. *SSE Riga Working Papers* 2004:13 (68). Available at: http://www.sseriga.edu.lv/library/working_papers/FT_2004_13.pdf
- Davis, J. L., Fama, E., and French, K. (2000). Characteristics, covariances, and average returns: 1929 to 1997. *The Journal of Finance*, Vol. 55, Issue 1, pp. 389–406.
- Fama, E. F., French, K. R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics*, Vol. 33, Issue 1, pp. 3–56.
- Gibbons, M. R., Ross, S. A., Shanken, J. (1989). A test of the efficiency of a given portfolio. *Econometrica*, Vol. 57, Issue 5 pp. 1121–1152.
- Jegadeesh, N., Titman, S. (1993). Returns to buying winners and selling losers: implications for stock market efficiency. *The Journal of Finance*, Vol. 48, Issue 1, pp. 65–91.
- Liew, J, Vassalou, M. (2000). Can book-to-market, size, and momentum be risk factors that predict economic growth? *Journal of Financial Economics*, Vol. 57, Issue 1, pp. 221–245.
- Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, Vol. 47, Issue 1, pp. 13–37.
- Lyn, E.O., Zychowitz, E.J. (2004). Predicting stock returns in the developing markets of Eastern Europe. *The Journal of Investing*. Vol. 13, pp. 63–71.
- Pastor, L., Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *The Journal of Political Economy*, Vol. 111, Issue 3, pp. 642–685.
- Sharpe, W. (1964). Capital asset prices: a theory of market equilibrium. *The Journal of Finance*, Vol. 19, Issue 3, pp. 425–442.
- Shleifer, A., Lakonishok, J., La Porta, R., Vishny, R. (1997). Good news for value stocks: further evidence of market efficiency. *The Journal of Finance*, Vol. 52, Issue 2, pp. 859–874.

APPENDIX. Companies included in the four Baltic stock market portfolios, 2002–2009

Company	2002	2003	2004	2005	2006	2007	2008	2009
Alita		BL	SH	SL	SL	SL	SL	SL
Anykščių vynas	SL	SH						
Apranga			SL	SL	BL	BL	BL	BL
City Service							SL	SL
Dvarčionių keramika		SH	SH	SH	SH	SL	SH	SL
Grigiškės		SL	BL	SL	SL	SH	SH	SH
Invalda			BL	BL	BH	BH	BL	SH
Klaipėdos nafta		BH	BH	BH	BH	BH	BH	BL
Lietuvos dujos		BL	BL	BL	BH	BH	BH	BH
Lietuvos elektrinė		BH	BH	BH	BH	BH	BH	BL
Lietuvos energija		BL	BL	BL	BH	BH	BH	BL
Lietuvos jūrų laivininkystė			SH	SH	SH	SH	SH	SH
Lifosa		SH	SH	BH	BL	BH	BL	BL
Limarko laivininkystės kompanija		SH	SH	SH	SL	SH	SL	BL
Linias		SH						
Panevėžio statybos trestas		SH	SH	SH	SH	SL	SL	SH
Pieno žvaigždės	BL	BL	BL	BL	SL	SL	SL	BL
Rokiškio sūris		BL	BH	BL	BH	SH	BL	BL
Rytų skirstomieji tinklai		BL	BL	BH	BH	BH	BH	BH
Sanitas		SH	SL	SL	SL	BH	BL	BL
Snaigė		BL	BL	BL	BL	SL	SL	SH
Stumbras			BH	BH	BL	BL	BL	BL
TEO LT	BH	BL						
Vilkyškių pieninė						SL	SL	SH
Vilniaus baldai		SL						
VST				BH	BH	BH	BH	BL
Žemaitijos pienas			SH	SL	SH	SH	SH	SH
Arco Vara							BH	SH
Baltika	SL	SL	SL	SH	SL	BL	SL	BL
Ekspress Grupp							SL	SH
Harju Elekter	SL	SL	BL	SL	SL	SL	SL	SL
Jaarvevana	BL	SH						
Nordecon International						BL	BL	BL
Norma	BL	BL	BL	BL	BH	SH	SH	BL
Olympic Entertainment Group						BL	BL	BL
Silvano Fashion Group	SH	SH	SL	SL	SL	BL	BL	SH
Tallina Kaubamaja	BL	BL	BL	SH	BL	BL	BL	BL
Tallinna Vesi					BL	BL	BL	BL
Tallink Group					BL	BH	BH	BH
Trigon Property Development	SL	SL	SL	SL	SL	SL	SH	SH
Ditton pievadkēžu rūpnīca	SH							
Latvijas balzams	SH							
Latvijas gāze	BL	BL	BL	BH	BH	BL	BH	BL
Liepājas metalurģs	SH	SH	SH	BH	SH	SH	BH	BH
Rīgas kuģu būvētava	SH	SH	SH	SH	SH	SL	SH	SH
SAF Tehnika				BL	SL	SL	SH	SH
Valmieras stikla šķiedra	BH	BH	BH	BH	BL	SL	SH	SH
Ventspils nafta	BH							

Source: author's calculations.