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Bachelor's Thesis

Momentum in Mature and Emerging Markets under Different Market States: the Case of the Baltic Region

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Abstract

The paper investigates momentum profits in the emerging and unexplored Baltic markets and compares the results to the developed Swedish market. In addition, recent economic turmoil helps the study capture the effect of different market states on momentum returns. We employ the methodology by Jegadeesh and Titman (1993) to construct momentum portfolios and the methodology by Rouwenhorst (1998) to measure the impact of market states on momentum profitability. We uncover that momentum profits tend to be positive, but statistically insignificant in the Baltic States. In comparison, momentum returns in Sweden are found to be positive and statistically significant. The difference is mainly driven by the lower returns of losers in Sweden. Also, we document that momentum returns cannot be fully explained by the Fama and French factors and the liquidity risk factor. In addition, we find that market states can explain momentum returns to a large extent - more momentum exists in expansionary periods in both markets.

"If the force is greater than the resistance, motion will result…"

John Wallis, 1670

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Introduction

The 21st century has brought an abundance of sophisticated financial products. It has become easier and cheaper to replicate the market portfolio. One can even choose to concentrate on a specific region or sector or use leveraged products to match the desirable investment risk level according to the investors' risk aversion while capturing the benefits of wide diversification (Ferri, 2009). Such innovativeness should be highly valued by supporters of Modern Portfolio theory. Despite such development of the financial markets some traders are still sacrificing the benefits of these products while trying to "beat the market" by using extensive research or superior knowledge (Nagornia, 2005). People imagine that they could predict stock returns by combining publicly available information, such as historical performance, and achieve abnormal returns. In this way, a number of trading strategies have been created.

Momentum trading is one of these strategies. Its roots date back to the 1960s. Nonetheless, momentum strategy became widely known only in the early 90s after N. Jegadeesh and S. Titman published their study. In brief, people are supposed to buy relatively strong financial assets, in academic literature defined as *"winners"*, while short-selling relatively weak ones – *"losers"*. The relative strength of the securities is defined as their performance over the last 3-12 months. This strategy is found to "beat the market" by approximately 1% a month (Jegadeesh and Titman, 1993).

After the introduction of this strategy, a number of studies were carried out to prove or deny abnormal returns. However, most momentum strategy studies have concentrated exclusively on the US market and only a few authors have touched on non-US stock exchanges. Among non-US studies, the majority of papers investigated momentum in developed markets rather than in emerging markets. As momentum profits may be explained by market inefficiency, we hypothesize that underdeveloped stock exchanges may show higher momentum due to their lower efficiency level.

The Baltic States were even more neglected as no reference from accredited financial literature could be found. The only attempt to investigate momentum in the Baltic States was carried out by two students of the Stockholm School of Economics in Riga in their bachelor thesis. Exclusively huge economic swings in the Baltics (even compared to other emerging markets) in the past decade make these three countries particularly interesting for analysis. Lack

of empirical findings as well as the extraordinary economic situation of the Baltics gives us incentives to contribute to the existing academic literature with more up-to-date data.

Most researchers concentrated on the analysis of time-series data of one country or cross-sectional data of several countries that possess similar development levels. In comparison, our study researches momentum returns in both emerging and developed markets and compares them. Applying the same methodology for both markets provides higher comparison validity than researching only the Baltic market and comparing its results with the findings of other previous studies. The authors choose the Stockholm Stock Exchange as the most suitable developed market for the comparison because of its similarities and connections with the Baltic markets. Firstly, the Stockholm Stock Exchange has already experienced two financial downturns caused by the different sources: the local banking crisis in the early 1990s and the recent world financial crisis. The same two problems are currently present in the Baltic States. Secondly, the capital markets in the Baltics are highly influenced by Swedish banks. Thirdly, the three Baltic markets as well as the Stockholm Stock exchange belong to the OMX NASDAQ group. The main differences between the markets are that the Stockholm Stock Exchange is much more liquid. Moreover, investors can easily short sell stocks or satisfy their trading needs in a well functioning derivatives market. Therefore, we try to identify whether these differences influence momentum returns. Consequently, the first part of our research question is: **"How profitable is momentum trading in the Baltic States and in Sweden?"**

The recent economic instability not only boosted the concerns about behavioral finance, but also provided fruitful data for the analysis of different market states[1]. As the Baltic Stock Exchanges had experienced a massive rally that was followed by the recent harsh turmoil, we are now able to investigate the impact of different market states on momentum returns in the Baltic States and answer the second part of our research question: **"How differently are returns in the Baltic States and in Sweden affected by the changing market environment "** The difference in the results might be caused by the higher importance of behavioral finance during a negative market trend and, as a consequence, by lower market efficiency at that time. Also, stop-loss behavior is more active when the market state is negative, which leads to a

[1] Market state is defined as a measure of the financial market environment. Market state in the study is measured by the performance of the stock market index, GDP, and Interbank Offered Rates. For example, market state is UP when the performance of the market index performance is positive during the past year.

further drop in losers' prices. This process suggests higher profits for the short sold stocks which are held in the losers' portfolio. Both facts may suggest higher momentum profitability in the negative market state. However, the effect depends on the extent to which other investors may be willing to buy recent losers that they find already cheap and undervalued. All in all, the recent exclusive economic swings in the Baltics should help us better investigate the effect of the market state on momentum trading.

The following research is structured as follows. Section 2 presents the relevant literature on momentum trading. Section 3 describes the data used in the research, while the methodology used to calculate momentum returns and compare them between two countries is presented in section 4. Finally, in section 5 we discuss the empirical findings and section 6 concludes the research.

Review of Literature

The review of literature is divided into three general parts in order to consistently illustrate how the previous scientific articles are relevant to our study. Firstly, we give an overview of the papers that investigate the opposite trading strategy to momentum – buying past losers and selling past winners. The analysis of this strategy, which is widely called contrarian strategy, gave the background for examining momentum trading on which we concentrate. Thus, we find it relevant to touch upon the studies concerning contrarian strategy before digging deeper into the literature on momentum trading. In the next section we provide the evidence of abnormal momentum returns under different market environments together with the papers that try to explain excess profits based on various factors. The final section presents how behavioral finance is related to momentum trading.

Contrarian Strategies

Contrarian strategy literature reached its peak of popularity in the late 1980s – early 1990s. That type of trading is based on the idea that individuals tend to overreact to information, implying that stock prices may also overreact. The latter phenomenon is suggested by DeBondt and Thaler (1985) who find that contrarian strategies generate abnormal returns. They conclude that stocks which were losers over the previous 3 to 5 years generate higher returns than past winners in the 3- to 5-years holding periods. However, such results received a lot of critique,

which argued that the findings can be explained by systematic risk or the size effect[2]. Moreover, the January effect makes the impact of overreaction on the results even more vague as the stocks which performed poorly during the previous years achieve higher returns only in Januaries.

Subsequent studies found that contrarian strategies are profitable in shorter time spans. Jegadeesh (1990) and Lehmann (1990) show that the strategy of choosing stocks according to their performance in the previous week or month earns significant abnormal returns. However, other papers argue that their results can hardly be attributed to an overreaction effect, but are rather caused by a delayed stock price reaction to common factors (Lo & MacKinlay, 1990), the presence of short-term price pressure or a lack of market liquidity (Jegadeesh & Titman, 1991).

To sum up, even though the findings of the papers mentioned above concerning contrarian strategy are debated by other researchers, they find two possible time spans for when abnormal profits may exist – very short term (over a week to a month) and very long term (over 3- to 5-year period). The gap between them remained incomplete which created incentives for momentum trading researchers to step in.

Relative Strength and Momentum Strategies

Relative strength strategies that buy past winners and sell past losers were investigated to some extent already in the early literature on market efficiency. The most remarkable paper was written by Levy in 1967 who documented that the strategy of buying stocks priced significantly higher than their average price over the past 27 weeks generated abnormal returns. However, Jensen and Bennington (1970) dismissed such findings as a selection bias since they found that Levy's trading rule did not perform better than a buy and hold strategy in their sample period which was mostly outside Levy's timeframe of data.

Even though contrarian literature was dominant around 1990, some papers concerning the trading practices used at the time concluded that relative strength strategies were prevalent among practitioners. For instance, Grinblatt and Titman (1989, 1991) found that the majority of mutual funds tended to purchase stocks whose prices that had increased over the previous 3 months. In addition, the examined mutual funds showed successful results suggesting that relative strength strategies may be a source of abnormal returns. What is more, some non-accredited evidence claimed that relative strength strategy practitioners selected the stocks based

[2] See Chan (1988), Ball & Kothari (1989) or Zarowin (1990)

on the past 3- to 12-month period (Jegadeesh and Titman, 1993). The facts mentioned above inspired Jegadeesh and Titman in 1993 to investigate the profitability of relative strength strategies over the time span of 3-12 months. They published a remarkable paper "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency" where they introduced the momentum trading strategy into financial literature. Momentum strategy became one of the most common phenomena investigated in market efficiency and behavioral finance studies in the last two decades. The authors based their work on the NYSE and the AMEX stocks over a sample period from 1965 to 1989. They concluded that the self-financing strategy of forming a portfolio while buying the top 10% and selling short the bottom 10% of stocks is profitable over medium-term (between 3 and 12 months). It generates on average 12.01% abnormal returns annually if they rank the stocks according to their returns during the recent 6 months, and hold them for the same period. Although the strategy based on the 12-m/3-m[3] holding period appears to be the most rewarding, the 6-m/6-m time span was chosen for detailed investigation. They concluded that neither systematic risk, nor lead-lag effects could explain abnormal profits. Abnormal returns are argued to mainly appear due to the serial correlation in the firm-specific information. Increasing the holding period to 36 months leads to a decline of abnormal returns of the constructed portfolio. Similar long-term reversals in stock returns are documented by De Bondt and Thaler (1985), Lee and Swaminathan (2000), and Jegadeesh and Titman (2001) who find that losers outperform winners in the next 3 to 5 years.

Rouwenhorst (1998) contributed to the momentum literature by providing an early support for the results of Jegadeesh and Titman from an international perspective. The author examined 12 European Stock Exchanges within the time span of 1980-1995 using the similar methodology as Jegadeesh and Titman in 1993. Rouwenhorst found that momentum strategy was profitable in the medium term in all the stock markets generating on average 1% monthly return after adjusting for risk. In addition, stock returns were found to be negatively related to the companies' size, but not limited to small companies. Strong correlation of momentum returns

[3] Hereafter all the momentum strategies are defined in the following way. The abbreviation 12-m/3-m stands for the 12 month formation period and 3 month holding periods.

between the United States and European markets suggests that abnormal returns are driven by a common factor and do not occur by accident.

In a more recent paper Jegadeesh and Titman (2001) examined whether the momentum effect still existed in the years subsequent to their first study. They investigated the NYSE in 1990-1998 using the slightly different methodology. They found that the momentum anomaly was still present as the winners' portfolio outperformed the equally weighted market index by 0.56% a month, while the losers' portfolio underperformed the market index by 0.67% a month. Such consistent results over time concerning the momentum anomaly suggest that the momentum effect can hardly be attributed to time series bias.

A lot of researchers try to explain momentum profits by other factors, such as size, value, industry, country effects, but not all of them find the proof. For instance, Fama and French (1996) document that momentum cannot be explained by their famous unconditional three-factor model. Moskowitz and Grinblatt (1999) demonstrate that momentum in individual stock returns is almost solely caused by momentum in industry returns in the United States. In addition, they show that industry momentum strategy (buying stocks from industries that performed well and selling short stocks from industries that performed poorly) generate high abnormal returns even when controlling for many other factors (e.g. size, book-to-market, etc.). Furthermore, industry momentum and individual stock momentum are claimed to be separate phenomena by Grundy and Martin (2001). As for country momentum, there are controversial opinions on whether such an effect exists at all. Chan et al. (1996) report the 6-month momentum effect, whereas Richards (1997) finds no country momentum effect in the medium term. Nijman, Swinkels and Verbeek (2004) try to measure both industry and country effects on individual stock momentum in Europe. They document little impact of the industry effect and an even weaker country effect concluding that stock momentum is mainly attributed to individual stock effects. The results do not change after including the size and value factors.

Other papers try to explain stock momentum profitability using different macroeconomic indicators or market states. For example, a remarkable work in this field was published by Chordia and Shivakumar (2002) who report that a set of various macroeconomic factors (e.g. market dividend yield, default and term spreads, and short term bond yield) explain a part of momentum profits in the US. In addition, Cooper, Gutierrez, and Hameed (2004) find that momentum profits depend on the market state. Based on the US data for the 1929-1995 period,

they report positive 0.93% monthly momentum trading returns in a positive market state, while negative 0.37% monthly returns in a negative market state. Moreover, they conclude that momentum profits cannot be explained by macroeconomic factors. Griffin and Martin (2003) also support the latter finding concerning the attribution of macroeconomic factors to explaining momentum either abroad or in the US. However, they conversely conclude that momentum profits prevail in both good and bad market states.

Some studies associate momentum profits to other factors. For example, Chan, Jegadeesh, and Lakonishok (1996) find that earnings momentum is associated with return momentum. Lee and Swaminathan (2000) report that the stocks with larger turnover have more momentum. Hong, Lim, and Stein (2000) document that the small companies having low analyst coverage show higher momentum. Grinblatt and Moskowitz (2003) claim that the small firms with few institutional owners, growth firms, and high volume firms are likely to possess more momentum.

Emerging Markets

So far, emerging markets have not been thoroughly analyzed by the researchers. Rouwenhorst (1999) found that momentum in emerging markets is driven by qualitatively similar factors to developed markets. The author concludes that based on 1982-1997 data, momentum returns of approximately 0.5% per month exist. However, the result cannot be directly compared to the returns of developed markets if the top 30% stocks and the bottom 30% stocks are used to form portfolios. Additionally, he finds that small firms outperform large firms, and value stocks outperform growth stocks, while high beta stocks do not outperform low beta stocks. No direct relation between stock turnover and expected return is documented, but turnover is found to be correlated with other return factors. Griffin and Martin (2003) report statistically insignificant momentum profits for emerging markets when the full sample or the period of positive market state is used. However, when the market state is negative, momentum returns prevail, but are still lower than in developed markets. The more recent paper by van der Hart et al. (2005) concludes that momentum returns exist in emerging markets according to 1989-2004 data. They find that a momentum trading strategy gives 0.74% monthly returns, and the top stocks outperform the equally weighted market index by 0.36% per month if the whole period is used. For years 1999-2004, which are more relevant to our study, the results do not differ substantially. In addition, they report that neither emerging market risk, nor global risk

factors (including the market, the book to market and the size factors) can explain the significant excess returns.

The only paper which investigates momentum in the Baltic Stock Exchanges was written by the Stockholm School of Economics in Riga students Maniusis and Urba (2007) as their bachelor thesis. The methodology used is based on Jegadeesh and Titman (1993). However, the authors form portfolios each week instead of each month, which may suggest that the paper suffers from data mining. Forming portfolios each week may basically multiply the dataset by four since the portfolios are likely to be very similar between consecutive weeks. Because of such formation, the results become more significant. In addition, we find no practice of such formation technique in the accredited financial literature. Therefore, the results documented by Maniusis and Urba (2007) might be questionable. We interpret them with caution and hardly use them in our paper for comparison with our results or for major conclusions. Nevertheless, their study employs 2000-2006 data and excludes delisted stocks. The authors find positive and statistically significant short run momentum returns in the Baltic Stock Exchanges. To be precise, a 12-month formation and 3-month holding strategy is found to be the most profitable generating approximately 6% yearly returns. In addition, they uncover that the existence of momentum returns cannot be explained by market inefficiency related factors.

Behavioral Finance

The behavioral finance supporters ground momentum returns on two theoretical models. Kent, Hirshleifer, and Subrahmanyam (1998) have developed a theory where investors' overconfidence creates self-attribution bias. In simpler words, the investors tend to attribute positive results to their skills while the failures are often assumed to be caused by market noise. In this way, investors' overconfidence is enlarged by the confirming news, which in turn creates an overreaction of stock prices. This process continues until investors realize their mistakes (medium-term momentum) and eventually the prices correct to their fundamental values (long-run reversal). This theory is extended by Gervais and Odean (2001) who claim that expansionary market conditions should result in higher aggregate overconfidence and naturally lead to higher medium-term momentum profits.

Another model, developed by Hong and Stein (1999), assumes initial price under-reaction to the news due to gradual information spread among "newswatchers". Such under-reaction is hypothesized to create positive serial autocorrelation among stocks' returns which in

turn attracts momentum traders and leads to price overreaction. The extension of the model incorporates a risk aversion coefficient for momentum traders. The coefficient tends to decrease during expansionary market conditions. In addition, expansionary market conditions are found to be associated with higher momentum trading profits.

The latter model is further tested by Hong, Lim and Stein (2000) who hypothesize that stocks with slower information flow should provide higher momentum profits. They report that this tendency was in fact noticable during the two sub-periods prior to when the momentum trading was documented by Jegadeesh and Titman in 1993. However, the authors fail to find a significant relationship between information flow and momentum profits in the sub-period of 1991-1996. The authors claim that the startegy might have been already caught by arbitrageurs and thus might be hardly noticable in the future.

Furthermore, the theoretical models and their specifications about the impact of business cycles on momentum are later confirmed by the empirical findings of Cooper, Guitierrez and Hameed (2004). They show that momentum profits are significantly larger in the medium-term during expansionary periods even after adjusting for systematic risk. In addition, the authors find that the medium-term momentum is followed by a trend reversal or correction that is predicted by theoretical models. These findings enable the authors to conclude that the behavioral finance models are powerful tools for explaining the lagged-return anomalies.

Another important behavioral finance branch that tries to explain momentum profits largely concentrates on the institutional herding effect. The majority of the authors find that positive momentum profits are associated with an institutional herding effect (Wermers, 1999) and that this effect is explained by bilateral causality (Nofsinger & Sias, 1999). Another study, carried by Kaminsky, Lyons and Schmukler (2004), finds that mutual fund managers are actively engaging into lagged momentum trading during non-crises periods. They also document that during crises trading strategies of these mutual funds are mostly determined by individual investors' cash flow movements that follow contemporaneous momentum trading (Griffin, Ji & Martin, 2003).

Nonetheless, the behavioral finance approach to momentum trading has its flaws. Firstly, it is highly criticized by Fama (1998) that behavioral finance models just capture the results that they were designed to explain. Moreover, it is commonly argued that abnormal momentum returns should become unprofitable after being noticed by the public in 1993. However, as

mentioned previously, this critique is partly addressed by Hong et al. (2000) who fail to find abnormal returns associated with gradual information flow in the sub-period of 1991-1996. Moreover, two more studies try to explain the profitability of momentum trading strategies in the post-1993 period by attributing it to tech bubble (Hwang & Rubesam, 2008; Henker, Martens, & Huynh, 2009) and find that, in fact, momentum trading is becoming unprofitable. However, the mentioned studies are only working papers and are not accredited by serious academic literature. Thus, strong conclusions about the disappeareance of momentum profits in the 21st century cannot be drawn.

Methodology

Data

The data for this study includes all the stocks listed on the three Baltic Stock Exchanges (Vilnius, Riga and Tallinn) and the Stockholm Stock Exchange on the 31st of December, 2009, as well as stocks delisted from the Baltic Stock Exchanges during the analyzed period. The sample covers the time period from the 1st of January, 2000 to the 31st of December, 2009 in the Baltic States and from the 1st of January, 1986 to the 31st of December, 2009 in Sweden. Even though the data coverage for two markets is not identical, the authors believe that wider historical data of Swedish companies provides better comparison possibilities of different market development stages. In total, data for 92 currently listed stocks and 47 delisted stocks from the Baltic States as well as 288 listed stocks from Sweden was retrieved. However, as dual class shares, which are quite common in Stockholm Stock Exchange, are considered separately in this research, the number of analyzed companies in the sample is actually slightly lower than the reported number of stocks.

The sample does not include data about delisted companies in the Stockholm Stock Exchange due to its availability. Thus, we are bound to ground our main findings on the samples without delisted companies to maintain the possibility of comparison. Also, a potential liquidity problem would be triggered when including delisted companies because they are likely to be highly illiquid. Transactions for trading illiquid stocks are costly due to the high bid-ask spread which would reduce momentum profitability in reality, but not in the research as bid-ask spreads are not taken into account in the analysis. On the other hand, excluding delisted companies may cause survivorship bias. One possible reason for delisting is bankruptcy. In such case, the company's financial stagnation is negatively reflected in its last quoted prices in the stock

exchange. Thus, including bankrupted companies is likely to increase the momentum portfolio returns, which suggests that findings without delisted companies might be conservative. On the other hand, historically delisting most commonly occurred due to extremely low liquidity of companies, or because of mergers and acquisitions. In such cases there is no direct influence of the delisted companies' performance on the momentum strategy profits (Wang, 2000). Therefore, if bankruptcy was relatively uncommon as a reason for delisting, excluding delisted companies might not affect the findings to a large extent. Since the data for delisted companies are available for the Baltic States, we acquire it and perform a robustness test to see if any difference between the results exists.

We do not exclude any stocks because of low market capitalization, low liquidity or small share price. The reason is that control variables for size and liquidity risk effects are employed which minimize possible bias. Also, as stocks in the three Baltic markets are traded in different currencies, employing a price screen of a certain price level would exclude relatively more companies from Latvia than from Lithuania, which might cause country dependence bias. In addition, Jegadeesh and Titman (2001) find that the usage of a stock price screen almost does not affect the magnitude of momentum profits. Finally, the Baltic Stock Exchanges already contain a small number of companies and employing these screening parameters would significantly reduce the number of stocks analyzed in the Baltic States and thus negatively affect both the size and the power of statistical tests.

The market capitalization, volume values, which are used as a measure of liquidity, and yearly Book-to-Market values of the stocks were collected from the Reuters Datastream database. In addition, daily stock closing prices (with adjusted corporate actions excluding cash dividends) and information about dividends are retrieved for each company in original currency from the same source. However, after performing initial analysis, the authors observed the dominance of Estonian companies in the winners' portfolio for longer horizon strategies. The reason for this turned out to be a mistake in Thomson Reuters Datastream which reports dividend payments in EEK, while prices are reported in EUR. In addition, quite a large proportion of companies which are currently listed on the Baltic Stock Exchanges are not included in Thomson Reuters Datastream. Therefore, the authors manually collected the required information from the OMX NASDAQ web page (2009). What is more, the exchange rate quote of original currencies

and the deutschmark (DM) before 1999 (year of Euro introduction) and the Euro after 1999 are retrieved for each day from Thomson Reuters Datastream.

The observed continuously compounded daily returns[4] for each company are then calculated according to the formula:

$$R_{i,t} = \ln\left(\frac{E_{i,t} * (P_{i,t} + Div_{i,t})}{E_{i,t-1} * P_{i,t-1}}\right), \qquad (1)$$

where $E_{i,t}$ and $E_{i,t-1}$ are the exchange rates, $P_{i,t}$ and $P_{i,t-1}$ are the closing prices for the calendar day t and the previous day for the company i respectively, while $Div_{i,t}$ is the amount of gross cash dividends per stock of this company at the ex-dividend date t. All the returns are estimated after converting to a common currency following Rouwenhorst (1998) as we examine momentum in Sweden and in the Baltic States from the international investor's perspective, not from the local one. The international investor's perspective is chosen because the international strategy of investing into stocks traded under three different currencies is analyzed in the Baltics case, which makes sense to convert stock returns to one common currency. Converting Swedish stock returns into EUR benefits the comparison of the results between the Swedish and the Baltic markets. Nevertheless, conversion of stocks' returns to a common currency may have a two-sided effect. On the one hand, given a large share of international investors actively speculating in the markets, stock prices are influenced by variation of the currency rate, and therefore we successfully remove this undesirable effect in our study by converting to the common currency. On the other hand, if the share of international investors is low and, as a result, stock prices do not change significantly just because of currency rate changes, a common currency introduces exchange rate appreciation/depreciation into the stocks' returns which may cause some bias. Nevertheless, this bias does not appear in the results of the portfolio returns in the Swedish market as exchange rate appreciation/depreciation incorporated into winners' returns is cancelled out by losers' returns. Also, it hardly appears in the results of the portfolio returns in the Baltic markets because all three currency rates have been pegged to EUR since 2004 and before that had quite a similar development path.

[4] All the results regarding the returns are calculated and provided on a continuously compounded annual basis, unless stated otherwise.

Moreover, monthly closing prices (in EUR) of OMX Baltic Benchmark GI (BBGI)[5] index for the time span starting from the 1st of January, 2000 (the earliest date available) and monthly closing prices (in SEK) of OMX Stockholm Benchmark GI (SBGI) for the period starting from the 1st of January, 1996 (the earliest date available) are retrieved from the OMX NASDAQ web page (2009). In order to fill the gap between 1986 and 1996, monthly closing prices of the Stock Return Index[6] from the website of Sverige Riksbank (2010) are collected. We are forced to combine the two sources of the Stockholm index performance since the Stock Return Index provides data only until 2006. However, since both measures reinvest dividends, there should be no significant bias. Finally, the market indices of both the Baltic and Stockholm Stock Exchanges are transformed into continuously compounded monthly returns and the Stockholm index is converted into EUR for the main analysis[7].

Both quarterly and annual seasonal adjusted GDP growth rates for Estonia, Latvia, Lithuania and Sweden are retrieved from Thomson Reuters Datastream for the time span analyzed. In addition, 1-month and 6-month Interbank Offered Rates of Vilnius, Riga, Tallinn and Stockholm markets are collected from the same source.

We use the 10 year German Government bond yield as a risk free rate, which is retrieved from Deutsche Bundesbank (2009). The rate is transformed into continuously compounded monthly returns according to the formula (2):

$$Rf_T = \ln(1 + rf_T)/12\,, \qquad (2)$$

where rf_T is the annual 10-year German Government bond yield at time *t*.

Construction of Risk Factors

To address the question whether momentum profits could be explained by excess exposure to risk, the authors have chosen to use the most common control variables – the three risk factors documented by Fama and French (1996): systematic risk (risk premium), size (Small Minus Big (SMB)), and B/M (High B/M Minus Low B/M (HML), or so called value vs. growth).

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[5] GI (Gross Index) is chosen because, contrary to the PI (Price Index), it reinvests dividends in the index. This is relevant to adequately reflect index performance. The benchmark type (the index consists of the most liquid and the biggest stocks in the market) is used for comparison with Stockholm market. Nasdaq OMX Nordic provides only the OMX Stockholm Benchmark type index in which dividends would be accounted for the time span needed.

[6] Stock Return Index also accounts for dividend payments.

[7] A robustness test is performed also without currency conversion for Stockholm index when analyzing market state impact. The rationale behind the test is that market state might have been caused simply by currency fluctuations.

In addition, as Pastor and Stambaugh (2003) show that market liquidity explains the majority of momentum profits and Bekaert et al. (2007) document that liquidity is particularly important while predicting expected returns in emerging markets, we find it reasonable to use a control variable for liquidity as well.

According to the methodology that this paper follows (see below), it is necessary to estimate the price of each risk factor that would correspond to the momentum portfolio holding period. In case we find that portfolios are sensitive to the price changes of risk factors, we could conclude that momentum profits can be partly explained by taking excess risk. The estimates for the price of all the three Fama-French factors can only be found for the US market. However, it is proved that the correlation for these price changes in different countries, and especially continents, is extremely weak (Griffin, 2002); thus, we find it useful to estimate the price of each factor separately for the Baltic States and the Swedish markets ourselves.

To estimate the price of the risk premium we simply sum monthly the cumulative continuously compounded index returns in the holding period in the market and subtract the cumulative continuously compounded risk free return during the same period.

To estimate the price of two additional risk factors (the size and value vs. growth effects) we follow the methodology developed by Fama and French (1993) and later transformed by Kenneth R. French to constantly report risk factor prices in the US market (French, 2009). First of all, we sort all the stocks in both the Baltic and Swedish markets according to the book-to-market values and divide each market into three groups based on the 30^{th} and the 70^{th} percentiles. Afterwards, stocks in each group are sorted according to their market capitalization based on the median and again the groups are divided into two sub-groups. Consequently, one value-weighted portfolio per sub-group is formed. The monthly continuously compounded return for each risk factor portfolio is then calculated. In our paper we rebalance the portfolios every year. Even though a higher rebalancing rate would be preferable, it would not be possible due to data availability.

Having six portfolios (Small Value, Small Neutral, Small Growth, Big Value, Big Neutral, Big Growth) per market, the price of the size effect could be found as the difference

between average returns of the three small and the three big portfolios during the momentum portfolio holding period[8]:

$$SMB_{K,t} = \frac{1}{3}\left(\text{Small Value}_{\text{K,t}} + \text{Small Neutral}_{\text{K,t}} + \text{Small Growth}_{\text{K,t}}\right) - \frac{1}{3}\left(\text{Big Value}_{\text{K,t}} + \text{Big Neutral}_{\text{K,t}} + \text{Big Growth}_{\text{K,t}}\right) \quad (3),$$

where $SMB_{K,t}$ stands for returns on the size risk factor generated in K months starting at the calendar day t.

Similarly, the price of the value vs. growth effect is equal to the difference between the average returns of two value portfolios and two growth portfolios during the momentum portfolio holding period:

$$HML_{K,t} = \frac{1}{2}\left(\text{Small Value}_{\text{K,t}} + \text{Big Value}_{\text{K,t}}\right) - \frac{1}{2}\left(\text{Small Growth}_{\text{K,t}} + \text{Big Growth}_{\text{K,t}}\right) \quad (4),$$

where $HML_{K,t}$ is the return on the value vs. growth risk factor in K months starting at the calendar day t.

Finally, to estimate the price of liquidity we follow the methodology developed by Rouwenhorst (1999), where all the stocks in the market are sorted according to their prior monthly turnover. Two equally-weighted portfolios from the 30% of the stocks with the highest turnover and 30% of the stocks with the lowest turnover are then formed. In this way, the returns of high-turnover and low-turnover portfolios are calculated every month. The price of liquidity is the difference between the returns of high and low turnover portfolios during the momentum portfolio holding period:

$$L_{K,t} = \left(\text{HighTurn}_{\text{K,t}} - \text{LowTurn}_{\text{K,t}}\right), \quad (5)$$

where $L_{K,t}$ is the return on the liquidity risk factor in K months starting at the calendar day t.

[8] Since we calculate continuously compounded monthly returns for each risk portfolio, the price of each risk factor during the momentum portfolio holding period is the sum of monthly risk factor returns during the equivalent time period

Basic Methodology

The methodology of this study is based on two papers. We follow the technique introduced by Jegadeesh and Titman (1993) for constructing the portfolios and testing overall momentum strategy profitability, while we apply the methodology used by Rouwenhorst (1998) when controlling for several risk factors and adding market state impact into the analysis.

We form zero cost equally weighted portfolios each month while buying the top 10% past winning stocks, and selling short the bottom 10% past losing stocks. Instead of choosing 3, 6, 9, and 12 month periods as in Jegadeesh and Titman (1993), we form portfolios based on stocks' past performance in 1, 3, 6 and 12 month periods (later denoted as J-month) and hold each portfolio for 1, 3, 6, and 12 months (K-month). Such deviation was incentivized by the fact that the only paper investigating momentum in the Baltic Stock Exchanges found the 3 month holding strategy, which was the shortest holding strategy that was analyzed, to be the most profitable (Maniusis and Urba, 2007). Therefore, we are particularly interested in exploring momentum around the 3 month horizon, including very short term momentum while analyzing a 1 month time period. In addition, following the findings by Jegadeesh (1990) and Lehmann (1990) we skip a week (to be precise, 5 working days) between the formation period and the holding period to avoid bid-ask bounce, price pressure, and lagged reaction effects. Therefore, when calculating stock returns for the holding period, a month corresponds to the time span of all working days of that month (e.g. all working days in January), while for the formation period, the time span of a month is moved back by five working days (e.g. five last working days in November and all working days except the last five in December). In total, we examine 16 different J-month/K-month strategies. The technique used for determining the formation and holding periods for the J-month/K-month strategy is illustrated below:

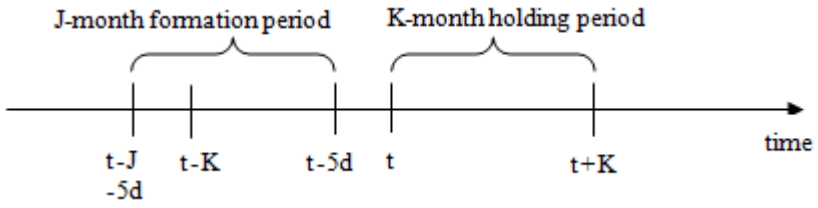

Figure 1. Technique for forming and holding J/K strategy portfolio.

Source: compiled by the authors

where t is the calendar day at which the portfolio is formed (in our case, it is always the first day of the month), and d is a working day.

Strategies with K>1 include portfolios with overlapping holding periods as portfolios are formed each month, meaning that at any given t and J/K strategy, there is a set of portfolios held which were formed in the current month and in the prior K – 1 months. Overlapping holding periods increase the power of statistical tests. Because of such overlapping, we apply a heteroskedasticity-and-autocorrelation-consistent (HAC) estimate of the variance (Gallant, 1987) making the number of lags to be equal to number of overlapping months (K – 1), depending on the holding period. We use Generalized Linear Models (GLM) with the normal/Gaussian probability distribution and the identity link function for all estimations.

After simply adding estimated continuously compounded daily returns of the top 10% winning stocks and subtracting them from the bottom 10% losing stocks' returns, we calculate average zero-cost portfolio returns for all 16 strategies both for Baltic Stock Exchanges and the Stockholm Stock Exchange and check its statistical significance. A robustness test is performed by including delisted stocks for the Baltic markets to check whether a possible survivorship bias changes the results significantly[9]. Then, two strategies for both the Swedish and the Baltic markets are chosen for further investigation and comparison: 1) the 6-month/6-month strategy, which is the most accepted and investigated among researchers; and 2) the most profitable strategy (or second most profitable if 6-month/6-month is the most profitable) derived from the results of the Baltic Stock Exchanges ignoring systematic risk and without inclusion of delisted companies.

Explanation of Momentum Profits

To begin with, in the following section the methodology that tries to explain momentum profits is presented. The results in the Baltic and Swedish markets will be presented while looking not only at the aggregate portfolio level, but also at the disaggregated winners' and losers' portfolios separately. Such division will provide us not only with data to explain the possible variations in momentum profits, but also grant better model applicability for the Baltic States, where short-selling is not possible.

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[9] When delisted stocks are included into the analysis, calculation of holding period returns has its own characteristics. If a delisted stock is in either portfolio at the month when a stock is delisted, we equally reinvest its portion into other stocks in the same portfolio. This means that while calculating returns in each month after delisting, we multiply other stocks' returns which are in the portfolio by the ratio n/n-x, where n is the number of stocks in initially formed portfolio, and x is the number of delisted stocks in the portfolio.

Risk Factors

By following previous works our study tries to explain momentum profits by several sources of risk that may induce excess returns on such strategies. Initially, we try to investigate whether the momentum strategies tend to assign riskier stocks to winners, while classifying less risky assets as losers. We use the following formula:

$$R_{K,t} - Rf_{K,t} = \alpha + \beta * \left(Rm_{K,t} - Rf_{K,t}\right) + \mathcal{E} \ , \qquad (6)$$

where $R_{K,t}$ is the continuously compounded raw return on a momentum portfolio (either winners', losers' or winners' minus losers' (in the last case, $Rf_{K,t}$ is naturally removed from the left side of the formula)), $Rm_{K,t}$ is the continuously compounded market index return and the subscripts indicate the holding period that started at the calendar day *t* and lasted for *K* months, $Rf_{K,t}$ is the continuously compounded risk free rate, and $\mathcal{E}$ is the error term. The authors hypothesize that a significantly positive α coefficient would indicate that momentum profits cannot be entirely explained by higher systematic risk of winner stocks.

Another important source of risk may come from firm-specific characteristics. As explained previously, two control variables for the size and value vs. growth effects are constructed. The following regression equation is used:

$$R_{K,t} - Rf_{K,t} = \alpha + \beta * \left(Rm_{K,t} - Rf_{K,t}\right) + \varepsilon * SMB_{K,t} + \gamma * HML_{K,t} + \mathcal{E} \ , (7)$$

where, besides previously explained notifications, $SMB_{K,t}$ and $HML_{K,t}$ stand for returns on the size and value vs. growth risk factors during the period *K* starting from the calendar day *t*. By employing this regression the authors try to exclude the excess return on risk documented by Fama and French (1993) from pure momentum profits - α. Obtaining a positive (negative) and statistically significant coefficient ε would indicate that stocks are sensitive to the SMB risk factor, and to some extent that the portfolio consist of rather small (big) stocks. The same logic applies for interpreting coefficients on the HML and Liquidity factors.

Finally, the control variable of liquidity ($L_{K,t}$) is added to the regression to remove omitted variable bias:

$$R_{K,t} - Rf_{K,t} = \alpha + \beta * \left(Rm_{K,t} - Rf_{K,t}\right) + \varepsilon * SMB_{K,t} + \gamma * HML_{K,t} + \chi * L_{K,t} + \mathcal{E} \ , \quad (8)$$

In the following sections all of the control variables presented here will be shortly described as $\sum_{a=1}^{4} f_{K,t,a} * \beta_a$, where $f_{K,t,a}$ corresponds to the premium of a risk factor during *K*

periods starting from the calendar day *t*, and the β_a stands for the estimated coefficient on this factor.

Market Development Factor

As the Baltic Stock Exchanges have developed during the last decade, we include the time factor in our regression to capture the variation of momentum profits over time:

$$R_{K,t} - Rf_{K,t} = \alpha + \mu * t + \sum_{a=1}^{4} f_{K,t,a} * \beta_a + \varepsilon, \qquad (9)$$

where μ is the coefficient on the time factor *t* which corresponds to months (for example, t=5 means that the fifth month of time span used is taken into account). Obtaining a positive (negative) and statistically significant μ would imply that momentum profits increased (decreased) over time, and, as a consequence, higher market development may imply higher (lower) momentum profits. Such analysis helps draw conclusions about the relationship between market efficiency and momentum profits.

Market States

In the following section, the methodology to test the impact of market states on momentum profits is presented. Four time span classifications of market states are investigated. The first one, suggested by Rouwenhorst (1998), defines the market state to be DOWN if the index return for the past one month is negative; otherwise the market state is considered to be UP. The second methodology, employed by Cooper et al. (2004), states that the market state is considered to be DOWN if the lagged one year index return is negative; in all other situations the market is said to be UP. The authors of this study find it useful to employ two additional time span measurements, namely the 3 months lagged index return and the 6 months lagged index return, to capture market state impact on momentum profitability in the medium term. Consequently, the market states are considered to be UP (DOWN) if the past 3-months/6-months index return is positive (negative).

A dummy variable ($D_{p,t}$) for the market state based on the past period p (either 1, 3, 6 months or 1 year) is created for every calendar day *t*, which is equal to 1, if market state is UP, and 0 during DOWN states.

In the following regression:

$$R_{K,t} - Rf_{K,t} = \alpha + \delta * D_{p,t} + \sum_{a=1}^{4} f_{K,t,a} * \beta_a + \varepsilon, \qquad (10)$$

a significantly positive (negative) coefficient δ would indicate that UP (DOWN) market states are more profitable for the investors.

An even more interesting question to answer would be whether the extent of market expansion or downturn affects momentum profits. A possible way to address this issue suggested by Cooper et al. (2004) is to include a continuous market state variable rather than a dummy. Even more importantly, in this paper it is proved that the relationship between momentum profits and market states is not linear. To cope with this issue we create two variables, $MS_{p,t}$ and $MS2_{p,t}$, which represents the past index returns and the past index returns squared at day *t*.

The following regression is run afterwards:

$$R_{K,t} - Rf_{K,t} = \alpha + \delta * MS_{p,t} + \lambda * MS2_{p,t} + \sum_{a=1}^{4} f_{K,t,a} * \beta_a + \mathcal{E}, \qquad (11)$$

In addition, an interesting idea, as suggested by Rouwenhorst (1998), is to investigate whether systematic risk that momentum investors bear is dependent on the market state. The authors hypothesize that during the UP market states the winners' portfolio may bear more systematic risk, while during market downturns the momentum strategy transfers more risk to the losers' portfolio. In this way, treating systematic risk as constant may cause a bias and overstate true unexplained momentum profits. To address this issue the following regression is run:

$$R_{K,t} - Rf_{K,t} = \alpha + \beta^{+} * D_t * \left(Rm_{K,t} - Rf_{K,t}\right) + \beta^{-} * (1 - D_t) * \left(Rm_{K,t} - Rf_{K,t}\right) + \sum_{a=1}^{3} f_{K,t,a} * \beta_a + \mathcal{E}, \qquad (12)$$

It is worth mentioning that the time dummy variable in this equation is equal to one if the market index return during the portfolio holding period is non-negative, and 0 if negative. In case we find a statistically significant α coefficient and/or β^{+} significantly different from β^{-}, interesting conclusions about the nature of momentum profits/losses under different market states may be drawn.

Finally, the authors of the study are interested in whether momentum profits can be explained by some factors which are independent of the stock markets. Thus, two additional sets of exogenous variables are employed to test whether momentum profits might be explained by the overall mood in the capital markets or the country's macroeconomic conditions. In the first

set lagged 1-month and 6-month interbank offered rates for each of the country are employed as independent variables. In the following regression:

$$R_{K,t} - Rf_{K,t} = \alpha + \delta * xBOR_{z,t} + \sum_{a=1}^{4} f_{K,t,a} * \beta_a + \mathcal{E}, \quad (13)$$

x stands for the country specific abbreviation (i.e. VILIBOR, TALIBOR etc.) and z stands for the maturity. The fact that we use levels instead of changes in these rates restricts our ability to interpret the α coefficient. However, the authors argue that changes in these rates would not capture the true mood in the capital markets and thus we sacrifice the possibility of measuring residual momentum profits in order to clearly identify the link between market conditions and momentum profits.

The second set of variables consists of quarterly and yearly GDP growth rates of the analyzed countries and their lagged values. For the Baltic States we used market capitalization value-weighted GDP growth rate. In addition, we perform a robustness check with Estonian quarterly GDP growth rate since this measurement may be classified as a leading GDP indicator for all the Baltic States according to the recent history.

The following regression is run afterwards:

$$R_{K,t} - Rf_{K,t} = \alpha + \Omega * GDP_{m,t} + \sum_{a=1}^{4} f_{K,t,a} * \beta_a + \mathcal{E}, \quad (14)$$

where m stands for the periodicity of GDP.

Empirical Findings

Overview of Strategies' Returns, Risk Factors and the Time Factor

In this section we answer the first part of our research question how profitable is momentum trading in the Baltic States and in Sweden. We present non-adjusted and systematic risk-adjusted profits for all 16 strategies. Also, the results of the robustness check of including delisted companies are reported for the Baltic States market. Then, the findings for the adjustments of the SMB, HML and Liquidity risk factors for the chosen 2 strategies are documented. Finally, the influence of the time factor is described. To present the results in a structured way, we separately provide the evidence from the Baltic States and Sweden. Also, we simultaneously make comparisons between the markets while presenting the results from the Stockholm Stock Exchange.

Evidence from the Baltic Stock Exchanges

Non-adjusted Returns

The first table in Appendix A represents the unadjusted annualized returns of all the momentum strategies for zero-cost portfolios as well as the returns for the winners' and losers' portfolios separately. Only the companies listed in the Baltic States on the last trading day of 2009 are taken into account. The results show that no momentum strategy generates statistically significant returns in the Baltic States. Despite the insignificance, almost all strategies have positive means, some of them reaching as much as 9-10% continuously compounded annualized returns. The latter fact suggests that the momentum effect might be present in the Baltic States to some extent. However, the insignificant results may be argued to be partly caused by the small number of companies in the market, which leads to a smaller number of companies in the momentum portfolios. The lack of companies might lead to high standard deviation of winners' and losers' aggregated returns and, as a consequence, might not be enough to capture the real momentum effect. The results show the tendency that a 6-month formation period generates the highest abnormal portfolio returns. The 6-month/6-month strategy is the most profitable (10.3%) and also has the highest t-value while the 6-month/1-month strategy (9.8%) is the second most profitable. Therefore, according to the methodology, these two strategies are chosen for more detailed investigation.

From the portfolio composition point of view, positive portfolio returns in the Baltic States are driven by relatively high winners' returns rather than small (or negative) losers' returns. Winners' returns alone in some strategies reach 18-19% and are statistically significantly different from zero which makes the long part of the zero-cost portfolio successful. However, the high returns of losers diminish portfolio abnormal returns, as losers are sold short. As it can be seen in the Table 1, losers outperform the market index in 12 out of 16 strategies. This implies that losers are on average not the worst performers in the market. Thus short-selling the market index or the other stocks which perform worse than losers might generate more profitable results.

Losers' returns	**1-m**	**3-m**	**6-m**	**12-m**
1-m	11.6%	13.7%	13.1%	11.1%
3-m	5.9%	12.1%	9.6%	9.6%
6-m	9.8%	9.4%	5.8%	10.2%
12-m	15.2%	15.7%	12.1%	10.9%
Index's returns	10.8%	9.5%	9.5%	8.0%

Table 1. Annualized losers' vs index's returns *Source: compiled by the authors*

The high returns of losers might be caused by two facts. Firstly, the Baltic Stock Exchanges are to a large extent driven by small local and inexperienced investors, which is common for most small emerging markets. Due to the abundance of more sophisticated information about the traded securities, it is highly likely that these investors base their decisions on easily accessible information such as historical stock performance. We argue that the extreme cases, recent winners and recent losers, would be mostly noticed by these investors and bought in anticipation of high future returns. Hence, stocks that are neither winners nor losers are likely to be the ones which perform worse than losers and selling short them instead of losers would create a more profitable strategy. In addition, as the Baltic Stock Exchanges are still underdeveloped and quite inefficient, rational investors are not able to capitalize quickly on the mispricing. What is more, rational investors are reluctant to correct mispricing due to the higher risk it involves. Thus, it takes more time for both winners' and losers' stock market prices to come back to the fundamental values. Secondly, the reported results do not take into account delisted companies which are likely to perform poorly in the market at least for a time before actual delisting. However, as mentioned before, including delisted companies would increase the liquidity problem of the study (as delisted companies are very likely to be illiquid). When delisted companies are included in the sample, the returns of the losers' portfolio tend to be lower (see Appendix B), especially in the short holding periods (1- and 3-months). However, the difference between the returns of the losers' portfolio in the samples with and without delisted companies is not statistically significant and thus the observed tendency cannot be taken for granted. Looking at the momentum portfolio as a whole, the addition of delisted companies to the sample increases portfolio profits and makes two strategies statistically significant at the 90% confidence level. We argue that the exclusion of the no longer traded companies would make our results more conservative.

The lower returns of losers might be explained by the bankruptcy argument. Near-bankrupt companies naturally perform poorly in the market and thus are continuously assigned to the losers' portfolio. Eventually, such losers are delisted from the market. Usually, delisting occurs within a few months after the company's market price starts to plummet due to faced bankruptcy. This fact is also in line with our results that losers' returns drop the most in the short holding periods. The longer holding periods fail to capture the full bankruptcy effect as the

companies usually get delisted before the portfolio matures and the shares of the delisted companies are reinvested in other losers.

Systematic Risk

The second table in Appendix A presents momentum profits only for listed companies after adjusting for systematic risk. The coefficient α indicates by how many continuously compounded percentage points per annum the market index is outperformed (underperformed), if the value of the coefficient is positive (negative), after taking systematic risk into account. The adjustment for systematic risk almost does not change momentum profits. However, this adjustment seems to make the 6-m/6-m strategy slightly more profitable – with a return of 11.8% per annum - which is statistically significant at the 90% confidence level. This was caused by the fact that losers are generally found to possess higher Beta coefficients than winners. Thus, the aggregated portfolio tends to have negative betas and this explains why the adjustment for systematic risk added some profits to the 6-month/6-month portfolio.

Four strategies generate a positive and statistically significant α for winners (around 7-9%). It implies that theoretically the market index might be outperformed by investing in the recent best performers, while borrowing at a risk free rate to achieve the desired level of risk. Practically, the documented higher returns are associated with the investments to low risk assets and thus might not be appreciated without leverage possibilities. Still, we believe that these findings are particularly important, especially for fund managers, from an applicability point of view as short-selling in the Baltic markets is not allowed.

In comparison to the sample containing only listed companies, including delisted companies does not change the results in an unexpected way – losers start to underperform the market index in two medium-term strategies (see Appendix B). In addition, it abates the winners' ability to outperform the market index. Portfolio returns did not change significantly after adjusting for systematic risk compared to non-adjusted results.

SMB, HML and Liquidity Risk Factors

The regression results for the other risk factors are reported in Appendix D and E. Contradicting Fama and French's (1996) findings, it is found that small stocks are as profitable as big stocks in the Baltic markets. As the return on the size risk factor is essentially zero, there is no way how this factor may explain momentum returns. Also, the negative but insignificant

coefficient on the portfolios' SMB factor throughout different regression specifications indicates that stocks held in the portfolios are not significantly influenced by the SMB risk factor.

As for the HML risk factor, the premium for value stocks is observed to be negative during the sample period in the Baltic States. These results also contradict the findings of Fama and French (1996). According to our data, growth stocks outperform value stocks on average by 14% annually if the portfolio holding period is only one month. This premium, though, gradually decreases to 2% for the 6-month holding period. However, the regression coefficient on the HML risk factor is not statistically significantly different from zero for the chosen strategies. Therefore, this risk factor does not have a clear impact on momentum profits.

Empirical data for the liquidity risk factor documents a higher return of 5-6% per year for more liquid stocks. This fact once again contradicts with the theory that extra premium should be paid for illiquidity. In addition, we find that formed portfolios are significantly sensitive to the liquidity risk factor, and the negative coefficient to a large extent suggests that the 6-m/6-m momentum portfolios are based on illiquid stocks. This is mainly driven by highly illiquid winners. However, since there is no premium for illiquid stocks in the Baltics, momentum profits do not decrease when adjusted for the liquidity risk factor. On the contrary, theoretical profits even increase. The 6-m/1-m momentum portfolios and winners also possess the negative coefficient on the liquidity risk factor, but lower and insignificantly different from zero. We argue that portfolios consist of less illiquid winners when the shorter holding period is estimated and that winners become more illiquid as time goes by. The two investigated portfolios (the 6-m/6-m and 6-m/1-m) mainly consist of the same stocks, as the formation period for both of them is the same. Thus, we argue that at the time when winners are assigned to the portfolio they are likely to be driven by company-specific events that surge the turnover. However, as time passes, the liquidity of the portfolio decreases. In addition, we find that if the liquidity risk factor is not based on previous month's measure, but on the current month, it leads to 20-30% higher returns of liquid over illiquid stocks (results are not reported due to limited paper length). The latter fact also suggests that a stock's turnover and returns are positively correlated and that both turnover and returns are driven by firm-specific events in the Baltics. Therefore, after a firm-specific event is over, the turnover as well as the returns are likely to reach the usual levels. It also suggests that even if a minimum turnover screen would be employed, it would very likely not

remove some illiquid stocks as firm-specific events would increase their turnovers during the portfolio formation period.

Time Factor

It is widely claimed that the Baltic markets gained efficiency while developing over past decade. Employing the hypothesis that higher market efficiency is associated with lower momentum profits we should expect the coefficient on the time factor[10] to be negative. However, this hypothesis cannot be accepted since the results are insignificant for the 6-m/6-m strategy. Contrary to the hypothesis, there are some insignificant signs for increased momentum profitability over time which is driven by decreased losers' returns in the 6-m/1-m strategy.

Evidence from the Stockholm Stock Exchange and Comparison with the Baltics

Non-adjusted Returns

The first table in Apendix C shows the unadjusted momentum profits for all strategies in the Stockholm Stock Exchange. Generally, all strategies generate positive and strongly significant portfolio returns except the 1-m/3-m, the 3-m/1-m, and the 1-m/1-m strategies. The 1-m/1-m strategy actually yields a negative portfolio return, meaning that a contrarian strategy might be profitable; however, the result is statistically insignificant. Strong momentum profitability is mostly driven by the negative returns of losers. These findings are contrary to the results from the Baltic markets. The strong evidence of the momentum effect might be attributed to the longer time span analyzed or the larger number of companies in the market as both these attributes diminish the standard deviation of winners' and losers' returns. However, the insignificant momentum profits in the Baltics cannot be solely explained by the fact that an insufficient number of years was investigated. Momentum profits remain significant in Sweden when analyzing its stock market for the same time span that was used for the Baltics (results are not reported due to limited paper length).

Systematic Risk

The second table in Appendix C presents momentum profits after an adjustment for systematic risk. The results are somewhat similar to the Baltics. Winners possess less systematic risk than losers in a way that basically all the strategies result in portfolios with negative betas. Therefore, instead of explaining and reducing momentum returns, the adjustment theoretically

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[10] A unit change in this variable represents one month change

boost momentum portfolio returns, since less compensation is required for lower risk-taking. However, the results are different from the Baltics in a way that the worst recent performers underperform the market index in almost all strategies. What is more, the best recent performers, based on the 1-month past period, also underperform the market index. Also, there is only one strategy based on which the winners outperform the market index. The results regarding portfolios do not change when adjusted for systematic risk.

Insight from the comparison. Even though momentum profits in the Stockholm Stock Exchange are statistically significantly different from zero, whereas the returns in the Baltics are not, we cannot conclude that their mean values are statistically different. However, the most fundamental difference in momentum returns between the Swedish and Baltic markets is the lower returns of losers in Sweden. This might be explained by the relatively lower share of small local and inexperienced investors in Sweden compared to the Baltics. Also, we hypothesize that due to higher market development, investors in the Stockholm market employ more sophisticated investing platforms that at least incorporate the automatic stop-loss function. Stop-loss is likely to automatically sell losers and therefore put downward pressure on losers' returns. One might say that since the market is quite efficient, rational investors should drive losers' prices back to their fundamental values. However, we argue that there is a lack of rational investors even in Sweden because otherwise momentum profits would probably disappear (it is quite unlikely that momentum returns occur purely due to fundamental reasons). Additionally, the possibility to sell short in Sweden provides an opportunity to capitalize on the stocks with continuously falling prices. Short-selling increases the supply of short sold stocks in the market and in this way puts downward pressure on price. If the lack of rational investors exists or the rational ones do not hurry to correct mispricing, losers' returns can actually become negative, which is empirically documented in our study.

SMB, HML and Liquidity Risk Factors

The results for SMB and HML for Sweden are very similar to the Baltics both in terms of premium and in terms of coefficient values (see Appendix G, H). In addition, portfolios are also likely to be based on less liquid stocks. Nevertheless, this relationship is not statistically significant. Contrary to the findings in the Baltic States, the observed phenomenon is stronger for the short holding period strategy. This might imply that stocks' returns and turnover are not caused by the firm-specific events as it is in the Baltics.

Time Factor

We find that losers' returns have significantly decreased for the chosen strategies over time. This in turn increased momentum portfolio profits on average by 0.1 percentage points per month on a continuously compounded annual basis. Even though the coefficient on the time factor for portfolio returns is insignificant, t-values almost reach the 90% confidence level, and both of them tend to be positive. This result shows that our results regarding general momentum profitability in Sweden do not contradict Rouwenhorst's (1998) findings which show insignificant momentum returns in Sweden based on 1980-1995 data. To sum up both results, it can be concluded that the momentum effect started to prevail in Sweden in more recent years when the market became even more developed and efficient. This might be explained by the significantly negative losers' results. We argue that the market development had a negative impact on losers' returns and so gave a boost for momentum profits.

Conclusion of Overview of Strategies' Returns, Risk Factors and Time Factor

Even though momentum trading on average generates positive returns for the Baltics, they are insignificant. In comparison, the Swedish market offers significant momentum returns for almost all strategies. However, there is no evidence that the true means of the profits are different in these two markets. Still, we identified that there is a divergence between momentum profits. The results are mainly driven by the negative losers' performance in the Swedish market, while in the Baltics losers show higher returns than the market index in a majority of the strategies. Adjusting for the Fama French risk factors does not change the results significantly in the Baltics and also cannot explain momentum in Sweden; however, it is found that the winners tend to be less systematically risky than losers in both markets. Including the liquidity risk factor does not change momentum profits either, but the winners' portfolio is likely to be formed from less liquid stocks.

Quite a few results suggest that the market development or efficiency is positively associated with momentum returns - generally higher momentum profits in Sweden than in the Baltics, significantly increased momentum in Sweden over time and similar albeit insignificant signs in the Baltics. Also, since we hypothesize that the Baltic markets follow a similar development path as the Swedish market, more significant momentum profits are quite likely to appear in the future as the market develops.

Momentum Profits under Different Market States

This section provides empirical evidence to answer the second research question of the study - **How differently are returns in the Baltic States and in Sweden affected by the changing market environment.** The insights from the Baltic markets are presented in the first place, followed by a comparison with the results from the Stockholm Stock Exchange.

Evidence from the Baltic Stock Exchanges

To establish the link between momentum profits and market states, we firstly examine the profitability of the chosen strategies depending on the past index performance. We find that the longer-term (from 3 to 12 months) past index performance successfully explains momentum profits. Even though we fail to observe significant coefficients on dummy variables representing market states in both strategies (the 6-m/6-m and the 6-m/1-m), the residual momentum profits are significantly reduced by controlling for the market states (see Appendices D & E for each strategy respectively). Moreover, we find that the dependence of momentum profits on the market states tends to increase as longer periods are used to determine the market state. To be precise, momentum profits are on average 15.2% higher in the 6-month UP market states, while they are hardly different from the average in a 1-month UP market state. Even though this phenomenon is statistically insignificant, the observed tendency is in line with Gervais and Odean's (2001) findings that predict that the aggregate investors' overconfidence tends to grow with the length of expansionary period. The second and the third tables of the Appendices D & E provide extra information on the nature of momentum profits by describing each portfolio (the winners' and the losers') separately. The winners' portfolio shows the similar results to those of the momentum portfolio. Winners alone generate higher returns in the UP states, especially when longer periods are used to determine the market states. This remark comes without any surprise if one follows the Gervais and Odean (2001) model. Investors buying the winners' portfolio receive more confirming news over the longer expansionary period, as they luckily manage to buy the best performing stocks. Thus, the aggregate overconfidence of these investors tends to upsurge in UP states (driving the winners' portfolio stock prices to exceptionally high levels) and burst in DOWN states, when the flow of good news is broken. However, the same logics cannot be applied to investors holding the losers' portfolio, since they do not receive so much confirming news as the expansionary period becomes longer. Nevertheless, the coefficients on

the market state dummy tend to be positive; however, this should be mainly attributed to the overall tendency of the stocks to generate positive returns during growth periods.

The second test, where the numerical past market index returns instead of dummy variables are employed, is supposed to capture how the degree of the market upturn/downturn influences the profitability of momentum trading. Moreover, the inclusion of the squared past market index performance helps us to determine whether the increase in momentum profits tends to follow decreasing returns to scale. We find that the increase in profits from the 6-m/6-m strategy tends to diminish when the long-term lagged index return becomes exceptionally large. This phenomenon is mainly caused by the increasing returns of the losers' portfolio, while winners' returns do not provide an increment boost in profits as the lagged index returns become larger. To understand the logic behind this observation, we employ the Kent, Hirshleifer, and Subrahmanyam (1998) model. We argue that the marginal increase in the aggregate losers' level of overconfidence tends to become bigger than the winners' when the market index returns grow to suspiciously high levels. It occurs because the initial level of overconfidence of the aggregate winners is at a relatively high level. In such a case, the price overreaction of the stocks in the losers' portfolio grows at a faster rate than the prices of the stocks in the winners' portfolio, making the increase in momentum profits to slow or even causing the profits to diminish.

A similar trend may be observed in the 6-m/1-m strategy, even though it is statistically insignificant. However, this strategy is interesting to analyze while looking at the short-term market states. We find that the returns of the losers' portfolio tend to decrease at an increasing rate as the lagged one-month market index return becomes extremely large. We argue that in these situations investors holding the losers' portfolio may not perceive losses as being caused by random market noise, since the losses on their investments become too large. Thus, they might choose to liquidate their portfolio. On the contrary, investors holding the winners' portfolio may even recognize losses as confirming news, since the returns on their portfolio outperform the market index. This prevents the winners' strategy from fire-sale and thus increases the short-term momentum profitability. In this way, the prices of the worst performing stocks overreact to market downturn, making momentum profits positive during extremely short and severe market contractions/corrections for the strategies with the relatively short holding periods.

To further investigate the nature of momentum profits in the Baltic States, we test whether systematic risk that the momentum strategies possess varies with the market state. The

results of the 6-m/6-m strategy suggest that momentum profits cannot be explained by varying systematic risk, as the UP state portfolio betas (-0.204) tend to be lower than the DOWN state betas (0.061). Even though neither the betas nor the difference between them are statistically significantly different from zero, the observed tendency is in line with Rouwenhorst's (1998) findings from 12 European markets. However, the 6-m/1-m strategy proves that short-term momentum is explained by varying systematic risk. We find that the average portfolio beta in the UP market (0.211) is statistically different from the average DOWN market beta (-0.582). The huge difference in portfolio systematic risk is mainly driven by the losers' portfolio. We document that the average UP market losers' portfolio beta (0.582) is significantly different from the DOWN state beta (1.200). These findings are in line with our previous argument that in the short-term the losers' portfolio is highly dependent on the negative market state and the fire-sale of loser stocks that the extreme market contraction creates.

Furthermore, a set of exogenous variables is employed to determine whether momentum profits are explained by the prevailing mood in the capital markets. The lagged 1-month and 6-month interbank offered rates from each of the three Baltic States are used to capture the effect. The documented outcome seems to explain the profits of the 6-m/6-m strategy and to prevail irrespective of the variable used, suggesting a negative relationship between interbank interest rates and the medium-term momentum profits (see Appendix D[11]). However, we fail to find any significant effect between the short-term momentum profits and the prevailing mood in the capital markets. The difference between these two strategies once again occurs due to the different tack of the losers' portfolio under varying moods in the capital markets. We find that the returns of the 6-m/1-m losers' portfolio might be negatively affected by an increase of the interbank interest rate, while the same phenomenon does not drive the returns of the losers' portfolio in the 6-m/6-m strategy. However, the observed phenomenon lacks statistical significance.

Finally, to test whether the variation in momentum profits is influenced by changes in macroeconomic conditions rather than pure market sentiments, we employ GDP growth rates as independent variables. We find that the medium-term momentum profitability is positively related to GDP growth rates. This dependence might be explained by both a positive relation

[11] Only the results for the 1month VILIBOR and the 1month TALIBOR are reported for brevity

between the returns of the winners' portfolio and GDP, and the negative influence of GDP on the profitability of the losers' portfolio. Nevertheless, no significant impact is observed either on the short-term momentum portfolio or on its components. This suggests that the short-term momentum portfolio profitability is to a large extent driven by the sentiments and irrational behavior of market participants rather than by changes in the stock fundamentals caused by reduced operating cash flows due to GDP contraction.

Evidence from the Stockholm Stock Exchange and Comparison with the Baltics

From the first look, the relationship between the Swedish short-term momentum profits (the 6-m/1-m strategy) and the ones observed in the Baltic States seems to be driven by the same forces. The market state dummy variable explains a great deal of momentum profits and its explanatory power tends to increase if longer periods are used to determine the market state. In addition, the results regarding overconfidence of the investors are similar between Sweden and the Baltic markets. It appears that investors of the Stockholm Stock Exchange also become more and more overconfident as the expansionary period becomes larger. However, the first difference appears when momentum profits are explained by looking at the components of the portfolio separately. It is obvious that the market states explain all of momentum profits of the winners' portfolio, but its explanatory power does not change with the market state definition. Whereas looking at the losers' portfolio, it seems that only the longer-term market states dummy variable is able to explain momentum profits. We argue that investors in Sweden may be using more sophisticated trading instruments such as short-selling or bigger leverage while trading. We predict that the aggregate level of overconfidence among irrational traders may increase not only during expansionary periods, but also as the contractionary periods become longer and the short positions (irrespective of the instruments used) become profitable. Furthermore, we fail to document the market state dummy variable to be able to explain the medium-term (the 6-m/6-m strategy) momentum profits, as the inclusion of the market state variable does not provide significant results either at the portfolio or at the component level. We argue that due to the higher efficiency in the Swedish market, the behavioral finance models are unable to explain the medium-term momentum profitability through market sentiments, while they still work under the same time span in the Baltic States. This argument might seem to contradict our previous findings that the development of the market is associated with higher momentum profits. However, we believe that market development might cause momentum returns to increase (due

to higher losers' returns), but the increase in market efficiency would shift most of momentum profits from the medium-term to the short-term.

Our second attempt to explain momentum profits by employing the market state as a continuous variable produces similar results for both strategies. We find that the short and the medium term momentum profits tend to diminish or even become negative when the past market index returns becomes extremely positive/negative. Moreover, these findings are more robust when the longer definition of the market index (the 6-month or the 1-year lagged return) is employed. This inarguably suggests that as the overall level of market inefficiency tends to increase (during long periods of extreme expansion or severe downturn) losers tend to outperform winners. It is interesting that a similar phenomenon is observed in the Baltic markets; however, there the results are robust only for the 6-m/6-m strategy.

The third test, which allows the portfolio betas to change depending on the market state, does not provide an explanation of momentum profits. Both strategies tend to have lower portfolio betas in the UP state than in the DOWN state, but the difference is statistically insignificant. The only statistically significant change in the betas is observed in the 6-m/6-m winners' portfolio, in which the UP state beta (0.765) is statistically different from the DOWN state beta (1.134). This observation, despite making momentum profits even more anomalous, is similar to the observations made about the Baltic States in the 6-m/6-m portfolio records.

The set of lagged interbank interest rates seems to explain the results of both the Swedish portfolio strategies. These exogenous variables fit the data better than the lagged market index return. We argue that the interbank offered rates are an extremely good predictor of the capital market mood in Sweden, which is dominated by large banks. It is also worth mentioning that both interbank offered rates show significant impact on the 6-m/6-m strategy, which was not explained by the lagged market state index variable. Even though it might be too venturesome to propose this idea, we argue that large Swedish banks (or their governed funds) may actively engage in momentum strategies when the interbank interest rates are high. Since a high STIBOR is accompanied by fewer contracts in the interbank market, the banks invest excess liquidity in the stock market, namely the most distressed but fundamentally sound stocks (part of the losers' portfolio). However, this suggestion should not be taken for granted and may be interesting to investigate further. Overall, both momentum portfolios in Sweden seem to be robustly affected

by the changes in interbank interest rates, and this impact appears to be stronger than in the Baltic States.

Finally, a set of quarterly and yearly GDP changes is used to determine whether momentum profits might be explained by changes in the companies' fundamental values, rather than changes in the investors' sentiments. Once again we document that momentum profits are to a large extent determined by market conditions, and are mostly influenced through the losers' portfolio. The latter fact is in line with all of our previous findings that momentum profits in Sweden might be explained by the market states, which to a large extent affect the losers' portfolio. However, the negative relationship between the losers' portfolio and the growth rate of GDP seems to be illogical if one tries to defend the efficient market hypothesis and explain momentum profits through changes in the riskiness of the stocks.

Final Insights

After analyzing momentum profits under different market states, we noticed a pattern that might be interesting to present. Firstly, we tried to identify what generated momentum profits in each of the strategies analyzed. For example, in the 6-m/1-m strategy in the Baltic States the generated positive but insignificant momentum returns were driven by the winners' portfolio, since it outperformed the market index by on average 10.9% (see table 2). In comparison, the profitability of the 6-m/6-m strategy in Sweden was mainly driven by the losers' portfolio, which underperformed the market index by roughly 14.2% (see table 3). The pattern that we identified is that the enlarged influence of market states on portfolio returns may be noticed only for the profit drivers of the strategy. Moreover, the profit driver is always influenced in a way that would make momentum profits during expansionary periods. For instance, the losers' portfolio in the 6-m/1-m Baltic strategy yields on average 17.0% annualized returns. However, we argue that this positive potential of losers in an

The Baltic States	**6x6**		**6x1**	
	Winners'	Losers'	Winners'	Losers'
α in (2)	0.161	-0.046	0.109	-0.009
	(1.15)	(-0.88)	(1.33)	(-0.10)
Six month dummy	0.244	0.092	0.336	0.170
	(2.87)	(1.11)	(1.98)	(0.67)
TALIBOR (1-month)	-0.072	0.040	-0.094	-0.065
	(-1.68)	(1.06)	(-1.53)	(-0.78)
GDP quarterly	0.026	-0.027	0.003	0.046
	(1.12)	(-1.30)	(0.09)	(0.80)

Table 2. The market state impact on the profit drivers, the Baltic States. *Source: compiled by the authors. The annualized values of coefficients (the upper number)and t-statistics (in parantheses) are reported.*

UP state is nothing else but the generally higher stock returns during expansionary market states. On the contrary, the 33.6% difference in returns between market states for the winners' portfolio can hardly be explained by the potential of the UP market state. Thus, the combined effect is that momentum profits are positively correlated with the market states and are driven by the winners' portfolio. Looking at the Swedish 6-m/6-m strategy, the higher profitability of the momentum portfolio in the UP states is driven by the losers' portfolio which is significantly and positively affected by rising interbank offered rates and negatively influenced by GDP growth. Once again, the combined effect shows that momentum profits are positively correlated with the market states.

Even though the above remark does not directly answer the question whether the returns of momentum strategies are fully explained by changing market states, it touches upon a widely discussed issue concerning the nature of momentum profits. Since we find that the momentum strategies in Sweden are mainly driven by the negative returns of loser stocks and that these stocks tend to significantly lose value even during expansionary market periods, we can argue that any risk factor might be found to explain this observation. Thus, we do not find significant evidence in favour of the efficient market hypothesis and argue that the behavioral finance explanation fits the data more accurately. The irrational decisions made by market agents tend to drive winners' prices (or keep losers' prices at low levels) during market upturns, while making the winners' stocks go bust (or the losers' stocks prosper) during market crashes.

Sweden	**6x6**		**6x1**	
	Winners'	Losers'	Winners'	Losers'
α in (2)	0.023	-0.142	0.074	-0.148
	(0.77)	(-3.47)	(1.73)	(-2.27)
One year dummy	-0.007	-0.041	0.148	-0.162
	(-0.15)	(-0.45)	(1.77)	(-1.16)
STIBOR (6-month)	-0.002	0.029	-0.151	0.030
	(-0.35)	(2.92)	(-1.47)	(1.61)
GDP yearly	-0.007	-0.048	0.025	-0.045
	(-0.61)	(-2.07)	(1.35)	(-1.64)

Table 3. The market state impact on the profit drivers, Sweden.
Source: compiled by the authors. The annualized values of coefficients (the upper number)and t-statistics (in parantheses) are reported.

Conclusion

"If the force is greater than the resistance, motion will result…" This idea, first suggested by the famous physicist John Wallis in 1670 (Scott, 1981), now seems to be

inarguable in the real world. And why should it be differently? We may tangibly see the driving *force* and understand the *resistance* that may stop the motion. However, could the same logics be applied in stock markets? Undoubtedly… as long as one defines the driving *force* and the *resistance* that would stop the motion. The definition of inputs seems to be the hardest part to find, since the financial academic world intensively debate on this issue for more than 20 years.

This research is part of the above mentioned debate trying to find whether the *motion*, better known as momentum, prevails in the Baltic and Swedish stock markets. The paper applies the methodology firstly described by N. Jegadeesh and S. Titman (1993), and provides one of the first insights on momentum profitability in the region. Moreover, the authors try to uncover the *forces* driving momentum profits in the emerging Baltic States and compare them to the forces found in the mature Swedish market. Finally, we employ a number of market state variables to test whether momentum profits in the Baltics and Sweden exhibit the same patterns under different market conditions.

The first conclusion of this study is that momentum portfolios in the Baltic States tend to show positive, but statistically insignificant abnormal returns during our sample period. The inclusion of delisted companies, as expected, slightly increases momentum profits, suggesting that our main findings based only on listed stocks are conservative. Moreover, we find that momentum strategies in Sweden tend to produce significantly positive abnormal returns.

Secondly, we document that momentum profits are driven by different factors in the two analyzed markets. We uncover that the winners' portfolio tends to be highly profitable in the Baltic States, however relatively high losers' returns reduce momentum profitability. The latter fact suggests that both momentum and contrarian strategies are partly present in the Baltic States. By contrast, we uncover that momentum returns in Sweden are mainly driven by low (or even negative) returns of the losers' portfolio.

Furthermore, we find that momentum profits cannot be explained by higher systematic risk, the size or value vs. growth premiums. The latter fact prevails in both the Swedish and Baltic markets. However, we document that in both markets the momentum portfolio is based on rather illiquid stocks. Nevertheless, even when controlling for the liquidity premium factor momentum profits cannot be explained.

Moreover, the study reveals that momentum profits in Sweden not only do not diminish over the time, but tend to increase. Even though we fail to observe an equivalent effect in the

Baltic States, we argue that momentum strategies might become profitable as the Baltic markets advance to the higher development level.

We also document that momentum profits in both the Baltic States and Sweden can be explained by different market states. We find that behavioral finance models that explain momentum profits by investors' overconfidence superiorly fit the conditions observed in both markets. We also document that longer lasting market states are associated with higher aggregate investors' overconfidence and thus a bigger difference between momentum profits during expansionary and contractionary periods.

Finally, we notice that momentum profits tend to be higher during the UP market states irrespectively of the component (losers' or winners') that produces these results. We also discover that the same profit driver tends to significantly reverse during the DOWN market states. Once again, we show that these changes might be better explained by behavioral finance models than by the efficient market hypothesis. However, the observation that the losers' portfolio tends to be negatively influenced by the better market conditions might suggest that more sophisticated financial instruments ease the growth of aggregate investors' overconfidence under different market states.

Suggestions for Further Studies

Despite the wide scope of the study, there are still several blank areas which could be filled by additional future research.

As stocks in the Baltic Stock Exchanges are generally illiquid, high bid-ask spreads prevail. Thus, if a momentum strategy was actually implemented, significant transactions costs would incur diminishing portfolio returns. In addition, we find that momentum portfolios consist of less liquid stocks than the average stocks in the market. Therefore, we encourage future momentum researchers in the Baltics to incorporate transaction costs into calculating returns as this might contribute to the existing literature to a large extent.

In addition, we were bound to ground our main findings for the Baltics on the sample without delisted stocks in order to maintain the possibility of comparison with Sweden. A robustness check showed that after the inclusion of delisted stocks the results become less conservative. Therefore, we suggest further studies to include delisted stocks for the main analysis of the Baltics. However, since delisted stocks are likely to be highly illiquid, we also

suggest to employ a minimum liquidity parameter scan to cope with the illiquidity issue unless bid-ask spreads are also taken into account.

What is more, as we document that stock returns and turnover are likely to be driven by firm-specific events in the Baltics, we encourage future studies to investigate this phenomenon in more depth.

Finally, there are a number of ideas which could be tested only after a necessary period of time has passed. For example, the differences between Vilnius, Riga, and Tallinn Stock exchanges or industry effects might be captured when the number of companies as well as their liquidity has increased to an appropriate level. In addition, as we document that momentum returns in Sweden increased over time, we encourage a further investigation of the relationship between the market development and momentum profits in the Baltics.

Works Cited

Ball, R., & Kothari, S. P. (1989). Nonstationary Expected Returns: Implications for Tests of Market Efficiency and Serial Correlation in Returns. *Journal of Financial Economics 25* , 51-74.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2007). Liquidity and Expected Returns: Lessons From Emerging Markets. *Review of Financial Studies* , 1783-1831.

Chan, K. C. (1988). On the Contrarian Investment Strategy. *Journal of Business 61* , 147-163.

Chan, L. K., Jegadeesh, N., & Lakonishok, J. (1996). Momentum Strategies. *Journal of Finance 51* , 1681-1713.

Chordia, T., & Shivakumar, L. (2002). Momentum, Business Cycle, and Time-varying Expected Returns. *Journal of Finance 57* , 985-1018.

Cooper, M., Guitierrez, R. C., & Hameed, A. (2004). Market States and Momentum. *Journal of Finance 59* , 1345-1366.

De Bondt, W. F., & Thaler, R. (1985). Does the Stock Market Overreact? *Journal of Finance 40* , 793-805.

Deutsche Bundesbank. (2009). *BBK*. Retrieved 2009 December 20 from Statistics: http://www.bundesbank.de/statistik/statistik_zeitreihen.en.php?lang=en&open=&func=row&tr=WZ3459

Fama, E. F. (1998). Market Efficiency, Long-term Returns, and Behavioral Finance. *Journal of Financial Economics 49* , 283-306.

Fama, E. F., & French, K. R. (1996). Multifactor Explanations of Asset Pricing Anomalies. *Journal of Finance 51* , 55-84.

Fama, E., & French, K. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics* , 3-56.

Ferri, R. A. (2009). *Indexing In The 21st Century*. Retrieved 2009 November 21from Portfolio Solutions: http://www.portfoliosolutions.com/f-18.html

French, K. R. (2009). *Kenneth R. French*. Retrieved 2009 December 20 from Description of Fama/French factors: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

Gallant, A. R. (1987). *Nonlinear Statistical Models.* New York: Wiley.

Gervais, S., & Odean, T. (2001). Learning to be Overconfident. *Review of Financial Studies 14* , 1-27.

Griffin, J. M. (2002). Are the Fama and French Factors Global or Country Specific? *The Review of Financial Studies, Vol. 15, No. 3* , 783-803.

Griffin, J. M., Ji, X., & Martin, J. S. (2003). Momentum Investing and Business Cycle Risk: Evidence from Pole to Pole. *Journal of Finance* , 2515-2547.

Grinblatt, M., & Moskowitz, T. J. (2003). *Predicting Stock Price Movements from the Pattern of Past Returns.* Working paper, University of Chicago.

Grinblatt, M., & Titman, S. (1989). Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings. *Journal of Business 62* , 394-415.

Grinblatt, M., & Titman, S. (1991). *Performance Measurement without Benchmarks: An Examination of Mutual Fund Returns.* Working paper, University of California at Los Angeles.

Grundy, B. D., & Martin, J. S. (2001). Understanding the Nature of the Risks and the Source of the Rewards to Momentum Investing. *Review of Financial Studies 14* , 29-78.

Henker, T., Martens, M. P., & Huynh, R. (2009). The Vanishing Abnormal Returns of Momentum Strategies and 'Front-Running' Momentum Strategies. *Working Paper Series* .

Hong, H., & Stein, J. (1999). A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets. *Journal of Finance 54* , 2143–2184.

Hong, H., Lim, T., & Stein, J. C. (2000). Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies. *Journal of Finance 55* , 265-295.

Hwang, S., & Rubesam, A. (2008). The Disappearance of Momentum. *Working Paper Series* .

Jegadeesh, N. (1990). Evidence of Predictable Behavior of Security Returns. *Journal of Finance 45* , 881-898.

Jegadeesh, N., & Titman, S. (2001). Profitability of Momentum Strategies: An Evaluation of Alternative Explanations. *Journal of Finance 56* , 699-718.

Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance 48* , 35-91.

Jegadeesh, N., & Titman, S. (1991). *Short Horizon Return Reversals and the Bid-ask Spread.* Working paper, University of California at Los Angeles.

Jensen, M., & Bennington, G. (1970). Random Walks and Technical Theories: Some Additional Evidence. *Journal of Finance 25* , 469-482.

Kaminsky, G. L., Lyons, R. K., & Schmukler, S. (2004). Managers, Investors, and Crises: Mutual Fund Strategies in Emerging Markets. *Journal of International Economics 64* , 113-134.

Kent, D., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor Psychology and Security Market under- and Overreactions. *Journal of Finance 52* , 1839-1885.

Lee, C. M., & Swaminathan, B. (2000). Price Momentum and Trading Volume. *Journal of Finance 55* , 2017-2069.

Lehmann, B. (1990). Fads, Martingales and Market Efficiency. *Quarterly Journal of Economics 105* , 1-28.

Levy, R. (1967). Relative Strength as a Criterion for Investment Selection. *Journal of Finance 22* , 595-610.

Lo, A., & MacKinlay, C. (1990). When Are Contrarian Profits due to Stock Market Overreaction? *Review of Financial Studies 3* , 175-205.

Maniusis, V., & Urba, M. (2007). Short Run Momentum and Stock Market Efficiency. Case Study of the Baltic States. *SSE Riga Student Research Papers* .

Moskowitz, T. J., & Grinblatt, M. (1999). Do Industries Explain Momentum? *Journal of Finance 54* , 1249-1290.

Nagornia, J. J. (2005). From Theory to Practice. *Financial Analyst Journal 61* , 42-46.

NASDAQ OMX Group. (2009). Retrieved 2009 December 20 from NASDAQ OMX Group Web site: http://www.nasdaqomx.com/

Nijman, T., Swinkels, L., & Verbeek, M. (2004). Do Countries or Industries Explain Momentum in Europe? *Journal of Empirical Finance 11* , 461-481.

Nofsinger, J. R., & Sias, R. W. (1999). Herding and Feedback Trading by Institutional and Individual Investors. *Journal of Finance 54* , 2263-2295.

Pastor, L., & Stambaugh, R. (2003). Liquidity Risk and Expected Stock Returns. *Journal of Political Economy, 111* , 642-85.

Richards, A. (1997). Winner-Loser Reversals in National Stock Market Indices: Can they be Explained? *Journal of Finance, vol. 52(5)* , 2129-44.

Rouwenhorst. (1998). International Momentum Strategies. *Journal of Finance 53* , 267-284.

Rouwenhorst. (1999). Local Return Factors and Turnover in Emerging Stock Markets. *Journal of Finance 54* , 1439-1464.

Scott, T. F. (1981). *The Mathematical Work of John Wallis.* Chelsea Publishing Company.

Sverige Riksbank. (2010). Retrieved 2010 March 10 from Sverige Riksbank Web site: http://www.riksbank.com/templates/Page.aspx?id=27397

van der Hart, J., Zwart, G. d., & Dijk, D. v. (2005). The Success of Stock Selection Strategies in Emerging Markets: Is It Risk or Behavioral Bias? *Emerging Markets Review 6* , 238-262.

Wang, X. (2000). Size Effect, Book-to-Market Efffect, and Survival. *Journal of Multinational Financial Management 10* , 257-273.

Wermers, R. (1999). Mutual Fund Herding and the Impact on Stock Prices. *Journal of Finance 54* , 582-622.

Zarowin, P. (1990). Size, Seasonality, and Stock Market Overreaction. *Journal of Financial and Quantitative Analysis 25* , 113-125.

Appendix A

Annualized momentum returns of only listed companies on the Baltic Stock Exchanges

Balt. l. Form.	Hold.	1-m Win.	- los.	= port	3-m Win.	- los.	= port	6-m Win.	- los.	= port	12-m Win.	- los.	= port
1-m	coef.	0.161	0.116	0.044	0.184	0.137	0.047	0.179	0.131	0.048	0.154	0.111	0.044
	t-stat	(1.42)	(1.00)	(0.33)	(1.76)*	(1.33)	(0.72)	(1.49)	(1.10)	(1.11)	(1.12)	(0.77)	(1.28)
3-m	coef.	0.138	0.059	0.079	0.184*	0.121	0.063	0.162	0.096	0.066	0.154	0.096	0.058
	t-stat	(1.30)	(0.46)	(0.60)	(1.75)	(1.22)	(0.88)	(1.34)	(0.82)	(1.29)	(1.19)	(0.67)	(1.17)
6-m	coef.	0.196**	0.098	0.098	0.185*	0.094	0.091	0.161	0.058	0.103	0.165	0.102	0.063
	t-stat	(1.97)	(0.78)	(0.86)	(1.76)	(0.88)	(1.32)	(1.39)	(0.44)	(1.34)	(1.28)	(0.65)	(1.02)
12-m	coef.	0.136	0.152	-0.016	0.180*	0.157	0.023	0.127	0.121	0.006	0.130	0.109	0.021
	t-stat	(1.47)	(1.09)	(-0.13)	(1.92)	(1.25)	(0.27)	(1.15)	(0.81)	(0.06)	(0.89)	(0.68)	(0.37)

Table 4. **Non-adjusted annualized momentum returns of listed companies on the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level*

Baltics listed		Winners α	Winners β†	- Losers α	Losers β†	= Portfolio α	Portfolio β
1x1	coef.	0.080	0.704***	0.028	0.859	0.053	-0.155
	t-stat	(0.83)	(-2.64)	(0.30)	(-0.88)	(0.39)	(-0.64)
1x3	coef.	0.093	0.974	0.049	0.919	0.044	0.055
	t-stat	(1.64)	(-0.37)	(0.82)	(-0.63)	(0.66)	(0.36)
1x6	coef.	0.082*	1.027	0.033	1.054	0.050	-0.028
	t-stat	(1.70)	(0.33)	(0.67)	(0.59)	(1.11)	(-0.25)
1x12	coef.	0.073*	1.095	0.026	1.140*	0.045	-0.045
	t-stat	(1.68)	(1.22)	(0.042)	(1.89)	(1.29)	(-0.56)
3x1	coef.	0.057	0.736*	-0.035	0.980	0.092	-0.245
	t-stat	(0.65)	(-1.87)	(-0.36)	(-0.13)	(0.69)	(-0.94)
3x3	coef.	0.084	0.990	0.031	0.817	0.053	0.173
	t-stat	(1.57)	(-0.15)	(0.48)	(-1.55)	(0.73)	(1.25)
3x6	coef.	0.062	1.034	-0.002	0.999	0.064	0.035
	t-stat	(1.20)	(0.44)	(-0.04)	(-0.02)	(1.26)	(0.54)
3x12	coef.	0.073	0.987	0.008	1.136**	0.064	-0.149*
	t-stat	(1.54)	(-0.15)	(0.19)	(2.03)	(1.34)	(-1.67)
6x1	coef.	0.109	0.653***	-0.009	0.934	0.118	-0.282**
	t-stat	(1.33)	(-4.82)	(-0.10)	(-0.54)	(1.04)	(-1.98)
6x3	coef.	0.091	0.871*	-0.002	0.894	0.093	-0.023
	t-stat	(1.42)	(-1.84)	(-0.03)	(-0.91)	(1.31)	(-0.18)
6x6	coef.	0.072	0.854	-0.046	1.122	0.118*	-0.268**
	t-stat	(1.15)	(-1.55)	(-0.88)	(1.33)	(1.70)	(-2.05)
6x12	coef.	0.086**	0.938	0.011	1.211***	0.074	-0.273***
	t-stat	(1.97)	(-0.78)	(0.22)	(2.64)	(1.34)	(-3.04)
12x1	coef.	0.060	0.571***	0.045	1.080	0.015	-0.509***
	t-stat	(0.78)	(-5.36)	(0.46)	(0.78)	(0.13)	(-3.80)
12x3	coef.	0.090*	0.778***	0.051	1.025	0.039	-0.246*
	t-stat	(1.70)	(-3.58)	(0.71)	(0.19)	(0.49)	(-1.73)
12x6	coef.	0.041	0.773**	0.010	1.191*	0.030	-0.418***
	t-stat	(0.68)	(-2.27)	(0.16)	(1.66)	(0.39)	(-2.74)
12x12	coef.	0.041	1.020	0.013	1.168*	0.028	-0.148
	t-stat	(0.89)	(0.24)	(0.24)	(1.81)	(0.51)	(-1.51)

Table 5. **Systematic risk-adjusted annualized momentum returns of listed companies on the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from zero unless stated otherwise) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix B

Annualized momentum returns of listed and delisted companies on the Baltic Stock Exchanges

Balt. d. / Form.	Hold.	1-m Win.	- Los.	= Port.	3-m Win.	- Los.	= Port.	6-m Win.	- Los.	= Port.	12-m Win.	- Los.	= Port.
1-m	coef.	0.175	0.002	0.173	0.164*	0.050	0.114*	0.146	0.071	0.075*	0.120	0.086	0.034
	t-stat	(1.62)	(0.02)	(1.41)	(1.68)	(0.54)	(1.73)	(1.36)	(0.67)	(1.71)	(0.94)	(0.64)	(0.88)
3-m	coef.	0.147	-0.003	0.150	0.146	0.081	0.065	0.120	0.043	0.077	0.118	0.075	0.043
	t-stat	(1.44)	(-0.02)	(1.22)	(1.45)	(0.94)	(0.87)	(1.06)	(0.42)	(1.31)	(0.96)	(0.57)	(0.74)
6-m	coef.	0.139*	-0.011	0.150	0.119	-0.002	0.121	0.101	-0.001	0.102	0.116	0.066	0.049
	t-stat	(1.74)	(-0.09)	(1.25)	(1.26)	(-0.03)	(1.52)	(0.94)	(-0.01)	(1.15)	(0.99)	(0.47)	(0.79)
12-m	coef.	0.099	0.095	0.004	0.163*	0.108	0.055	0.135	0.071	0.063	0.103	0.084	0.019
	t-stat	(1.16)	(0.65)	(0.03)	(1.88)	(0.89)	(0.59)	(1.30)	(0.51)	(0.67)	(0.78)	(0.56)	(0.39)

Table 6. **Non-adjusted annualized momentum returns of listed and delisted companies on the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level*

Baltics delisted		Winners α	Winners β†	- Losers α	Losers β†	= Portfolio α	Portfolio β
1x1	coef.	0.093	0.733**	-0.086	0.851	0.179	-0.119
	t-stat	(1.05)	(-2.34)	(-0.98)	(-0.95)	(1.43)	(-0.48)
1x3	coef.	0.076	0.929	-0.034	0.861	0.111	0.068
	t-stat	(1.47)	(-0.96)	(-0.66)	(-1.17)	(1.63)	(0.45)
1x6	coef.	0.053	0.944	-0.023	0.972	0.076*	-0.028
	t-stat	(1.34)	(-0.71)	(-0.62)	(-0.37)	(1.72)	(-0.25)
1x12	coef.	0.039	1.031	0.036	1.080	0.035	-0.047
	t-stat	(1.04)	(0.41)	(0.11)	(1.63)	(0.91)	(-0.52)
3x1	coef.	0.066	0.732*	-0.095	0.934	0.161	-0.202
	t-stat	(0.80)	(-1.76)	(-0.98)	(-0.44)	(1.28)	(-0.79)
3x3	coef.	0.046	0.980	-0.002	0.709***	0.049	0.272**
	t-stat	(0.97)	(-0.36)	(-0.04)	(-2.97)	(0.68)	(2.31)
3x6	coef.	0.023	0.976	-0.050	0.905*	0.073	0.071
	t-stat	(0.48)	(-0.32)	(-1.32)	(-1.94)	(1.27)	(1.00)
3x12	coef.	0.039	0.941	-0.010	1.066	0.048	-0.125
	t-stat	(0.81)	(-0.70)	(-0.27)	(1.20)	(0.85)	(-1.13)
6x1	coef.	0.060	0.536***	-0.120	0.954	0.180	-0.419***
	t-stat	(0.93)	(-8.14)	(-1.19)	(-0.34)	(1.57)	(-2.78)
6x3	coef.	0.028	0.809***	-0.093*	0.818*	0.122	-0.009
	t-stat	(0.52)	(-2.76)	(-1.67)	(-1.92)	(1.51)	(-0.07)
6x6	coef.	0.016	0.779***	-0.099**	1.015	0.115	-0.236*
	t-stat	(0.27)	(-2.64)	(-2.28)	(0.21)	(1.39)	(-1.89)
6x12	coef.	0.040	0.850*	-0.021	1.120**	0.060	-0.270**
	t-stat	(0.87)	(-1.81)	(-0.56)	(1.97)	(1.11)	(-2.49)
12x1	coef.	0.026	0.529***	-0.014	1.112	0.040	-0.583***
	t-stat	(0.36)	(-6.36)	(-0.14)	(1.09)	(0.33)	(-4.54)
12x3	coef.	0.078	0.684***	0.003	1.001	0.076	-0.317**
	t-stat	(1.48)	(-4.86)	(0.04)	(0.01)	(0.88)	(-2.16)
12x6	coef.	0.050	0.734***	-0.036	1.131	0.087	-0.397***
	t-stat	(0.88)	(-3.09)	(-0.63)	(1.30)	(1.08)	(-2.83)
12x12	coef.	0.017	0.948	-0.009	1.100	0.026	-0.152*
	t-stat	(0.46)	(-0.80)	(-0.18)	(1.18)	(0.56)	(-1.76)

Table 7. **Systematic risk-adjusted annualized momentum returns of listed and delisted companies on the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from zero unless stated otherwise) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix C

Annualized momentum returns of listed companies on the Stockholm Stock Exchange

Sweden| Form.	Hold.	1-m Win.	- los.	= port	3-m Win.	- los.	= port	6-m Win.	- los.	= port	12-m Win.	- los.	= port
1-m	coef.	-0.040	0.028	-0.068	0.033	-0.012	.0.046	0.041	-0.040	0.082***	0.044	-0.043	0.087***
	t-stat	(-0.61)	(0.38)	(-1.14)	(0.59)	(-0.18)	(1.21)	(0.67)	(-0.56)	(2.69)	(0.71)	(-0.57)	(3.24)
3-m	coef.	0.051	-0.028	0.078	0.097*	-0.066	0.163***	0.092	-0.062	0.154***	0.059	-0.062	0.121***
	t-stat	(0.86)	(-0.31)	(1.13)	(1.71)	(-0.89)	(3.11)	(1.54)	(-0.79)	(3.17)	(1.00)	(-0.75)	(2.65)
6-m	coef.	0.155**	-0.053	0.208**	0.135**	-0.056	0.192***	0.110*	-0.043	0.153***	0.077	-0.052	0.129**
	t-stat	(2.55)	(-0.56)	(2.57)	(2.39)	(-0.70)	(3.25)	(1.87)	(-0.52)	(2.75)	(1.27)	(-0.61)	(2.24)
12-m	coef.	0.153**	-0.024	0.177**	0.132**	-0.045	0.176***	0.112*	-0.025	0.136**	0.068	-0.027	0.095*
	t-stat	(2.43)	(-0.26)	(2.30)	(2.35)	(-0.57)	(3.25)	(1.94)	(-0.31)	(2.50)	(1.05)	(-0.35)	(1.73)

Table 8. **Non-adjusted annualized momentum returns of listed companies on the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level*

Sweden|		Winners α	Winners β†	- Losers α	Losers β†	= Portfolio α	Portfolio β
1x1	coef.	-0.135***	0.952	-0.071	1.062	-0.064	-0.110
	t-stat	(-3.10)	(-0.69)	(-1.46)	(0.87)	(-1.05)	(-1.07)
1x3	coef.	-0.060**	1.043	-0.113***	1.233***	0.053	-0.191**
	t-stat	(-2.13)	(0.78)	(-3.28)	(2.88)	(1.41)	(-2.17)
1x6	coef.	-0.052**	1.162***	-0.140***	1.344***	0.088***	-0.182**
	t-stat	(-2.07)	(2.60)	(-4.82)	(4.84)	(3.00)	(-2.37)
1x12	coef.	-0.042**	1.173***	-0.135***	1.414***	0.093***	-0.241***
	t-stat	(-2.04)	(2.84)	(-4.79)	(4.45)	(3.75)	(-3.19)
3x1	coef.	-0.034	0.848***	-0.126**	1.244**	0.092	-0.396***
	t-stat	(-0.85)	(-2.81)	(-2.10)	(2.39)	(1.38)	(-3.50)
3x3	coef.	0.012	0.924	-0.163***	1.304***	0.175***	-0.381***
	t-stat	(0.35)	(-1.13)	(-3.97)	(3.07)	(3.52)	(-3.39)
3x6	coef.	0.005	1.041	-0.161***	1.407***	0.165***	-0.366***
	t-stat	(0.15)	(0.58)	(-4.24)	(4.31)	(3.61)	(-3.23)
3x12	coef.	-0.023	1.087	-0.154***	1.478***	0.130***	-0.391***
	t-stat	(-0.94)	(1.19)	(-4.01)	(3.68)	(3.06)	(-2.83)
6x1	coef.	0.074*	0.828***	-0.148**	1.286***	0.222***	-0.458***
	t-stat	(1.73)	(-2.97)	(-2.27)	(2.75)	(2.87)	(-3.67)
6x3	coef.	0.051	0.934	-0.155***	1.391***	0.206***	-0.457***
	t-stat	(1.48)	(-1.14)	(-3.38)	(3.69)	(3.67)	(-3.73)
6x6	coef.	0.023	1.023	-0.142***	1.445***	0.166***	-0.422***
	t-stat	(0.77)	(0.33)	(-3.47)	(4.51)	(3.16)	(-3.14)
6x12	coef.	-0.004	1.058	-0.142**	1.446***	0.138**	-0.387*
	t-stat	(-0.12)	(0.53)	(-3.16)	(2.69)	(2.45)	(-1.88)
12x1	coef.	0.064	0.864**	-0.130**	1.281***	0.194***	-0.417***
	t-stat	(1.47)	(-2.27)	(-2.05)	(3.08)	(2.63)	(-3.81)
12x3	coef.	0.044	0.957	-0.146***	1.340***	0.190***	-0.383***
	t-stat	(1.33)	(-0.80)	(-3.31)	(3.82)	(3.67)	(-3.61)
12x6	coef.	0.027	0.968	-0.121***	1.337***	0.148***	-0.369***
	t-stat	(0.81)	(-0.38)	(-2.84)	(3.51)	(2.80)	(-2.59)
12x12	coef.	-0.014	1.106	-0.113**	1.240*	0.098*	-0.134
	t-stat	(-0.38)	(0.68)	(-2.52)	(1.66)	(1.72)	(-0.58)

Table 9. **Systematic risk-adjusted annualized momentum returns of listed companies on the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from zero unless stated otherwise) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix D

Detailed investigation of annualized momentum returns for the 6-month/6-month strategy in the Baltic Stock Exchanges.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.103	0.118*	0.118	0.141**	0.030	0.040	0.094	0.128	0.174**	0.183***	0.159**	0.139*	0.199**	0.157	0.401**	0.582**	0.018	-0.042
	(1.34)	(1.70)	(1.61)	(2.30)	(0.19)	(0.37)	(0.83)	(1.34)	(2.19)	(3.17)	(2.06)	(1.91)	(2.18)	(1.35)	(2.30)	(2.36)	(0.13)	(-0.24)
$R_m - R_f$		-0.268**	-0.253*	-0.037	-0.089	-0.076	-0.061	-0.043	-0.160	-0.145	-0.102	-0.039		-0.043	-0.129	-0.204	-0.140	-0.094
		(-2.05)	(-1.79)	(-0.35)	(-0.78)	(-0.71)	(-0.53)	(-0.39)	(-1.49)	(-1.35)	(-0.83)	(-0.33)		(-0.36)	(-0.99)	(-1.50)	(-1.06)	(-0.81)
SMB			-0.215	-0.201	-0.397	-0.357	-0.276	-0.211	-0.521	-0.638*	-0.383	-0.208	-0.252	-0.216	-0.259	-0.357	-0.387	-0.211
			(-0.49)	(-0.46)	(-1.00)	(-0.92)	(-0.66)	(-0.50)	(-1.34)	(-1.77)	(-0.89)	(-0.48)	(-0.61)	(-0.50)	(-0.63)	(-0.96)	(-1.04)	(-0.50)
HML			0.138	0.234	0.330	0.283	0.254	0.230	0.330	0.286	0.145	0.233	0.295	0.243	0.105	0.142	0.305	0.251
			(0.41)	(0.79)	(1.18)	(1.02)	(0.89)	(0.76)	(1.30)	(1.32)	(0.51)	(0.78)	(1.06)	(0.85)	(0.34)	(0.47)	(1.19)	(0.90)
Liquidity				-0.835***	-0.733***	-0.761***	-0.799***	-0.825***	-0.374	-0.431**	-0.645**	-0.831***	-0.847***	-0.826***	-0.750***	-0.612**	-0.610***	-0.699***
				(-2.74)	(-2.98)	(-2.86)	(-2.83)	(-2.93)	(-1.52)	(-1.99)	(-2.37)	(-2.77)	(-2.78)	(-3.11)	(-2.72)	(-2.45)	(-2.89)	(-2.97)
MS^y_{dummy}					0.148													
					(0.86)													
MS_y									0.263									
									(0.99)									
MS_y^2									-0.386									
									(-1.10)									
MS^{6m}_{dummy}						0.152												
						(1.21)												
MS_{6m}										0.214								
										(1.45)								
MS_{6m}^2										-0.249**								
										(-2.50)								
MS^{3m}_{dummy}							0.076											
							(0.57)											
MS_{3m}											0.077							
											(0.55)							
MS_{3m}^2											-0.076*							
											(-1.78)							
MS^m_{dummy}								0.024										
								(0.23)										
MS_m												0.085						
												(0.11)						
MS_m^2												0.021						
												(0.10)						
$(R_m - R_f)*MS_{6m}$													-0.204					
													(-0.86)					
$(R_m - R_f)*(1-MS_{6m})$													0.061					
													(0.42)					
													0.66					
													(0.418)					
Time														-0.000				
														(-0.11)				
VBor 1m															-0.069			
															(-1.59)			
TBor 1m																-0.111*		
																(-1.79)		
GDPy																	0.047	
																	(1.10)	
GDPylag																		0.057
																		(1.23)
# of OBS	108	108	108	108	102	108	108	108	102	108	108	108	108	108	108	108	108	108
Deviance	31.644	29.234	29.141	24.650	23.525	24.214	24.538	24.637	21.179	20.162	23.362	26.647	24.429	24.645	23.762	22.935	23.828	23.877

Table 10. **The momentum portfolio returns for the 6-m/6-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.161 (1.39)	0.072 (1.15)	0.086 (1.43)	0.108** (2.27)	0.004 (0.04)	-0.053 (-0.89)	-0.014 (-0.20)	0.066 (0.95)	0.098 (1.40)	0.080* (1.74)	0.073 (1.41)	0.081 (1.58)	0.128* (1.82)	0.087 (0.84)	0.309** (2.47)	0.392** (2.15)	0.040 (0.50)	0.094 (0.80)
$R_m - R_f$ †		0.854 (-1.55)	0.787** (-2.14)	0.990 (-0.16)	0.944 (-0.82)	0.928 (-1.16)	0.927 (-1.07)	0.074 (0.97)	0.933 (-0.87)	0.893 (-1.48)	0.940 (-0.80)	0.979 (-0.30)		0.998 (-0.03)	0.919 (-1.00)	0.882 (-1.28)	0.933 (-0.81)	0.985 (-0.20)
SMB			0.703** (2.18)	0.716** (2.24)	0.583** (1.81)	0.465 (1.57)	0.519 (1.63)	0.685** (2.16)	0.559 (1.86)	0.359 (1.32)	0.532 (1.62)	0.675** (2.13)	0.698** (2.30)	0.736** (2.35)	0.671** (2.29)	0.615** (2.22)	0.613** (2.12)	0.715** (2.26)
HML			-0.139 (-0.50)	-0.049 (-0.19)	0.004 (0.01)	0.030 (0.13)	0.003 (0.01)	-0.051 (-0.24)	-0.012 (-0.05)	0.041 (0.18)	-0.064 (-0.28)	-0.057 (-0.23)	-0.027 (-0.11)	-0.060 (-0.24)	-0.148 (-0.63)	-0.107 (-0.46)	-0.009 (-0.04)	-0.048 (-0.19)
Liquidity				-0.784*** (-5.04)	-0.694*** (-5.18)	-0.666*** (-4.74)	-0.691*** (-5.05)	-0.753*** (-5.25)	-0.589*** (-4.08)	-0.544*** (-3.67)	-0.703*** (-4.31)	-0.769*** (-5.22)	-0.788*** (-5.00)	-0.796*** (-5.64)	-0.719*** (-4.60)	-0.641*** (-4.14)	-0.660*** (-5.51)	-0.773*** (-6.30)
MS^y_{dummy}					0.134 (1.18)													
MS_y									0.168 (0.92)									
MS_y^2									-0.085 (-0.34)									
MS^{6m}_{dummy}						0.244*** (2.87)												
MS_{6m}										0.290*** (2.73)								
MS_{6m}^2										0.007 (0.08)								
MS^{3m}_{dummy}							0.200** (2.12)											
MS_{3m}											0.176* (1.78)							
MS_{3m}^2											0.043 (1.28)							
MS^m_{dummy}								0.074 (0.97)										
MS_m												0.073 (1.20)						
MS_m^2												0.025* (1.86)						
$(R_m - R_f) * MS_{6m}$†													1.024 (0.26)					
$(R_m - R_f) * (1-MS_{6m})$ †													0.932 (-0.44) 0.19 (0.660)					
Time														0.004 (0.22)				
VBor 1m															-0.053* (-1.86)			
TBor 1m																-0.072* (-1.68)		
GDPy																	0.026 (1.00)	
GDPylag																		0.004 (0.13)
# of OBS	108	108	108	108	102	108	108	108	102	108	108	108	108	108	108	108	108	108
Deviance	43.127	18.763	171072	13.019	12.684	11.897	12.341	12.979	12.412	11.454	12.420	12.789	13.082	13.099	12.582	12.399	12.858	13.104

Table 11. **The winners' portfolio returns for the 6-m/6-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.058 (0.44)	-0.046 (-0.88)	-0.031 (-0.67)	-0.033 (-0.69)	-0.026 (-0.27)	-0.094 (-1.25)	-0.109 (-1.41)	-0.062 (-1.18)	-0.076 (-0.93)	-0.103** (-1.96)	-0.086 (-1.63)	-0.058 (-1.15)	-0.070 (-1.03)	-0.070 (-0.66)	-0.093 (-0.66)	-0.190 (-1.32)	0.022 (0.30)	0.136 (1.71)
$R_m - R_f$ †		1.122 (1.33)	1.040 (0.55)	1.027 (0.31)	1.033 (0.38)	1.004 (0.04)	0.988 (-0.14)	1.016 (0.19)	1.093 (1.07)	1.038 (0.45)	1.042 (0.44)	1.019 (0.21)		1.041 (0.42)	1.048 (0.54)	1.086 (0.92)	1.073 (0.77)	1.079 (0.93)
SMB			0.918*** (3.21)	0.918*** (3.19)	0.980*** (3.24)	0.823*** (3.16)	0.795*** (2.71)	0.896*** (3.17)	1.080*** (3.60)	0.998*** (3.45)	0.915*** (3.27)	0.883*** (2.94)	0.950*** (3.35)	0.952*** (3.56)	0.930*** (3.09)	0.972*** (3.17)	1.000*** (3.61)	0.926*** (3.36)
HML			-0.277 (-1.18)	-0.286 (-1.21)	-0.326 (-1.38)	-0.253 (-1.12)	-0.251 (-1.07)	-0.291 (-1.24)	-0.342 (-1.61)	-0.246 (-1.20)	-0.209 (-0.97)	-0.290 (-1.28)	-0.322 (-1.41)	-0.303 (-1.38)	-0.253 (-1.20)	-0.249 (-1.07)	-0.314 (-1.39)	-0.298 (-1.36)
Liquidity				0.051 (0.26)	0.039 (0.22)	0.095 (0.52)	0.108 (0.56)	0.071 (0.40)	-0.215 (-1.25)	-0.114 (-0.79)	-0.057 (-0.33)	0.063 (0.31)	0.059 (0.31)	0.029 (0.16)	0.031 (0.18)	-0.029 (-0.17)	-0.050 (-0.31)	-0.075 (-0.44)
MS^{y}_{dummy}					-0.014 (-0.14)													
MS_y									-0.095 (-0.59)									
MS_y^2									0.301 (1.25)									
MS^{6m}_{dummy}						0.092 (1.11)												
MS_{6m}										0.076 (0.93)								
MS_{6m}^2										0.256*** (4.13)								
MS^{3m}_{dummy}							0.123 (1.34)											
MS_{3m}											0.100 (1.27)							
MS_{3m}^2											0.119*** (4.61)							
MS^{m}_{dummy}								0.051 (0.84)										
MS_m												0.065 (1.59)						
MS_m^2												0.023 (1.39)						
$(R_m - R_f) * MS_{6m}$†													1.135 (0.69)					
$(R_m - R_f) * (1-MS_{6m})$ †													0.963 (-0.39) 0.55 (0.459)					
Time														0.001 (0.38)				
VBor 1m															0.016 (0.42)			
TBor 1m																0.040 (1.06)		
GDPy																	-0.021 (-1.00)	
GDPylag																		-0.053** (-2.47)
# of OBS	108	108	108	108	102	108	108	108	102	108	108	108	108	108	108	108	108	108
Deviance	56.640	14.482	12.068	12.051	11.361	11.893	11.759	11.992	10.474	10.418	10.599	11.794	11.958	12.023	12.005	11.833	11.887	11.391

Table 12. **The losers' portfolio returns for the 6-m/6-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix E

Detailed investigation of annualized momentum returns for the 6-month/1-month strategy in the Baltic Stock Exchanges.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α .	0.098 (0.86)	0.118 (1.04)	0.098 (0.88)	0.105 (0.95)	-0.042 (-0.14)	-0.004 (-0.02)	0.046 (0.22)	0.136 (0.66)	0.192 (1.15)	0.123 (0.93)	0.122 (1.01)	-0.053 (-0.43)	-0.167 (-1.12)	-0.141 (-0.49)	-0.034 (-0.11)	0.224 (0.60)	0.172 (0.90)	0.126 (0.46)
$R_m - R_f$		-0.282** (-1.98)	-0.332** (-2.20)	-0.221 (-1.50)	-0.280* (-1.77)	-0.246 (-1.58)	-0.239 (-1.50)	-0.207 (-1.26)	-0.256 (-1.62)	-0.229 (-1.52)	-0.256 (-1.59)	-0.117 (-0.75)		-0.187 (-1.25)	-0.197 (-1.22)	-0.241 (-1.41)	-0.194 (-1.24)	-0.219 (-1.47)
SMB			-0.302 (-1.18)	-0.230 (-0.93)	-0.301 (-1.08)	-0.260 (-0.99)	-0.241 (-0.95)	-0.221 (-0.86)	-0.275 (-0.97)	-0.236 (-0.82)	-0.255 (-0.90)	-0.321* (-1.66)	-0.239 (-1.05)	-0.196 (-0.77)	-0.217 (-0.86)	-0.244 (-0.91)	-0.206 (-0.78)	-0.228 (-0.90)
HML			-0.172 (-1.19)	-0.190 (-1.38)	-0.176 (-1.28)	-0.182 (-1.34)	-0.184 (-1.33)	-0.187 (-1.35)	-0.189 (-1.36)	-0.192 (-1.41)	-0.197 (-1.47)	-0.192 (-1.47)	-0.244* (-1.71)	-0.217 (-1.46)	-0.177 (-1.23)	-0.195 (-1.42)	-0.199 (-1.38)	-0.190 (-1.36)
Liquidity				-0.287 (-1.47)	-0.272 (-1.40)	-0.277 (-0.62)	-0.279 (-1.41)	-0.297 (-1.37)	-0.286 (-1.40)	-0.279 (-1.41)	-0.247 (-1.01)	-0.297 (-1.45)	-0.227 (-1.14)	-0.319* (-1.65)	-0.301 (-1.51)	-0.275 (-1.40)	-0.316 (-1.62)	-0.290 (-1.52)
MS^y_{dummy}					0.216 (0.65)													
MS_y									-0.132 (-0.32)									
MS_y^2									-0.373 (-0.66)									
MS^{6m}_{dummy}						0.167 (0.62)												
MS_{6m}										-0.015 (-0.05)								
MS_{6m}^2										-0.055 (-0.22)								
MS^{3m}_{dummy}							0.097 (0.38)											
MS_{3m}											0.037 (0.14)							
MS_{3m}^2											-0.046 (-0.32)							
MS^m_{dummy}								-0.056 (-0.21)										
MS_m												0.044 (0.27)						
MS_m^2												0.164*** (2.94)						
$(R_m - R_f)*MS_m$													0.211 (0.95)					
$(R_m - R_f)*(1-MS_m)$													-0.582*** (-2.89) 5.54 (0.019)					
Time														0.004 (0.88)				
VBor 1m															0.037 (0.44)			
TBor 1m																-0.029 (-0.30)		
GDPy																	-0.030 (-0.51)	
GDPylag																		-0.007 (-0.09)
# of OBS	113	113	113	113	107	113	113	113	107	113	113	113	113	113	113	113	113	113
Deviance	166.911	159.139	151.622	147.275	137.285	146.659	147.057	147.204	137.581	147.189	146.817	133.740	140.413	145.675	146.946	147.108	146.626	147.258

Table 13. **The momentum portfolio returns for the 6-m/1-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.196** (1.97)	0.109 (1.33)	0.100 (1.20)	0.105 (1.27)	-0.019 (-0.12)	-0.116 (-0.90)	-0.031 (-0.23)	0.045 (0.32)	0.019 (0.17)	0.113 (1.26)	0.060 (0.68)	0.033 (0.36)	0.045 (0.37)	0.114 (0.58)	0.425* (1.87)	0.487* (1.80)	0.089 (0.84)	0.174 (1.15)
$R_m - R_f$ †		0.653*** (-4.83)	0.627*** (-4.81)	0.698*** (-3.16)	0.662*** (-3.45)	0.647*** (-3.63)	0.655*** (-3.48)	0.673*** (-3.23)	0.658*** (-3.39)	0.636*** (-3.53)	0.627*** (-3.51)	0.661*** (-3.35)		0.697*** (-3.10)	0.644*** (-3.53)	0.634*** (-3.47)	0.692*** (-3.06)	0.705*** (-3.08)
SMB			0.002 (0.01)	0.048 (0.31)	0.021 (0.13)	-0.013 (-0.09)	0.022 (0.14)	0.030 (0.19)	0.022 (0.13)	-0.031 (-0.20)	-0.003 (-0.02)	-0.030 (-0.22)	0.046 (0.30)	0.046 (0.29)	0.018 (0.11)	0.003 (0.02)	0.042 (0.26)	0.053 (0.35)
HML			-0.098 (-1.05)	-0.109 (-1.20)	-0.097 (-1.07)	-0.094 (-1.07)	-0.097 (-1.08)	-0.114 (-1.23)	-0.101 (-1.11)	-0.109 (-1.20)	-0.119 (-1.29)	-0.109 (-1.19)	-0.121 (-1.32)	-0.108 (-1.11)	-0.138 (-1.60)	-0.125 (-1.46)	-0.107 (-1.15)	-0.111 (-1.60)
Liquidity				-0.183 (-1.47)	-0.146 (-1.18)	-0.164 (-1.38)	-0.165 (-1.36)	-0.164 (-1.26)	-0.139 (-1.10)	-0.139 (-1.15)	-0.144 (-1.08)	-0.150 (-1.23)	-0.170 (-1.36)	-0.182 (-1.49)	-0.150 (-1.26)	-0.145 (-1.18)	-0.177 (-1.44)	-0.195 (-1.60)
MS^{y}_{dummy}					0.167 (0.88)													
MS_y									0.292 (1.12)									
MS_y^2									0.301 (0.77)									
MS^{6m}_{dummy}						0.336 (1.98)												
MS_{6m}										0.195 (1.11)								
MS_{6m}^2										-0.085 (-0.51)								
MS^{3m}_{dummy}							0.223 (1.27)											
MS_{3m}											0.242* (1.73)							
MS_{3m}^2											0.042 (0.57)							
MS^{m}_{dummy}								0.107 (0.62)										
MS_m												0.173* (1.82)						
MS_m^2												0.059* (1.82)						
$(R_m - R_f) * MS_m$†													0.793 (-1.30)					
$(R_m - R_f)*(1-MS_m)$ †													0.619*** (-2.91) 0.63 (0.429)					
Time														-0.000 (-0.06)				
VBor 1m															-0.084 (-1.61)			
TBor 1m																-0.094 (-1.53)		
GDPy																	0.007 (0.21)	
GDPylag																		-0.023 (-0.52)
# of OBS	113	113	113	113	107	113	113	113	107	113	113	113	113	113	113	113	113	113
Deviance	126.268	84.668	83.820	82.040	78.584	79.536	80.904	81.778	78.274	80.265	80.059	79.232	81.711	82.037	80.300	80.322	82.005	81.847

Table 14. **The winners' portfolio returns for the 6-m/1-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.098 (0.78)	-0.009 (-0.10)	0.002 (0.02)	-0.001 (-0.01)	0.023 (0.09)	-0.112 (-0.53)	-0.077 (-0.40)	-0.092 (-0.55)	0.674 (1.15)	-0.010 (-0.08)	-0.062 (-0.60)	0.086 (0.87)	0.211 (1.51)	0.255 (1.07)	0.460* (1.82)	0.263 (0.84)	-0.083 (-0.46)	0.049 (0.18)
$R_m - R_f$ †		0.934 (-0.54)	0.959 (-0.31)	0.919 (-0.63)	0.941 (-0.43)	0.893 (-0.78)	0.895 (-0.78)	0.881 (-0.84)	0.915 (-0.62)	0.865 (-0.96)	0.883 (-0.81)	0.778 (-1.54)		0.884 (-0.90)	0.841 (-1.17)	0.874 (-0.89)	0.886 (-0.85)	0.923 (-0.58)
SMB			0.304 (1.60)	0.278 (1.43)	0.323 (1.54)	0.247 (1.14)	0.263 (1.29)	0.251 (1.22)	0.296 (1.37)	0.205 (0.91)	0.252 (1.07)	0.291 (1.61)	0.285 (1.51)	0.243 (1.23)	0.235 (1.20)	0.247 (1.22)	0.248 (1.24)	0.282 (1.43)
HML			0.074 (0.72)	0.081 (0.80)	0.079 (0.76)	0.088 (0.85)	0.087 (0.83)	0.073 (0.72)	0.088 (0.86)	0.083 (0.81)	0.078 (0.81)	0.083 (0.87)	0.123 (1.11)	0.109 (1.01)	0.039 (0.39)	0.070 (0.69)	0.092 (0.88)	0.080 (0.80)
Liquidity				0.103 (0.69)	0.127 (0.87)	0.113 (0.73)	0.113 (0.74)	0.134 (0.79)	0.146 (0.95)	0.140 (0.83)	0.103 (0.50)	0.147 (0.92)	0.057 (0.36)	0.137 (0.92)	0.151 (0.94)	0.130 (0.85)	0.139 (0.94)	0.095 (0.65)
MS^{y}_{dummy}					-0.049 (-0.18)													
MS_y									0.424 (1.33)									
MS_y^2									0.674 (1.15)									
MS^{6m}_{dummy}						0.170 (0.67)												
MS_{6m}										0.210 (0.80)								
MS_{6m}^2										-0.031 (-0.12)								
MS^{3m}_{dummy}							0.124 (0.53)											
MS_{3m}											0.205 (0.98)							
MS_{3m}^2											0.087 (0.78)							
MS^{m}_{dummy}								0.162 (0.72)										
MS_m												0.129 (0.99)						
MS_m^2												-0.106*** (-2.95)						
$(R_m - R_f) * MS_m$†													0.582* (-1.87)					
$(R_m - R_f) * (1-MS_m)$ †													1.201 (1.03) 3.19 (0.074)					
Time														-0.004 (-1.06)				
VBor 1m															-0.121* (-1.86)			
TBor 1m																-0.065 (-0.78)		
GDPy																	0.037 (0.67)	
GDPylag																		-0.016 (-0.23)
# of OBS	113	113	113	113	107	113	113	113	107	113	113	113	113	113	113	113	113	113
Deviance	201.903	116.329	111.689	111.125	103.290	110.489	110.765	110.520	100.959	109.725	109.458	101.961	106.939	109.396	107.544	110.310	110.141	111.028

Table 15. **The losers' portfolio returns for the 6-m/1-m strategy in the Baltic Stock Exchanges.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix F

Detailed investigation of annualized momentum returns for the 6-month/6-month strategy in the Stockholm Stock Exchange.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.153*** (2.75)	0.166*** (3.16)	0.171*** (3.43)	0.170*** (3.56)	0.149* (1.67)	0.152** (2.00)	0.212*** (3.07)	0.173*** (3.02)	0.248*** (3.30)	0.311*** (5.13)	0.254*** (4.69)	0.178*** (3.69)	0.228*** (3.89)	0.047 (0.50)	0.357*** (4.27)	0.381*** (3.96)	0.053 (1.21)	0.032 (0.42)
$R_m - R_f$		-0.422 (-3.14)	-0.418*** (-3.28)	-0.304** (-2.45)	-0.312** (-2.42)	-0.310** (-2.54)	-0.293** (-2.40)	-0.303** (-2.41)	-0.273** (-2.22)	-0.217* (-1.88)	-0.245** (-2.12)	-0.292** (-2.41)		-0.305** (-2.42)	-0.359*** (-2.70)	-0.367*** (-2.71)	-0.330*** (-2.75)	-0.361*** (-2.68)
SMB			-0.281 (-0.76)	-0.112 (-0.35)	-0.138 (-0.45)	-0.140 (-0.44)	-0.051 (-0.16)	-0.109 (-0.34)	-0.158 (-0.52)	-0.309 (-1.14)	-0.115 (-0.41)	-0.039 (-0.12)	-0.106 (-0.33)	-0.095 (-0.30)	-0.222 (-0.76)	-0.176 (-0.60)	-0.216 (-0.69)	0.173 (-0.55)
HML			0.319 (1.26)	0.282 (1.11)	0.291 (1.17)	0.287 (1.12)	0.268 (1.07)	0.281 (1.10)	0.269 (1.10)	0.283 (1.30)	0.198 (0.84)	0.255 (1.00)	0.287 (1.14)	0.277 (1.10)	0.303 (1.42)	0.273 (1.123)	0.319 (1.49)	0.77 (1.28)
Liquidity				-0.589 (-1.30)	-0.557 (-1.24)	-0.572 (-1.27)	-0.629 (-1.39)	-0.592 (-1.26)	-0.686** (-2.01)	-0.712** (-2.33)	-0.677* (-1.78)	-0.643 (-1.41)	-0.566 (-1.22)	-0.561 (-1.23)	-0.392 (-0.84)	-0.414 (-0.88)	-0.443 (-0.99)	-0.334 (-0.74)
MS^y_{dummy}					0.034 (0.34)													
MS_y									-0.010 (-0.05)									
MS_y^2									-0.842 (-1.28)									
MS^{6m}_{dummy}						0.028 (0.30)												
MS_{6m}										-0.116 (-0.89)								
MS_{6m}^2										-0.818*** (-3.35)								
MS^{3m}_{dummy}							-0.063 (-0.77)											
MS_{3m}											-0.111 (-1.18)							
MS_{3m}^2											-0.249** (-2.52)							
MS^m_{dummy}								-0.004 (-0.08)										
MS_m												-0.04 (-1.25)						
MS_m^2												-0.004 (-0.18)						
$(R_m - R_f)*MS_{6m}$													-0.494** (-2.35)					
$(R_m - R_f)*(1-MS_{6m})$													-0.170 (-0.97) 1.15 (0.284)					
Time														0.001 (1.64)				
Bor 1m															-0.029*** (-2.69)			
Bor 6m																-0.032*** (-2.42)		
GDPy																	0.040* (1.91)	
GDPylag																		0.059** (2.49)
# of OBS	276	276	271	271	270	271	271	271	270	271	271	271	271	271	270	270	271	271
Deviance	74.526	65.834	64.448	62.039	61.921	61.998	61.829	62.038	60.115	53.952	58.687	61.771	61.636	60.878	58.394	58.375	60.052	59.192

Table 16. **The momentum portfolio returns for the 6-m/6-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.110* (1.87)	0.023 (0.77)	0.054** (2.08)	0.054** (2.11)	0.061 (1.46)	0.069 (1.48)	0.067 (1.57)	0.046 (1.40)	0.122** (2.39)	0.120*** (3.82)	0.100*** (3.54)	0.057** (2.31)	0.120*** (3.58)	0.049 (0.95)	0.071 (1.39)	0.072 (1.28)	0.069* (1.90)	0.064* (1.86)
$R_m - R_f$ †		1.022 (0.32)	0.950 (-0.80)	0.982 (-0.27)	0.984 (-0.24)	0.986 (-0.21)	0.985 (-0.22)	0.980 (-0.30)	1.02 (0.31)	1.025 (0.39)	1.014 (0.23)	0.982 (-0.27)		0.982 (-0.27)	0.978 (-0.29)	0.977 (-0.30)	0.986 (-0.20)	0.986 (-0.19)
SMB			0.386** (2.19)	0.434** (2.48)	0.463*** (3.03)	0.456*** (2.82)	0.445*** (2.96)	0.422*** (2.72)	0.482*** (3.54)	0.412*** (3.04)	0.427*** (3.11)	0.431*** (2.79)	0.440*** (2.85)	0.434*** (2.86)	0.445*** (2.87)	0.449*** (2.91)	0.452*** (2.88)	0.438*** (2.68)
HML			0.320*** (2.73)	0.310*** (2.61)	0.301** (2.49)	0.306*** (2.58)	0.305*** (2.61)	0.315*** (2.68)	0.277** (2.57)	0.302*** (3.06)	0.263** (2.37)	0.304*** (2.59)	0.315*** (2.68)	0.309*** (2.60)	0.305*** (3.70)	0.303*** (2.62)	0.452*** (2.88)	0.310*** (3.79)
Liquidity				-0.168 (-0.64)	-0.180 (-0.68)	-0.182 (-0.72)	-0.180 (-0.69)	-0.159 (-0.60)	-0.327* (-1.74)		-0.212 (-0.98)	-0.166 (-0.63)	-0.141 (-0.54)	-0.169 (-0.64)	-0.157 (-0.56)	-0.159 (-0.57)	(-0.192 (-0.72)	-0.188 (-0.69)
MS^y_{dummy}					-0.007 (-0.15)													
MS_y									-0.111 (-1.17)									
MS_y^2									-0.615* (-1.85)									
MS^{6m}_{dummy}						-0.022 (-0.41)												
MS_{6m}										-0.114 (-1.50)								
MS_{6m}^2										-0.349** (-2.45)								
MS^{3m}_{dummy}							-0.020 (-0.42)											
MS_{3m}											-0.058 (-1.10)							
MS_{3m}^2											-0.139** (-2.43)							
MS^m_{dummy}								0.138 (0.45)										
MS_m												-0.001 (-0.05)						
MS_m^2												-0.004 (-0.27)						
$(R_m - R_f) * MS_{6m}$†													0.765** (-2.30)					
$(R_m - R_f) * (1-MS_{6m})$ †													1.134 (1.32) 4.84 (0.028)					
Time														0.000 (0.11)				
Bor 1m															-0.002 (-0.39)			
Bor 6m																-0.002 (-0.35)		
GDPy																	-0.007 (-0.61)	
GDPylag																		-0.005 (-0.34)
# of OBS	276	276	271	271	270	271	271	271	270	271	271	271	271	271	270	270	271	271
Deviance	74.850	24.319	18.708	18.512	18.279	18.486	18.491	18.500	17.065	16.748	17.475	18.505	17.987	18.510	18.257	18.260	18.450	18.495

Table 17. **The winners' portfolio returns for the 6-m/6-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	-0.043 (-0.52)	-0.142*** (-3.47)	-0.117*** (-2.98)	-0.117*** (-3.05)	-0.089 (-1.05)	-0.083 (-1.47)	-0.145*** (-2.80)	-0.127*** (-2.83)	-0.127** (-2.17)	-0.191*** (-3.96)	-0.154*** (-3.39)	-0.121*** (3.14)	-0.109** (-2.49)	0.002 (0.02)	-0.286*** (-5.18)	-0.306*** (-4.92)	-0.017 (-0.22)	0.032 (0.37)
$R_m - R_f$ †		1.445*** (4.51)	1.367*** (4.02)	1.29*** (3.32)	1.296*** (3.05)	1.296*** (3.38)	1.278*** (3.26)	1.283*** (3.21)	1.292*** (3.12)	1.242*** (2.84)	1.259*** (2.98)	1.274*** (3.23)		1.287*** (3.36)	1.337*** (3.62)	1.344*** (3.59)	1.317*** (3.22)	1.348*** (3.27)
SMB			0.666*** (2.86)	0.546** (2.53)	0.601*** (3.09)	0.596*** (2.68)	0.504** (2.22)	0.531** (2.49)	0.641*** (3.16)	0.721*** (3.39)	0.541*** (2.58)	0.470** (2.12)	0.546** (2.52)	0.587** (2.52)	0.667*** (3.65)	0.625*** (3.42)	0.667*** (3.49)	0.612*** (3.17)
HML			0.001 (0.00)	0.027 (0.13)	0.010 (0.06)	0.019 (0.09)	0.037 (0.18)	0.034 (0.17)	0.008 (0.04)	0.019 (0.10)	0.065 (0.33)	0.050 (0.24)	0.028 (0.14)	0.032 (0.16)	0.002 (0.01)	0.030 (0.15)	-0.016 (-0.09)	0.032 (0.17)
Liquidity				0.421* (1.70)	0.376 (1.61)	0.390 (1.54)	0.449* (1.74)	0.432* (1.72)	0.359 (1.60)	0.440** (2.07)	0.465* (1.92)	0.477* (1.89)	0.424* (1.71)	0.394 (1.60)	0.235 (0.95)	0.254 (1.03)	0.261 (1.04)	0.146 (0.58)
MS^{y}_{dummy}					-0.041 (-0.45)													
MS_y									-0.101 (-0.76)									
MS_y^2									0.228 (0.62)									
MS^{6m}_{dummy}						-0.050 (-0.76)												
MS_{6m}										0.003 (0.03)								
MS_{6m}^2										0.469*** (3.74)								
MS^{3m}_{dummy}							0.043 (0.65)											
MS_{3m}											0.0532 (0.88)							
MS_{3m}^2											0.110* (1.75)							
MS^{m}_{dummy}								0.058 (0.69)										
MS_m												0.039 (1.57)						
MS_m^2												-0.000 (-0.01)						
$(R_m - R_f) * MS_{6m}$†													1.259 (1.52)					
$(R_m - R_f) * (1-MS_{6m})$ †													1.304*** (2.73) 0.04 (0.838)					
Time														-0.001** (-2.12)				
Bor 1m															0.026*** (3.14)			
Bor 6m																0.029*** (2.92)		
GDPy																	-0.048*** (-2.07)	
GDPylag																		-0.064*** (-2.47)
# of OBS	276	276	271	271	270	271	271	271	270	271	271	271	271	271	270	270	271	271
Deviance	144.457	42.335	36.595	35.364	35.226	35.231	35.264	35.344	34.992	32.752	34.702	35.090	36.083	34.292	32.293	32.238	32.613	32.062

Table 18. **The losers' portfolio returns for the 6-m/6-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

Appendix G

Detailed investigation of annualized momentum returns for the 6-month/1-month strategy in the Stockholm Stock Exchange.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.208****	0.222***	0.214***	0.204***	0.013	-0.133	0.109	0.210*	0.262*	0.412***	0.319***	0.249***	0.332***	-0.011	0.430***	0.503***	0.068	0.034
·	(2.57)	(2.87)	(2.77)	(2.71)	(0.09)	(0.86)	(0.70)	(1.69)	(2.34)	(4.22)	(3.44)	(2.84)	(2.81)	(-0.06)	(2.76)	(3.57)	(0.68)	(0.31)
$R_m - R_f$		-0.458***	-0.493***	-0.297**	-0.356**	-0.315**	-0.323**	-0.295*	-0.336**	-0.298**	-0.317**	-0.275*		-0.296**	-0.335**	-0.344**	-0.308**	-0.310**
		(-3.67)	(-3.52)	(-2.04)	(-2.31)	(-2.01)	(-2.01)	(-1.90)	(-2.17)	(-1.99)	(-2.01)	(-1.70)		(-2.09)	(-2.32)	(-2.39)	(-2.13)	(-2.18)
SMB			-0.142	-0.097	-0.160	-0.122	-0.130	-0.094	0.135	-0.177	-0.130	-0.044	-0.109	-0.090	-0.124	-0.121	-0.109	-0.097
			(-0.64)	(-0.46)	(-0.76)	(-0.57)	(-0.61)	(-0.42)	(-0.65)	(-0.88)	(-0.60)	(-0.19)	(-0.54)	(-0.43)	(-0.56)	(-0.55)	(-0.49)	(-0.45)
HML			-0.126	-0.169	-0.185	-0.172	-0.173	-0.169	-0.187	-0.171	-0.194	-0.168	-0.170	-0.170	-0.189	-0.195	-0.156	-0.171
			(-0.74)	(-1.05)	(-1.14)	(-1.05)	(-1.05)	(-1.05)	(-1.14)	(-1.06)	(-1.19)	(-1.03)	(-1.08)	(-1.07)	(-0.90)	(-0.93)	(-0.74)	(-0.82)
Liquidity				-0.641**	-0.611**	-0.625**	-0.616**	-0.642**	-0.634**	-0.633**	-0.597**	-0.656**	-0.628**	-0.634**	-0.624	-0.615	-0.612	-0.603
				(-2.15)	(-2.10)	(-2.08)	(-2.03)	(-2.12)	(-2.19)	(-2.26)	(-1.99)	(-2.22)	(-2.13)	(-2.15)	(-1.55)	(-1.55)	(-1.54)	(-1.54)
MS^{y}_{dummy}					0.310*													
					(1.87)													
MS_y									0.253									
									(0.87)									
MS_y^2									-0.758									
									(-0.81)									
MS^{6m}_{dummy}						0.109												
						(0.59)												
MS_{6m}										0.098								
										(0.43)								
MS_{6m}^2										-1.202***								
										(-2.72)								
MS^{3m}_{dummy}							0.146											
							(0.77)											
MS_{3m}											-0.050							
											(-0.27)							
MS_{3m}^2											-0.342							
											(-1.60)							
MS^{m}_{dummy}								-0.011										
								(-0.06)										
MS_m												-0.110						
												(-0.97)						
MS_m^2												-0.044						
												(-0.71)						
$(R_m - R_f)*MS_m$													-0.521**					
													(-2.46)					
$(R_m - R_f)*(1-MS_m)$													-0.139					
													(-0.58)					
													1.09					
													(0.297)					
Time														0.001				
														(1.52)				
Bor 1m															-0.034			
															(-1.43)			
Bor 6m																-0.045**		
																(-2.10)		
GDPy																	0.070**	
																	(2.36)	
GDPylag																		0.075**
																		(2.23)
# of OBS	281	281	276	276	275	276	276	276	275	276	276	276	276	276	276	276	276	276
Deviance	517.488	472.311	462.402	440.882	431.182	440.208	439.695	440.874	433.886	418.908	434.287	439.224	437.782	437.256	431.111	428.625	433.301	435.523

Table 19. **The momentum portfolio returns for the 6-m/1-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	0.155** (2.55)	0.074* (1.73)	0.094** (2.37)	0.095** (2.38)	0.001 (0.02)	0.004 (0.06)	-0.074 (-1.01)	0.019 (0.30)	0.175*** (3.12)	0.204*** (4.33)	0.142*** (2.88)	0.073 (1.58)	0.132** (2.21)	0.085 (0.90)	0.171** (2.31)	0.193** (2.34)	0.046 (0.81)	0.084 (0.71)
$R_m - R_f$ †		0.828*** (-2.95)	0.903* (-1.77)	0.890 (-1.60)	0.866* (-1.89)	0.866* (-1.83)	0.842** (-2.17)	0.870* (-1.70)	0.862** (-1.96)	0.869* (-1.93)	0.836** (-2.29)	0.878 (-1.57)		0.890 (-1.60)	0.879 (-1.62)	0.876* (-1.66)	0.885 (-1.56)	0.888 (-1.53)
SMB			0.503*** (3.91)	0.499*** (3.66)	0.469*** (3.46)	0.468*** (3.42)	0.440*** (3.24)	0.470*** (3.14)	0.453*** (3.46)	0.419*** (3.29)	0.421*** (3.17)	0.473*** (3.17)	0.496*** (3.68)	0.500*** (3.65)	0.490*** (3.96)	0.491*** (3.95)	0.495*** (3.88)	0.499*** (3.90)
HML			0.046 (0.65)	0.049 (0.74)	0.046 (0.68)	0.045 (0.66)	0.043 (0.63)	0.048 (0.72)	0.043 (0.64)	0.042 (0.64)	0.023 (0.34)	0.048 (0.70)	0.048 (0.73)	0.049 (0.73)	0.044 (0.59)	0.042 (0.57)	0.054 (0.72)	0.049 (0.65)
Liquidity				0.045 (0.25)	0.062 (0.35)	0.065 (0.36)	0.088 (0.50)	0.059 (0.32)	0.058 (0.34)	0.075 (0.45)	0.120 (0.68)	0.052 (0.29)	0.048 (0.28)	0.045 (0.26)	0.052 (0.23)	0.055 (0.24)	0.054 (0.24)	0.047 (0.21)
MS^{y}_{dummy}					0.148* (1.77)													
MS_y									0.279* (1.89)									
MS_y^2									-1.085** (-2.21)									
MS^{6m}_{dummy}						0.139 (1.58)												
MS_{6m}										0.218* (1.95)								
MS_{6m}^2										-0.716*** (-3.31)								
MS^{3m}_{dummy}							0.260*** (3.05)											
MS_{3m}											0.172* (1.89)							
MS_{3m}^2											-0.195 (-1.52)							
MS^{m}_{dummy}								0.134 (1.34)										
MS_m												0.055 (0.85)						
MS_m^2												0.021 (0.51)						
$(R_m - R_f) * MS_m$†													0.824* (-1.84)					
$(R_m - R_f)*(1-MS_m)$ †													0.936 (-0.59) 0.51 (0.473)					
Time														0.000 (0.13)				
Bor 1m															-0.012 (-1.39)			
Bor 6m																-0.151 (-1.47)		
GDPy																	0.025 (1.35)	
GDPylag																		0.005 (0.22)
# of OBS	281	281	276	276	275	276	276	276	275	276	276	276	276	276	276	276	276	276
Deviance	293.614	146.152	124.034	123.930	122.512	122.831	120.149	122.814	118.910	113.613	117.986	123.317	123.663	123.923	123.130	122.888	122.952	123.907

Table 20. **The winners' portfolio returns for the 6-m/1-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
α	-0.053 (-0.56)	-0.148** (-2.27)	-0.120* (-1.90)	-0.109* (-1.84)	-0.012 (-0.10)	-0.129 (-1.01)	-0.183 (-1.45)	-0.191* (-1.89)	-0.086 (-0.95)	-0.208*** (-2.61)	-0.177** (-2.46)	-0.176*** (-2.60)	-0.200** (-2.13)	0.097 (0.68)	-0.259** (-2.05)	-0.310*** (-2.97)	-0.022 (-0.23)	0.050 (0.43)
$R_m - R_f$ †		1.286*** (2.77)	1.396*** (3.54)	1.186 (1.58)	1.223* (1.82)	1.181 (1.46)	1.165 (1.31)	1.166 (1.38)	1.199 (1.62)	1.167 (1.37)	1.152 (1.24)	1.153 (1.25)		1.196* (1.71)	1.214* (1.72)	1.220* (1.76)	1.193 (1.53)	1.199 (1.58)
SMB			0.645*** (4.70)	0.596*** (4.88)	0.629*** (4.91)	0.589*** (4.58)	0.570*** (4.47)	0.565*** (4.56)	0.588*** (4.72)	0.596*** (4.81)	0.551*** (4.21)	0.517*** (3.98)	0.605*** (5.04)	0.589*** (4.89)	0.614*** (3.97)	0.612*** (4.00)	0.604*** (4.04)	0.597*** (4.10)
HML			0.171 (1.18)	0.218 (1.61)	0.231* (1.71)	0.217 (1.61)	0.216 (1.62)	0.218 (1.62)	0.230* (1.69)	0.213 (1.58)	0.217* (1.66)	0.216 (1.61)	0.219 (1.64)	0.219* (1.66)	0.233 (1.37)	0.238 (1.39)	0.210 (1.22)	0.220 (1.29)
Liquidity				0.685*** (3.65)	0.673*** (3.69)	0.690*** (3.61)	0.705*** (3.67)	0.701*** (3.69)	0.692*** (3.68)	0.708*** (3.78)	0.716*** (3.81)	0.709*** (3.82)	0.676*** (3.62)	0.678*** (3.66)	0.676*** (3.32)	0.670*** (3.34)	0.667*** (3.33)	0.650*** (3.25)
MS^y_{dummy}					-0.162 (-1.16)													
MS_y									0.026 (0.12)									
MS_y^2									-0.327 (-0.51)									
MS^{6m}_{dummy}						0.030 (0.20)												
MS_{6m}										0.121 (0.69)								
MS_{6m}^2										0.486 (1.51)								
MS^{3m}_{dummy}							0.114 (0.75)											
MS_{3m}											0.222 (1.63)							
MS_{3m}^2											0.147 (1.04)							
MS^m_{dummy}								0.145 (1.12)										
MS_m												0.165** (2.04)						
MS_m^2												0.065 (1.50)						
$(R_m - R_f) * MS_m$†													1.345* (1.84)					
$(R_m - R_f)*(1-MS_m)$ †													1.075 (0.41) 0.82 (0.364)					
Time														-0.001* (-1.85)				
Bor 1m															0.023 (1.01)			
Bor 6m																0.030 (1.61)		
GDPy																	-0.045 (-1.64)	
GDPylag																		-0.070** (-2.02)
# of OBS	281	281	276	276	275	276	276	276	275	276	276	276	276	276	276	276	276	276
Deviance	692.104	334.826	298.011	273.394	269.131	273.342	272.663	272.081	270.357	269.633	269.581	267.856	271.847	270.075	268.198	267.025	270.281	268.712

Table 21. **The losers' portfolio returns for the 6-m/1-m strategy in the Stockholm Stock Exchange.** *Compiled by the authors. Values of coefficients are reported as the upper numbers, while the values of t-statistics (corresponding the coefficient significantly different from one) are reported in parentheses. * indicates the 10% significance level, ** indicates the 5% significance level, and indicates the 1% significance level. Values below t-statistics of (Rm-Rf)*(1-MS) variable indicates p-value of the different between (Rm-Rf)*(1-MS) and (Rm-Rf)*MS coefficients. † indicates that the value of t-statistics corresponds to the coefficient significantly different from one.*