BUSINESS, MANAGEMENT AND EDUCATION
ISSN 2029-7491 print / ISSN 2029-6169 online
2012, 10(1): 110–127
doi:10.3846/bme.2012.09

MARKET BEHAVIOUR: CASE STUDIES OF NASDAQ OMX BALTIC

Jelena Stankevičienė[1], Natalija Gembickaja[2]

Vilnius Gediminas Technical University, Saulėtekio al. 11, LT-10223 Vilnius, Lithuania
E-mails: [1]jelena.stankeviciene@vgtu.lt (corresponding author);
[2]natalija.gembickaja@vgtu.lt;

Received 10 May 2011; accepted 15 April 2012

Abstract. The paper examines market behaviour, defines the concept of behavioural finance and exhaustively analyzes the varying behaviour of market participants and occurring examples. The article deals with the issues of possible anomalies describing their main features. The conducted research is aimed at investigating two anomalies in the Baltic Stock Exchanges, including branches in Tallinn, Riga and Vilnius. The publication selects specific stocks listed in the equity market and analyzes their features. The obtained results are compared to discuss differences and characteristics of the markets. The paper also presents an original examination of the practical aspects of momentum and contrarian anomalies, underlies recommendations and helps financial market participants with a better understanding of the influence of anomalies from an economic perspective and with improving their competitiveness thus helping them to make appropriate decisions.

Keywords: market behaviour, behavioural finance, financial market anomalies, momentum and contrarian anomalies.

Reference to this paper should be made as follows: Stankevičienė, J.; Gembickaja, N. 2012. Market behaviour: case studies from NASDAQ OMX Baltic, *Business, Management and Education* 10(1): 110–127.
http://dx.doi.org/10.3846/bme.2012.09
JEL classification: D53, G02, G11, O16.

1. Introduction

Over the past few years, equity markets have been characterized by a rise in volatility and fluctuations. The ever more integrated financial markets are increasingly exposed to macroeconomic shocks affecting the markets on a global scale. From the investor's point of view, the vulnerability of the markets has lead to increased uncertainty and unpredictability, as market conditions cannot always be judged with the help of standard financial measures and tools. For a long time, when making financial decisions, market participants have relied on the notion of efficient markets and the rational behaviour of the investor. However, the idea of fully rational investors always maximizing their utility and demonstrating perfect self-control is becoming inadequate. Despite strong evidence that the stock market is highly efficient, i.e. one cannot earn abnormal profits by trading on publicly available information, there have been a number of studies documenting

long-term historical anomalies in the stock market that seem to contradict the efficient market hypothesis. During the recent years, the examples of market inefficiency in the form of anomalies and the irrational behaviour of the investor have been observed more frequently (Johnsson *et al.* 2002). The existing phenomenon can in part be attributed to the less-than-rational aspects of investor behaviour and human judgment.

Due to a growth in uncertainty in financial markets, the approaches based on perfect predictions, completely flexible prices and a complete knowledge of investment decisions made by other players in the market are increasingly unrealistic in today's global financial markets. Behavioural finance is a new paradigm of the finance theory that seeks to understand and predict systematic financial market implications of psychological decision-making (Abarbanell, Bernard 1992). By understanding human behaviour and a psychological mechanism involved in financial decision-making, standard finance models may be improved to better reflect and explain the reality faced in today's evolving markets. Moreover, this understanding should help with avoiding the occurrence of an anomaly phenomenon and enhance the efficiency of the present global financial markets (Johnsson *et al.* 2002).

The goal of research is to examine and analyze two anomalies in NASDAQ OMX Baltic stock exchanges in Tallinn, Riga and Vilnius forming the Baltic Market.

Market efficiency, in the sense that market prices reflect fundamental market characteristics and that excess returns on the average are levelled out in the long run, has been challenged by behavioural finance. There have been a number of studies pointing to market anomalies that cannot be explained with the help of a standard financial theory such as abnormal price movements in connection with IPOs, mergers, stock splits and spin-offs. This contradicts the efficient market hypothesis and implies that investors believe they can beat the market and overestimate their talents while underestimating the likelihood of bad outcomes. Throughout the years, statistical anomalies have been continued to appear which suggests that the existing models of standard finance are, if not wrong, probably, incomplete. Investors have been shown not to react "logically" to new information but to be overconfident and to alter their choices when given superficial changes in the presentation of investment information (Olsen 1998). The existing anomalies suggest that the fundamental principles of rational behaviour underlying the efficient market hypothesis are not entirely correct and that we need to look, as well, at other models of human behaviour, as studied in other social sciences (Shiller 1998).

The presence of regularly occurring anomalies in the conventional economic theory was a big contributor to the formation of behavioural finance. These so-called anomalies, and their continued existence, directly violate modern financial and economic theories, which assume rational and logical behaviour.

The paper describes and analyzes the momentum and contrarian anomaly, i.e. size effect, momentum and contrarian anomalies. These anomalies were not randomly selected as by some extent they could cause or be related.

Some researchers argue that large positive abnormal returns generated by the contrarian strategy can be attributable to this well known size effect (Zarowin 1990; Clare,

Thomas 1995 respectively for U.S. and U.K. evidence). For this reason, there is a tendency among many momentum/contrarian studies to examine whether the returns earned are attenuated by small firm effect.

However, Gunasekarage, Wan Kot (2007) published their empirical findings providing some evidence that momentum profits were available across all liquidity groups but excluding possibilities that these returns were influenced by the well known size effect or January effect. Moreover, Chopra *et al.* (1992) shows that having controlled size or beta, overreaction in momentum and contrarian anomalies though gets reduced but still remains. On the basis of evidence reported in these studies, it is important to examine if profits generated by contrarian and momentum anomalies are also driven by size effects.

2. Momentum and contrarian anomaly

Two recent approaches to investment that have challenged the weak form of the EMH are the contrarian strategy and the momentum strategy. The contrarian strategy, suggested by the overreaction hypothesis, ranks shares on the basis of their past performance and recommends buying past losers and selling past winners. In contrast, the momentum strategy also ranks shares according to their prior performance but recommends the purchase of the past winners and the sale of the past losers. Haj Youssef *et al.* (2010) pointed that the best (poorly) performing stocks would continue their upward (downward) trend, momentum strategies, to be profitable in the medium run. In the long run, the trend will reverse and the contrarian strategy, implying a long position in the past losers and a short position in the winners, will be profitable. Prior findings of Jegadeesh and Titman (1993) suggest that the length of the holding period is relevant. Momentum strategies were found to generate significant positive abnormal returns in three-to-twelve month holding periods, but not for very short (weekly or monthly) or very long (in excess of one year) holding periods.

Many studies provide evidence for the profitability of both above introduced strategies. Table 1 provides information on researchers investigating a certain investment strategy at certain markets.

The first formal investigation into the momentum effect was conducted by Jegadeesh and Titman (1993). They measured the performance of the strategy for buying the winner's portfolio and shorting the loser portfolio over various holding periods. The momentum strategy has also been examined in the markets outside the US. For example, the UK market has been investigated by Liu *et al.* (1999) and Hon and Tonks (2003). Chan *et al.* (2000) has examined the momentum effect based on individual stock market indices in 23 countries. They have also found statistically significant evidence of momentum profits. Drew *et al.* (2007) investigated the profitability of momentum strategies in Australian setting and discovered a substantial momentum in monthly stock returns for the period 1988–2002. Gunasekarage and Wan Kot (2007) studied the profitability of such strategy in the New Zealand stock market and proved the existence of the

momentum effect in the New Zealand market. Their empirical findings provide some evidence that momentum profits are available across all liquidity groups but exclude possibilities that these returns were influenced by the well known size effect or January effect. Rastogi *et al.* (2009) found strong support for the existence of momentum strategy profits in Indian markets, while evidence for overreaction was present only in stocks referred to be mid-size.

Table 1. Investigation into momentum and contrarian strategies in international markets. (Source: created by authors)

Momentum effect	Jegadeesh and Titman (1993)	USA
	Liu *et al.* (1999)	UK
	Hon and Tonks (2003)	UK
	Chan *et al.* (2000)	23 countries (Australia; Austria; Belgium; Canada; Denmark; France; Germany; Hong Kong; S. Korea; Italy; Japan; Netherlands; Norway; S. Africa; Spain; Singapore; Switzerland; U.K.; U.S.; Thailand; Taiwan; Malaysia; Indonesia
	Drew *et al.* (2007)	Australia
	Gunasekarage and Wan Kot (2007)	New Zealand
	Rastogi *et al*. (2009)	India
Contrarian effect	De Bondt and Thaler (1984)	USA
	Power *et al.* (1991)	UK
	Wang *et al*. (1999)	Japan, Hong Kong, Taiwan
	Zamri and Hussain (2001)	Malaysia
	Alonso and Rubio (1990)	Spain
	Da Costa (1994)	Brazil
	Gunasekarage and Power (2005)	Sri Lanka
No evidence of either effect	Kryzanowski and Zhang (1992)	Canada
	Brailsford (1992)	Australia
	Hameed and Kusnadi (2002)	Asia

De Bondt and Thaler (1984) were the first to prove the contrarian effect in the USA; they performed research using data on New York Exchange (NYSE) common stocks, which resulted in loser portfolios outperforming the market, while winner portfolios, on the other hand, earned less than the market. Moreover, it was found that "the overreaction effect was asymmetric; it is much larger for losers than for winners." De Bondt and Thaler's proposition is based on evidence that individuals tend to overweight recent information and underweight prior information when revising beliefs. Market overreaction

has also been examined outside the US market. For example, Power *et al.* (1991) tested mean-reverting tendencies towards share returns of 'excellent' and 'non-excellent' UK companies for the period from 1973 to 1987 and documented results consistent with the winner-loser effect; during the five-year period following portfolio formation, the loser portfolio yielded a cumulative abnormal return of 86 per cent, while the winners generated a cumulative abnormal return of 47 per cent. Further evidence for the profitability of the contrarian strategy has been documented for the markets in Japan, Hong Kong and Taiwan (Wang *et al.* 1999), Malaysia (Zamri, Hussain 2001), Spain (Alonso, Rubio 1990), Brazil (Da Costa 1994) and Sri Lanka (Gunasekarage, Power 2005). All these studies report a long-run reversal of fortune for the winner and loser portfolios; an investment strategy of buying past losers and selling past winners generates statistically significant returns to investors.

There are some studies that have failed to find evidence of either overreaction or momentum. Kryzanowski and Zhang (1992) found no evidence of mean reversion behaviour in the Canadian market; over the 24-month post-ranking period, the winner's portfolio outperformed the loser portfolio by 7.42 per cent. Brailsford (1992) analyzed Australian data and discovered that, even though the winner's portfolio in his study experienced a price reversal during the 36-month testing period, the loser portfolio continued to accumulate negative abnormal returns; at the end of the post-ranking period, both the winner and loser portfolios realized negative abnormal returns of 69.58 per cent and 52.59 per cent respectively. Hameed and Kusnadi (2002), who analyzed monthly returns of 1,008 securities, traded on six Asian markets and found no evidence of this anomaly. On the other hand, Chan *et al.* (2000) proved that in 23 countries, including Canada, Australia and some Asian countries, the momentum strategy could be applied in stock markets. Moreover, other researchers such as Drew *et al.* (2007) and Wang *et al.* (1999) made investigations into Australian and Asian countries respectively and got reverse results. The only reasons for such contrary findings could be the time period analyzed or different methods of methodology and interpretation.

Haj Youssef *et al.* suggests the behavioural approach as the advanced one to explain the profitability of these trading strategies. This approach explains strategy profits by means of judgment biases inducing investors' over-reaction or under-reaction to information and as a result producing the continuation and reversals of stock returns. One of the earliest observations about overreaction in markets was made by J. M. Keynes (1964): "…day to day fluctuations in profits in the existing investments, which are obviously of an ephemeral and non-significant character, tend to have altogether excessive, and even an absurd, influence on the market".

Advocates for the behavioural approach propose a number of theoretical models of investor behaviour to explain these serial correlation properties in stock prices. The underpinning of Daniel *et al.* (1998) is investor overconfidence. They consider that stock prices are determined by the informed investors who are subject to two biases: overconfidence and self-attribution. Overconfidence in their signals causes overreaction to their private information, and self-attribution causes under-reaction to public infor-

mation. Over-reaction to private information leads them to push up the prices of the winners above their fundamental values. This trend will be reversed, in the long run, when public information is confirmed. Specifically, when a positive earnings surprise is followed by another positive (negative) surprise, the investor raises the likelihood that he is in the trending regime and tends to become too optimistic (pessimistic) about the future profitability of the firm. As a result, the firms realizing a rapid growth in earnings tend to become overvalued, and those realizing a slow growth in earnings tend to become undervalued. (Barberis *et al.* 1998, 2003) The behavioural models also suggest that such anomaly is affected by information asymmetry. Specifically, they argue that the momentum (and contrarian) effect is attributed to inefficient stock price reaction to the specific information about the firm. Empirical evidence supports it is related to various proxies for the quality and type of information about the firm, the relative amounts of information disclosed publicly and being generated privately (Haj Youssef *et al.* 2010).

3. Momentum and contrarian strategy in NASDAQ OMX Baltic Market

Momentum strategies will be profitable if stock returns display a positive serial correlation, whereas contrarian strategies will be profitable in case of a negative serial correlation of stock returns. In order to examine the profits of these trading strategies, the stocks listed on NASDAQ OMX Baltic were classified into four quintiles based on average returns (sorted from the lowest to the highest) in the one month period. The lowest and highest quintiles of stocks are termed as the loser and the winner portfolio respectively, while the second and third quintiles are not considered in investigation. This paper provides data on the market collected from three Baltic regions – NASDAQ OMX Vilnius, NASDAQ OMX Tallinn and NASDAQ OMX Riga for the period 2000.01–2009.12. Thereafter, the results of the Lithuanian market will be compared with those obtained in Estonia and Latvia, as these countries are more or less similar in respect of economy and financial situation. However, the speed of the strategy reversal in Lithuania is much slower than that in the USA or other developed countries, and as a result, would be a disparate comparison. Further empirical evidences from NASDAQ OMX Baltic show a graphical representation of winners and losers' performance in Vilnius, Tallinn and Riga thereafter. As a result, it will provide a better view on comparing results.

3.1. Evidence of the momentum and contrarian strategy in NASDAQ OMX Vilnius

The performance of the winner and loser portfolios is evaluated in the next 24 months, i.e. for the period from 2000.01 to 2009.12. The study has looked at the momentum results by getting these portfolios with reference to the performance at the intervals of 1, 3, 6 and 12 months. We also evaluate the over-reaction phenomenon in the Lithuanian market looking at the intervals of 15 and 18 and 24 months. The difference between the average winner and the average loser portfolio was also computed testing its significance. This is done to evaluate whether the momentum strategy of buying winners and

selling losers (or vice versa) would earn a positive difference in return for investors. Table 2 below shows the returns and standard deviation (risk taken) of the winner and loser portfolios in NASDAQ OMX Vilnius.

Table 2. Returns of the winner-loser and winner minus loser portfolios received from NASDAQ OMX Vilnius (2000 – end of 2009 end). (Source: created by authors using data obtained from NASDAQ OMX Vilnius)

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2000–2001	1	8.81%	44.73%	–1.21%	1.65%	10.02%	43.08%
	3	–2.66%	12.51%	0.18%	2.79%	–2.84%	9.72%
	6	–8.19%	15.44%	–0.02%	2.02%	–8.17%	13.42%
	12	–9.39%	16.85%	0.15%	2.75%	–9.54%	14.10%
	15	–6.05%	13.57%	0.03%	3.48%	–6.08%	10.09%
	18	–16.15%	17.53%	1.53%	14.49%	–17.68%	3.04%
	24	–19.09%	12.18%	0.09%	1.64%	–19.18%	10.54%
2002–2003	1	1.11%	3.38%	–0.32%	3.17%	1.43%	0.21%
	3	0.17%	2.33%	0.22%	2.79%	–0.05%	–0.46%
	6	0.13%	2.40%	–0.23%	2.50%	0.36%	–0.10%
	12	0.21%	2.34%	0.03%	1.83%	0.18%	0.51%
	15	0.14%	1.72%	0.16%	2.55%	–0.02%	–0.83%
	18	0.59%	2.35%	0.09%	1.85%	0.50%	0.50%
	24	0.29%	2.29%	0.00%	2.76%	0.29%	–0.47%
2004–2005	1	0.47%	1.73%	0.13%	1.33%	0.34%	0.40%
	3	0.51%	2.17%	0.29%	1.95%	0.22%	0.22%
	6	0.00%	1.57%	0.07%	2.22%	–0.07%	–0.65%
	12	0.06%	2.27%	0.27%	2.43%	–0.21%	–0.16%
	15	0.04%	2.18%	0.60%	2.99%	–0.56%	–0.81%
	18	–0.21%	1.65%	0.14%	2.55%	–0.35%	–0.90%
	24	0.00%	1.73%	0.09%	3.08%	–0.09%	–1.35%
2006–2007	1	–0.03%	5.93%	–0.43%	1.61%	0.40%	4.32%
	3	–1.89%	6.58%	–0.31%	3.18%	–1.58%	3.40%
	6	–6.55%	7.40%	–0.24%	2.32%	–6.31%	5.08%
	12	–4.68%	8.63%	0.18%	2.09%	–4.86%	6.54%
	15	–4.21%	8.06%	–0.13%	3.39%	–4.08%	4.67%
	18	–3.22%	7.58%	0.02%	1.88%	–3.24%	5.70%
	24	–4.56%	7.65%	–0.07%	2.21%	–4.49%	5.44%

End of Table 2

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2008–2009	1	–0.09%	2.60%	–0.92%	2.82%	0.83%	–0.22%
	3	–0.31%	3.21%	0.07%	2.59%	–0.38%	0.62%
	6	–0.16%	2.99%	–0.22%	2.56%	0.06%	0.43%
	12	–0.49%	4.41%	–0.84%	4.94%	0.35%	–0.53%
	15	–0.13%	3.73%	0.13%	4.60%	–0.26%	–0.87%
	18	0.28%	3.55%	0.13%	3.87%	0.15%	–0.32%
	24	0.21%	3.81%	0.35%	3.67%	–0.14%	0.14%

Several results arise from our experimental analysis. Considering the obtained empirical evidences, we can make a conclusion that the momentum strategy of buying past winners and selling past losers in NASDAQ OMX Vilnius would result in significant positive return for the investor only in the first month considered in this study. The strategy for buying losers and selling winners would result in positive significant returns at the interval of 3 to 24 months. The momentum strategy could be used by the investor in the first month and within the period from 18 to 24 months. Moreover, the contrarian strategy takes place in the period from 3 to 15 months. The results of analysis have suggested that the momentum strategy of buying past winners and selling past losers in NASDAQ OMX Vilnius in the specified period would result in significant positive return for the investor only for the first three months considered in this study.

The strategy for buying losers and selling winners would result in positive significant returns at the interval of 6 to 24 months. The investor will get profit from buying winners and selling loosing shares only in the first months. However, in the next months, while losers are stable in their returns, winners represent a spiral drop. This completely contradicts the scientific findings of this particular strategy.

The momentum strategy of buying past winners and selling past losers would result in significant positive return for the investor for the first months at the intervals of 6 to 12 and for 18 months. Moreover, the strategy for buying losers and selling winners would result in positive significant returns for the remaining third, 15 and 24 months. Therefore, it could be concluded that those strategies do not take place in the Lithuanian stock market as stated in the strategy statement, because at least in the period from the beginning of 2000 to the end of 2009, no precious tendency for this anomaly was noticed. In the period from the beginning of 2000 to the end of 2001 and for the period 2006–2007, losers started earning higher returns from the third month. Later, it was hard to envisage any consistency, as both losers and winners slogged on for the returns. However, the period of 2004–2005 could definitely show some momentum and contrarian strategy in the Lithuanian stock market. Still, we can conclude that though this strategy could take place in the market in the short term period, it disappears in the long term.

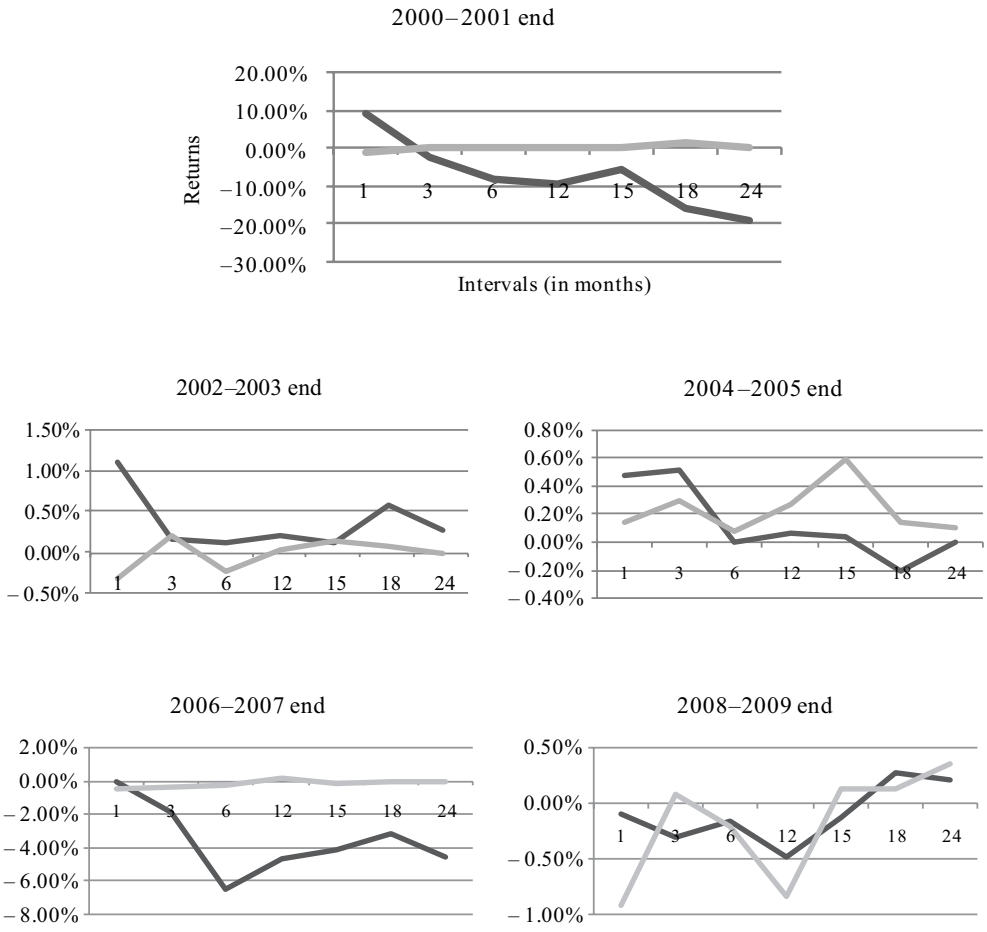

Fig. 1. Graphical representation of returns received from NASDAQ OMX Vilnius using momentum and contrarian strategies (2000–end of 2009). (Source: created by authors using data obtained from NASDAQ OMX Vilnius)

3.2. Evidence of the momentum and contrarian strategy in NASDAQ OMX Tallinn

The momentum strategy of buying past winners and selling past losers in NASDAQ OMX Tallinn would result in significant positive return for the investor for the first and 24 months at the intervals of 6 to 12 months considered in this study (Table 3). The strategy of buying losers and selling winners would result in positive significant returns in the third month and in the period of 15 to 18 months.

Table 3. Returns of the winner-loser and winner minus loser portfolios received from NASDAQ OMX Tallinn (2000–end of 2009). (Source: made by authors using data obtained from NASDAQ OMX Tallinn)

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2000–2001	1	2.33%	8.59%	–0.15%	0.85%	2.48%	7.74%
	3	0.41%	5.72%	0.84%	2.71%	–0.43%	3.01%
	6	–0.26%	4.97%	–0.40%	4.90%	0.14%	0.07%
	12	0.42%	6.36%	0.17%	4.97%	0.25%	1.39%
	15	–0.07%	3.72%	0.15%	4.53%	–0.22%	–0.81%
	18	0.09%	2.58%	1.44%	4.90%	–1.35%	–2.32%
	24	0.16%	4.58%	0.11%	3.29%	0.05%	1.29%
2002–2003	1	0.63%	2.03%	–8.70%	16.11%	9.33%	–14.08%
	3	–2.24%	15.20%	–4.62%	22.86%	2.38%	–7.66%
	6	–0.45%	4.34%	–10.15%	17.86%	9.70%	–13.52%
	12	0.05%	1.24%	–12.14%	17.92%	12.19%	–16.68%
	15	0.04%	0.97%	–9.80%	17.27%	9.84%	–16.30%
	18	0.06%	1.80%	–16.12%	19.32%	16.18%	–17.52%
	24	–0.11%	4.44%	–16.81%	18.49%	16.70%	–14.05%
2004–2005	1	0.69%	2.71%	–0.30%	5.15%	0.99%	–2.44%
	3	0.23%	2.12%	0.12%	3.21%	0.11%	–1.09%
	6	–0.08%	2.20%	0.06%	3.19%	–0.14%	–0.99%
	12	0.08%	1.19%	0.02%	4.21%	0.06%	–3.02%
	15	0.76%	2.86%	0.54%	3.54%	0.22%	–0.68%
	18	–0.11%	2.26%	0.29%	4.09%	–0.40%	–1.83%
	24	0.16%	1.77%	0.39%	3.26%	–0.23%	–1.49%
2006–2007	1	0.06%	1.14%	–0.07%	3.60%	0.13%	–2.46%
	3	0.04%	1.37%	–0.14%	2.35%	0.18%	–0.98%
	6	–0.23%	1.39%	–0.05%	2.54%	–0.18%	–1.15%
	12	0.25%	1.34%	0.38%	3.23%	–0.13%	–1.89%
	15	0.09%	2.13%	0.16%	1.62%	–0.07%	0.51%
	18	–0.27%	3.31%	0.54%	3.41%	–0.81%	–0.10%
	24	–0.29%	1.57%	–0.43%	4.50%	0.14%	–2.93%

End of Table 3

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2008–2009	1	–0.98%	2.72%	–0.52%	2.17%	–0.46%	0.55%
	3	–0.27%	1.97%	0.07%	2.78%	–0.34%	–0.81%
	6	–0.45%	1.90%	–0.17%	2.76%	–0.28%	–0.86%
	12	–0.73%	4.69%	–0.54%	4.44%	–0.19%	0.25%
	15	–0.56%	5.62%	0.05%	4.80%	–0.61%	0.82%
	18	0.20%	4.38%	0.04%	3.38%	0.16%	1.00%
	24	0.42%	4.60%	0.32%	3.41%	0.10%	1.19%

Based on the obtained results and aforementioned conclusions, the strategy could not be used within the period of two years. Fig. 2 shows that winners all along the analyzed intervals are operating better than losers. The momentum strategy of buying past winners and selling past losers in NASDAQ OMX Tallinn in the specified period would result in significant positive return for the investor over the period of 1 to 3 months and for 12 to 15 months considered in this study. The strategy of buying losers and selling winners would result in positive significant returns at the interval of 6 months and at the interval of 18 to 24 months. For the interval analyzed, the conclusion that the investor will get profit from buying winners and selling loosing shares only in the first three months and at the end of the two-year period could be made. However, in the remaining months, losers were stable in their returns while winners represented a spiral drop. This completely confirms the scientific findings of this particular strategy.

In addition to the previous results, analysis showed that the momentum strategy of buying past winners and selling past losers would result in significant positive return for the investor at the interval of 1 to 15 months. The strategy of buying losers and selling winners would result in positive significant returns for the remaining period of 18 to 24 months. As a result, momentum and contrarian strategies do not take place in the Estonian stock market as stated in the strategy statement because at least in the period from the beginning of 2000 to the end of 2009, no precious tendency for this anomaly was noticed. In the period from the beginning of 2002 to the end of 2003, winners were operating better than losers at the interval of two years. However, for the period 2008-2009, losers started earning higher returns than winners at the interval of 15 months, which totally contradicts specific strategy peculiarities. In the following periods, it was hard to envisage any consistency as both losers and winners slogged on for returns, as can be seen from the periods 2000–2001 and 2004–2005. However, the period of 2006–2007 could definitely show some momentum and contrarian strategy in the Estonian stock market. Still, we can conclude that though this strategy could take place in the market in the short term period, it disappears in the long term

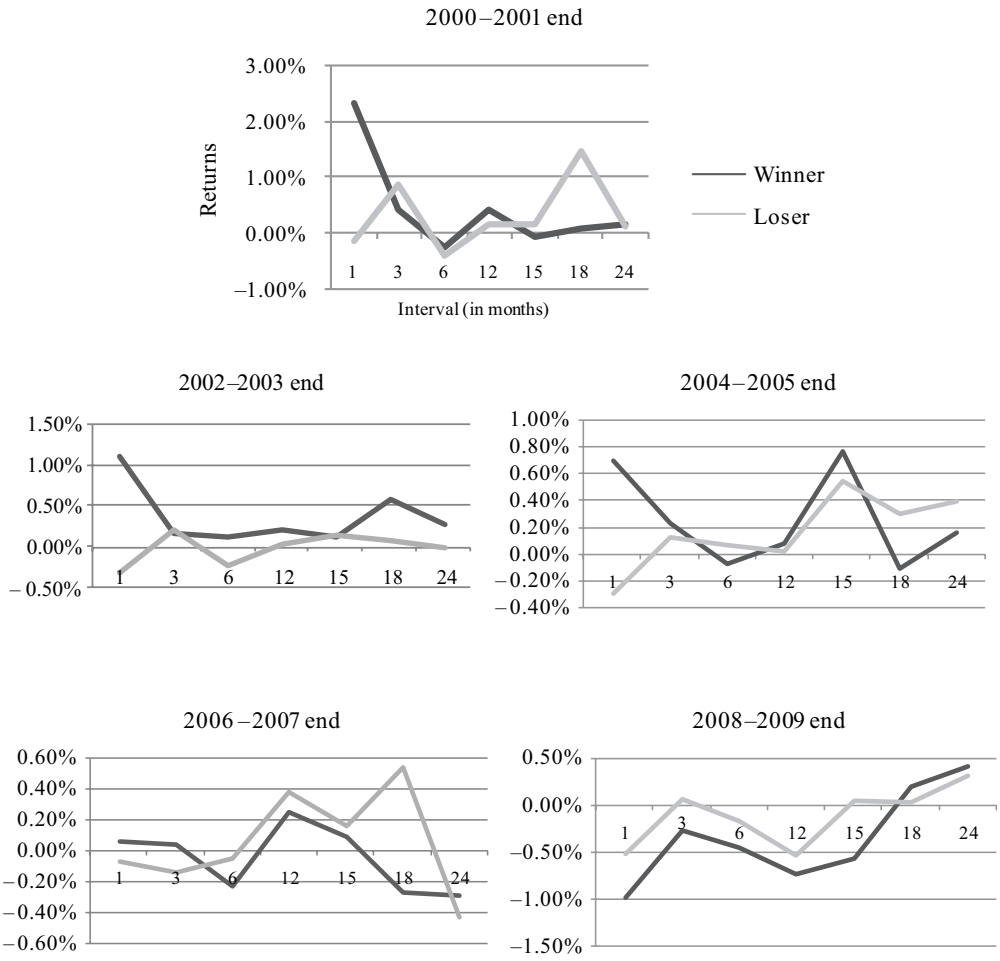

Fig. 2. Graphical representation of returns received from NASDAQ OMX Tallinn using momentum and contrarian strategies (2000–end of 2009). (Source: created by authors using data obtained from NASDAQ OMX Tallinn)

3.3. Evidence of the momentum and contrarian strategy in NASDAQ OMX Riga

In respect of a more in-depth analysis of data obtained from NASDAQ OMX Riga, it should be concluded that the momentum strategy of buying past winners and selling past losers in NASDAQ OMX Riga would result in significant higher return for the investor at the interval of 24 months considered in this study (Table 4). The strategy of buying losers and selling winners would result in higher significant returns almost during the whole analyzed period, to be more precise, during first 18 months.

Table 4. Returns of the winner-loser and winner minus loser portfolios received from NASDAQ OMX Riga (2000–end of 2001). (Source: made by the authors using data obtained from NASDAQ OMX Riga)

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2000–2001	1	2.33%	8.59%	–0.15%	0.85%	2.48%	7.74%
	3	0.41%	5.72%	0.84%	2.71%	–0.43%	3.01%
	6	–0.26%	4.97%	–0.40%	4.90%	0.14%	0.07%
	12	0.42%	6.36%	0.17%	4.97%	0.25%	1.39%
	15	–0.07%	3.72%	0.15%	4.53%	–0.22%	–0.81%
	18	0.09%	2.58%	1.44%	4.90%	–1.35%	–2.32%
	24	0.16%	4.58%	0.11%	3.29%	0.05%	1.29%
2002–2003	1	0.63%	2.03%	–8.70%	16.11%	9.33%	–14.08%
	3	–2.24%	15.20%	–4.62%	22.86%	2.38%	–7.66%
	6	–0.45%	4.34%	–10.15%	17.86%	9.70%	–13.52%
	12	0.05%	1.24%	–12.14%	17.92%	12.19%	–16.68%
	15	0.04%	0.97%	–9.80%	17.27%	9.84%	–16.30%
	18	0.06%	1.80%	–16.12%	19.32%	16.18%	–17.52%
	24	–0.11%	4.44%	–16.81%	18.49%	16.70%	–14.05%
2004–2005	1	0.69%	2.71%	–0.30%	5.15%	0.99%	–2.44%
	3	0.23%	2.12%	0.12%	3.21%	0.11%	–1.09%
	6	–0.08%	2.20%	0.06%	3.19%	–0.14%	–0.99%
	12	0.08%	1.19%	0.02%	4.21%	0.06%	–3.02%
	15	0.76%	2.86%	0.54%	3.54%	0.22%	–0.68%
	18	–0.11%	2.26%	0.29%	4.09%	–0.40%	–1.83%
	24	0.16%	1.77%	0.39%	3.26%	–0.23%	–1.49%
2006–2007	1	0.06%	1.14%	–0.07%	3.60%	0.13%	–2.46%
	3	0.04%	1.37%	–0.14%	2.35%	0.18%	–0.98%
	6	–0.23%	1.39%	–0.05%	2.54%	–0.18%	–1.15%
	12	0.25%	1.34%	0.38%	3.23%	–0.13%	–1.89%
	15	0.09%	2.13%	0.16%	1.62%	–0.07%	0.51%
	18	–0.27%	3.31%	0.54%	3.41%	–0.81%	–0.10%
	24	–0.29%	1.57%	–0.43%	4.50%	0.14%	–2.93%

End of Table 4

	Interval (in months)	Winner		Loser		Winner-loser	
		Returns	Standard deviation	Returns	Standard deviation	Returns	Standard deviation
2008–2009	1	–0.98%	2.72%	–0.52%	2.17%	–0.46%	0.55%
	3	–0.27%	1.97%	0.07%	2.78%	–0.34%	–0.81%
	6	–0.45%	1.90%	–0.17%	2.76%	–0.28%	–0.86%
	12	–0.73%	4.69%	–0.54%	4.44%	–0.19%	0.25%
	15	–0.56%	5.62%	0.05%	4.80%	–0.61%	0.82%
	18	0.20%	4.38%	0.04%	3.38%	0.16%	1.00%
	24	0.42%	4.60%	0.32%	3.41%	0.10%	1.19%

Analysis shows that the contrarian strategy should be used within this two-year period so that not to lose a higher amount of the invested money. The table shows that all along the analyzed intervals losers are operating better than winners. The prior results indicate that the momentum strategy of buying past winners and selling past losers in NASDAQ OMX Riga within the specified period would result in significant higher return for the investor in the period of 1 to 6 months at the interval of 15 months considered in this study.

The strategy of buying losers and selling winners would result in significantly higher returns at the interval of 12 months and at the interval of 18 to 24 months. For the interval analyzed, the investor will get profit from buying winners and selling loosing shares only in the first three months. However, in the remaining months, losers were stable in their returns while winners represented a spiral drop. This completely confirms the scientific findings of this particular strategy. The momentum strategy of buying past winners and selling past losers would result in significant positive return for the investor at the first and 18–24 month interval. The strategy of buying losers and selling winners would also result in positive significant returns for the remaining interval of 3 to 15 months.

In general, the findings have revealed that those strategies do not take place in the Latvian stock market as stated in the strategy statement, because at least in the period from the beginning of 2000 to the end of 2009, no precious tendency for this anomaly was noticed. In the first four years, losers were operating better than winners all the time; therefore, no evidence for momentum features to emerge was found. Thus, this totally contradicts specific strategy peculiarities. Later, in the next period (2004–end of 2005), it was hard to investigate any consistency, as both losers and winners slogged on for the returns. However, there are two periods (2006–2007 and 2008–2009) that could definitely or likewise show some momentum and contrarian strategy in the Latvian stock market. Still, we can conclude that though this strategy could take place in the market in the short term period, it disappears in the long term.

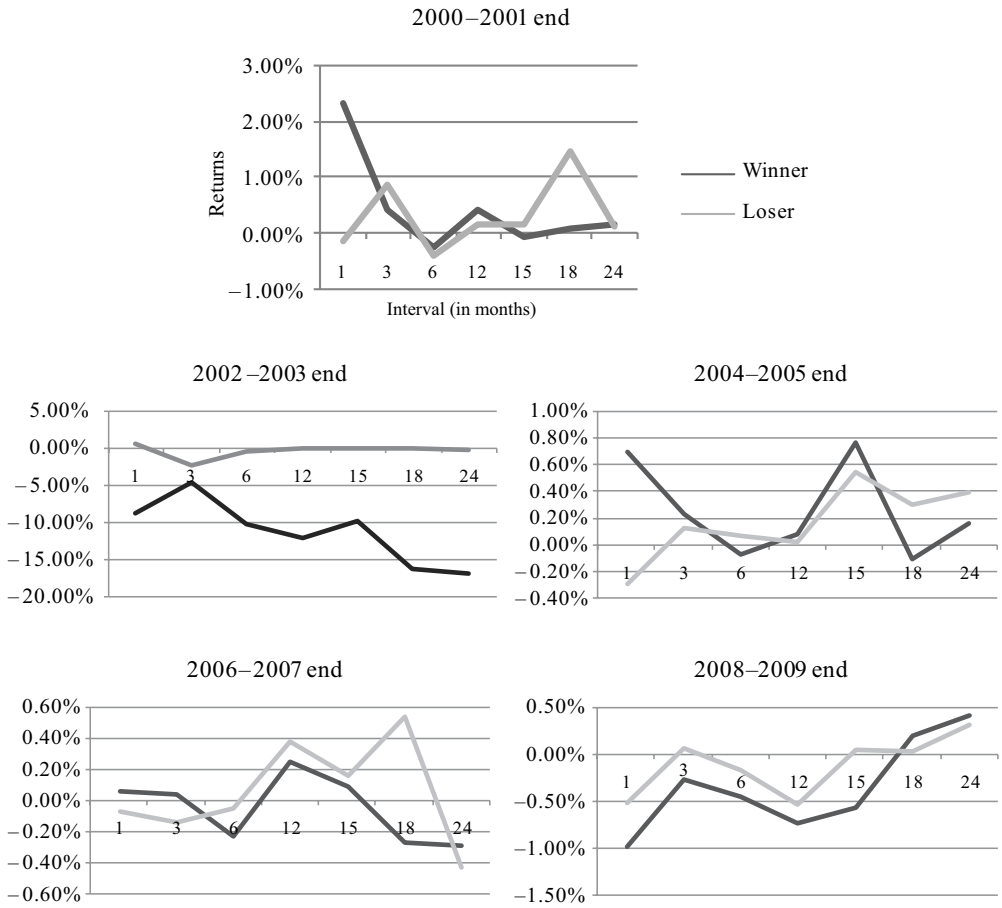

Fig. 3. Graphical representation of returns received from NASDAQ OMX Riga using momentum and contrarian strategies (2000–2009 end). (Source: created by authors using data obtained from NASDAQ OMX Riga)

4. Conclusions

For a long time, when making financial decisions, market participants have relied on the notion of efficient markets and the behaviour of a rational investor. However, academics in both finance and economics gradually started discovering anomalies and types of behaviour that could not be explained by the theories available at the time. While these theories could explain certain "idealized" events, the real world proved to be a very messy place where market participants often behaved very unpredictably. As a result, the notion that such irrational behaviour exists has become controversial. There is extensive literature on psychology documenting that people make systematic errors in a way they think: they are overconfident, put too much weight on recent experience, etc. Their preferences may also distort reality.

The prospect theory and heuristics may further help with explaining other psychological factors affecting the process of investment decision-making and how such processes can lead to speculative bubbles. The prospect theory offers an alternative to the theory of the expected utility maximization according to which investors are risk averse at all levels of wealth. Heuristics, a process by which people find things out for themselves usually by trial and error, may help with an explanation why the market sometimes acts in an irrational manner, which is opposite to the model of perfectly informed markets. The prospect theory and heuristics help with understanding some of the possible factors underlying the phenomenon of speculative bubbles, even though they cannot alone give exhaustive answers to all the matters surrounding the anomaly of this market (Johnsson *et al.* 2002). However, a more common understanding of these factors and the way psychological factors may affect our decision-making should help with avoiding the occurrence of such anomalies and assist in better understanding of the periodic unpredictability of the markets.

Momentum strategies will be profitable if stock returns display a positive serial correlation, whereas contrarian strategies will be profitable in case of a negative serial correlation of stock returns. According to the obtained results, it could be concluded that those strategies do not take place in NASDAQ OMX Baltic as stated in the strategy statement, because at least in the period from the beginning of 2000 to the end of 2009, no precious tendency for this anomaly was noticed. The studies on Lithuanian, Estonian and Latvian markets show that though these strategies could take place in the short term period, they disappear in the long term. An important point is that at some intervals it was hard to investigate any consistency, as both losers and winners slogged on for the returns.

Many researchers have uncovered empirical regularities in the returns of the stock market. The strategy might benefit from the theory. Then again, the tests on the strategy do not always confirm the theory. If these regularities persist, investors can expect to achieve superior performance. Unfortunately, nature can be perverse. Once an apparent anomaly is published, often it disappears or goes into reverse.

Empirical studies are required for testing the model regarding a large representative sample. We limit our conclusions to those firms and exchanges studied and the time period covered. Future research could extend this work thus investigating other types of anomalies.

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RINKOS ELGSENA: NASDAQ OMX BALTIC ATVEJŲ TYRIMAI

J. Stankevičienė, N. Gembickaja

Santrauka

Straipsnyje nagrinėjama rinkos elgsena. Išsamiai analizuojama rinkos dalyvių elgesio įvairovė bei pasireiškiantys pavyzdžiai, pasirinktos anomalijos klasifikuojamos, pateikiami pagrindiniai jų ypatumai. Straipsnio tikslas – ištirti ir išanalizuoti dvi anomalijų strategijas Baltijos vertybinių popierių biržoje: NASDAQ OMX Taline, Rygoje ir Vilniuje. Tyrimo metu atrenkamos analizei tinkamos akcijos listinguojamos vertybinių popierių biržoje ir tiriami akcijų prekybos rezultatai. Gauti rezultatai yra lyginami ir aptariami rinkų skirtumai bei ypatumai. Išnagrinėjus teorinius ir praktinius anomalijų aspektus, pateikiamos išvados ir siūlymai.

Reikšminiai žodžiai: rinkos elgsena, finansų psichologija, finansų rinkų anomalijos.

Jelena STANKEVIČIENĖ. PhD in Social Sciences (economics), Assoc. Prof., the Dean of the Faculty of Business Management at Vilnius Gediminas Technical University. Research interests: integrated assets and liability management, decision making under risk and uncertainty, balanced scorecard systems, risk, liquidity and value management of financial institutions, value creation strategies.

Natalija GEMBICKAJA. MSc in Business, the Faculty of Business Management at Vilnius Gediminas Technical University (Lithuania). Research interests: market behaviour, behavioural finance, anomalies in financial markets.