Inzinerine Ekonomika-Engineering Economics, 2022, 33(5), 473–485

The Month Effect in the Baltic and Nordic Stock Markets at Market-Level and Sector-Level

Rasa Norvaisiene, Jurgita Stankeviciene

Kaunas University of Technology
K. Donelaicio st. 73, LT-44029, Kaunas, Lithuania
E-mail. rasa.norvaisiene@ktu.lt; jurgita.stankeviciene@ktu.lt

crossref http://dx.doi.org/10.5755/j01.ee.33.5.28183

The purpose of this study is to analyze and compare the trends in the expression of the month effect in the Nasdaq Baltic and Nasdaq Nordic stock markets, as well as to examine whether the seasonal stock price fluctuations occur in all industrial sectors of these markets or are specific to certain sectors only. The OMX Baltic Benchmark, OMX Baltic, and OMX Nordic 40 indexes, which reflect the situation in the Baltic and Nordic stock markets, were used in the study to assess seasonality at the market level. To assess the seasonality in separate sectors of the Baltic and Nordic markets, we used sectoral indexes calculated in these markets. The data sample covers the period from January 2, 2004 through December 31, 2019. The methodology of the research used to examine seasonality in daily returns entails estimating a regression with dummies and GARCH (1,1) to capture month effects. Although the results of OLS and GARCH (1,1) analysis were quite different, they proved the existence of the month effect in both the Baltic and Nordic stock markets. The results of the analysis of seasonal fluctuations in stock prices at sector-level evidenced that month effects appear both in Baltic market and Nordic market, which allows earning abnormal returns in particular months for those who invested in stock of certain sectors. Our research has evidenced that trends in the volatility of stock prices in separate months in the Baltic countries are not stable and are characterized by greater instability as compared to the Nordic countries.

Keywords: *Calendar Effects; Calendar Anomalies; Markets Seasonality; Month Effect; Sector Rotation.*

Introduction

Since the emergence of modern financial markets, investors have been constantly striving to find such investment strategies that would allow them to outrun others and maximize returns. Pursuant to the efficient market hypothesis, it would be impossible to earn higher than average market returns consistently, regardless of the investment technique investors use, as it is assumed that investors always behave rationally (Fama, 1970). However, it is difficult to resist various psychological factors and make rational investment decisions constantly. There is plenty of non-professional investors in the markets who lack knowledge or analytical thinking to assess all the information circulating in the market objectively and to choose among the available alternatives quite properly. Even the professional investors find it difficult to readjust as the amount of information in the markets is growing constantly. The academic debates on the market inefficiencies and observable deviations have even intensified after financial markets faced yet two large-scale crises at the beginning of the 21st century. Researchers analyzing the global stock markets often find deviations from the rules of the efficient market hypothesis (Abeysekera, 2001; Smith & Ryoo, 2003; Awad & Daraghma, 2009; Mehla & Goyal, 2012; Shiller & Radikoko, 2014; Kiran & Rao, 2019).

A considerable number of researchers (Rozeff & Kinney, 1976; Keim, 1983; Berges et al, 1984; Kato & Schallheim, 1985; Bhardwaj & Brooks, 1992; Agrawal & Tandon, 1994; Haugen & Jorion, 1996; Asteriou & Kovetsos, 2006; Gu, 2006; Giovanis, 2009; Van Dijk, 2011; Kuria & Riro, 2013; Georgantopoulos & Tsamis, 2014; Milos & Milos, 2019) observed the January effect, which is evidenced by the fact that stock return is significantly higher in January compared to other months. Rozeff & Kinney (1976), Keim (1983), Haugen & Jorion (1996), Gu (2006), and Van Dijk (2011) investigated seasonal anomalies in large and developed markets and found a clear evidence of January effect. However, in smaller and less developed markets, the research results are quite controversial and dependent on both the research period and market conditions, as well as on the research methods. Contradictory results were obtained by different researchers even in the same markets. The number of studies focused on the seasonal anomalies in the European stock markets is limited, and the results obtained are ambiguous. Floros (2008) did not find any evidence of the January effect in Greece, while Georgantopoulos & Tsamis (2014) in their research of the same country proved the existence of this effect. Asteriou & Kovetsos (2006) confirmed the existence of the January effect in Poland, Romania, Hungary and Slovakia, while Milos & Milos (2019) studied the January effect in 11 countries of Central and Eastern Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) and found that the January effect occurred in the stock markets of Bulgaria, Croatia, Estonia and Latvia only. Tilica (2014) studied the month effect in 18 post-communist Eastern European countries during the period of 2004 – 2014 and found the existence of the January effect in only five of the countries, however, proved that significantly higher returns in the studied markets may not

necessarily be earned in January; moreover, splitting the study period into shorter periods resulted in lower or higher month effects in all markets.

Some researchers confirm the existence of the January effect, while others observe seasonal fluctuations of stock prices in other months. Furthermore, some authors who conducted research in this area have obtained different results after dividing the study period into the pre-crisis and post-crisis periods, or market growth and decline periods. It should be also mentioned that research on calendar effects at the industry level still gets little attention of the researchers, although one of the important factors influencing stock return are seasonal fluctuations in the economy, which affect separate industries differently. The occurrence of the calendar anomalies in European markets at the sectoral level has been analyzed only by Carrazedo et al. (2016), but their goal was to investigate the Halloween effect.

Calendar anomalies in the Baltic markets have been analyzed by only a few scientists. Sander & Veiderpass (2013) tested the turn-of-the-year effect in the Baltic stock exchanges (during the period of 2000 – 2012). Norvaišienė et al. (2015) analyzed the occurrence of the month effect and the Halloween effect in Lithuanian, Latvian and Estonian stock markets during the period of 2003 – 2014. Arendas & Kotlebova (2019) investigated the turn-of-the-month effect in the stock markets of 11 Central and Eastern European (CEE) countries during the period of 1998 – 2018. Among others, the Baltic countries were also included in this study. As already mentioned, Tilica (2014) and Milos & Milos (2019) studied the January effect in various European countries, including the Baltic countries. In some of the mentioned studies, it was proved that calendar anomalies exist in the Baltic stock markets, while other denied the effect of such anomalies.

Rather contradictory results of research of seasonal anomalies obtained by various authors in the large and small stock markets and the extremely limited research of these anomalies at the sector-level force to search for answers to the still problematic questions. Summarizing the results of the research conducted by various authors, questions arise as to whether the month effect occurs in both large and small stock markets, and whether the seasonal fluctuations of stock prices are statistically significant at the level of separate sectors. The Nasdaq Baltic stock market can be classified as small, as the total capitalization of this market amounted to 7.3 billion Euro at the end of 2019[1]. The total stock capitalization of Nasdaq Nordic market was 1,407.5 billion Euro at the same time[2].

The purpose of this paper is to analyze and compare the trends of the month effect in the Nasdaq Baltic and Nasdaq Nordic stock markets, as well as to investigate whether the seasonal stock price fluctuations occur in all sectors of these markets or are specific to certain sectors only.

The object of the research is the expression of the month effect in the Nasdaq Baltic and Nasdaq Nordic stock markets both at the market-level and at the industry sector-level.

There are two main methodological approaches, which are used to examine month effects: an Ordinary Least Squares (OLS) regression analysis with dummy variables and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) (1,1) model. Both models are used in this research. Our contribution to scientific research is valuable, as we have assessed and compared the manifestation of the month effect in small and large European stock markets (Baltic and Nordic markets); moreover, we assessed the trends in the manifestation of the month effect in these stock markets at sector-level.

The paper is organized as follows: section 1 provides an introduction; section 2 provides a literature review; section 3 describes the data and methodology; section 4 presents the empirical results; and summary of findings is presented in section 5.

Literature Review

One of the evidences for the stock market inefficiency is the month effect related to the fact that the average stock return varies in different months. The best-known and the most observed by researchers is the January effect. Rozeff & Kinney (1976) were the first to prove that the stock return earned from January investments in the NYSE significantly exceeds the return earned in other months. The research results of Keim (1983), Bhardwaj & Brooks (1992), Haugen & Jorion (1996), Van Dijk (2011) confirmed the existence of a strong January effect in the United States. Agrawal & Tandon (1994) identified that significant seasonality occurred in January in fourteen out of eighteen countries studied. January effect has also been evidenced in Canada (Berges et al., 1984), Japan (Kato & Schallheim, 1985), and Kenya (Kuria & Riro, 2013). However, Singh (2014), who studied the month effect in BRIC countries (Brazil, Russia, India, and China), found no evidence of this effect in any of them. Giovanis (2009), in a study of fifty-five countries, found that the January effect occurred in only seven of the markets studied and concluded that the January effect does not exist at the global level and is a very week calendar effect.

The expression of the month effect has also been studied in the European stock markets, but the results obtained are also quite controversial. Asteriou & Kovetsos (2006) proved the existence of the January effect in Poland, Romania, Hungary, and Slovakia. Floros (2008) found no evidence of January effect in Greece, while Georgantopoulos & Tsamis (2014) proved the existence of January effect in this country. Different results were obtained also by Vasileiou & Samitas (2015), who analyzed the calendar effects in the Greek stock market in the context of changing market conditions during the period of 2002 – 2012. They split the research period into periods of growth and recession and found that the results of the calendar effects' research could be quite controversial under different market conditions. The authors concluded that the January effect is significant during a period of market growth, but it disappears during a recession. The results of this study also evidenced that depending on the prevailing market trends, higher or lower returns may be earned in the Greek stock market in different months: during the period of market

[1] https://nasdaqbaltic.com/statistics/lt/capitalization

[2] http://www.nasdaqomxnordic.com/news/statistics

growth, positive returns were observed in July, while losses incurred in March; meanwhile, with during the decline in the stock market, significantly lower profitability is observed in February, June and November.

A similar approach was upheld by Obalade & Muzindutsi (2019), who studied the month effect in the stock markets of African countries (Nigeria, South Africa, Mauritius, Morocco and Tunisia) under different market conditions from January 1998 to February 2018. These authors found that the month effect is different depending on whether the market is experiencing downward or upward trends. Of all the countries studied, the predominant January effect was identified only in the Mauritius market, and it was more pronounced in the bull market. The results of the study evidenced that the January effect did not occur in other markets studied, however other months with higher returns were identified and the list of these months changes as market trends change.

The impact of the research period on the results was also confirmed by Tilica (2014), who analyzed the month effect in 18 post-communist Eastern European countries during the period of 2004–2014. The results of this study proved the existence of a January effect in five of the countries studied, i.e., Croatia, Lithuania, FYR Macedonia, Montenegro and Slovakia. According to the author of the study, the month effect did not occur during the research period in Bosnia, Bulgaria and Estonia. In six of the countries analyzed, investors earned statistically significantly higher returns in July. In many of these countries, statistically significant coefficients were obtained in two or more months instead of one month. The results obtained after splitting the study period into the periods before and after the largest drop of stock prices evidenced that month effects were observed in all markets in case of a shorter period, however the months in which investors earned the highest returns varied over the time periods in almost all countries studied. During the period before the biggest drop of stock prices, the most profitable months were July and December for investors in most markets, and in the period after significant changes in market, the January effect was evidenced in most countries, July also remained particularly important for investors, while October – in five countries analyzed .

Completely different results were obtained by Milos & Milos (2019) who analyzed the January effect in 11 Central and Eastern European countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia). These authors found that during the study period of 2009 – 2018, the return in January was higher as compared to the following months in the stock markets of Bulgaria, Croatia, Estonia and Latvia. Meanwhile, in the other stock markets studied, returns in separate months was not statistically different and the January effect did not appear.

Findings of other researchers suggest that the month effect in stock markets may not necessarily occur in January. Svrtinov et al. (2017) used MBI index and concluded that the January effect did not occur in Macedonia during the period of 2006 – 2016, however December distinguished for a statistically significant positive return. Vatrushkin (2018) identified the May and October effects in Brazil, the February effect in Russia, and the December effect in South-Africa.

Rossi and Gunardi (2018) analyzed the month effect in Spain, France, Italy, and Germany for the period of 2001 – 2010. The researchers concluded that there is no single overall month effect in all four stock markets analyzed. During the research period, the month effect was not found in France and Italy, while in the German market a significantly higher return was recorded in February and significantly lower return in September. In Spain, the additional return was earned in January and significantly lower return – in May.

There are several reasons for the January effect, the most mentioned is the tax benefits. According to Van Dijk (2011), to reduce taxable income at the end of the year, individual investors sell stocks that have fallen over the year, and actively buy again at the beginning of the new year, which in turn increases stock demand and prices. Another reason for this phenomenon mentioned by researchers is the windows dressing effect caused by the behavior of institutional investors. Professional investors are evaluated according to their investment philosophy and the results achieved, so, to improve their portfolio structure and varnish their annual reports, they sell part of the stock at the end of the year and buy again at the beginning of the new year, thus creating abnormal returns. Another hypothesis trying to explain the reasons of the January effect is related to the behavior of individual investors: these investors consider their plans, future decisions concerning savings and investments in late December – early January and implement them in January. This explains the existence of the January effect in countries where capital gains are not taxed, or the financial year begins not in January. Ogden (1990) explains the existence of the January effect using the liquidity hypothesis and relates it to the behavior of individual investors arguing that they receive additional cash benefits, bonuses at the end of the year and invest them in a stock market at the beginning of the new year thus causing rise of demand and increase of stock prices. Weigerding & Hanke's (2018) conducted a study in the German stock market and concluded that liquidity seems to be a major driver behind calendar effects at the level of individual stocks. Thus, many reasons of the January effect are related to the behavior of investors at the end of the calendar year and beginning of the next year and thus the fluctuations in supply and demand in the stock markets caused by this behavior. Opportunities to earn higher than usual stock return in other months of the year are also often related to significant changes in investor activity in those months.

However, it should be noted that stock markets are heterogeneous, and fluctuations of stock prices during the year are caused not only by investor sentiment but also by the seasonality of activities of a company. The activities of companies in different sectors and consequently their financial results, are subject to different seasonal changes, and therefore seasonal fluctuations of the stock prices in different sectors of the stock market may be different. However, there are very few studies that analyze this aspect.

Bouman and Jacobsen (2002) studied the occurrence of one of the calendar effects, the Halloween effect, in separate stock market sectors, however the results obtained by these authors evidenced that the effect was not sector-specific therefore it was concluded that the effect is country-specific but not sector-specific.

Marrett & Worthington (2011) searched for potential differences in the average monthly returns of various industrial sectors in the Australian stock market. At the market level, higher returns were observed not only in July, but also in April and December. However, results of analysis at the sector-level were quite different: the January effect was found in the Financial and Energy sectors as well as in the Telecommunications and Transport. On the other hand, the authors did not find any evidence of a January effect in the sectors of Health and Insurance, Materials and Communication.

Carrazedo et al. (2016) examined the existence of the Halloween effect in the European stock market at the level of industry. These authors proved the existence of the Halloween effect in the sectors of European stock market, however, did not receive a clear answer to the question "Is the Halloween effect specific to a particular sector?" It should be mentioned that the above-mentioned researchers found a statistically significant April effect in number of sectors.

Garay & Demmler (2019) studied the January effect in the Mexican stock market using data of 7 sectoral indices for the period of 2010 – 2018. These authors found that March, October, and December distinguish for a seasonal effect in Mexico. The March calendar effect was found in Consumer Staples Sector, Health Care Sector, and Financial Sector, the October effect was found in Consumer Staples Sector, Financial Sector and Telecommunication Services Sector, and December effect – in Materials Sector, Consumer Staples Sector and SE7 Financial Sector.

Jaisinghani et al. (2019) analyzed the existence of seasonal anomalies in the Israeli securities markets during the period of 2000 – 2018. The study period was divided into pre-crisis period and post-crisis period. In addition to the TASE-125 and TASE-35 indexes, these researchers also analyzed the sectoral indexes TASE-Real Estate and TASE-Financial. The authors found that in the Israeli stock market during the pre-crisis period, higher returns were observed in April, May, and November, however the January effect, though widely analyzed in the literature, did not occur in this market. Meanwhile in the post-crisis period, the situation changed completely, as statistically significantly higher returns were observed not in April, May, and November but also in January. In the pre-crisis period, higher returns in the real estate and financial sectors were earned only in April. Differences between the seasonality of stock return in separate months became particularly pronounced during the post-crisis period. In the meantime, the stock return of real estate companies was higher in January, June and December, and that of financial sector companies in March and October.

Thus, even the limited research allows to conclude that even if the month effect has not been proven on a market-wide basis, the abnormal return may be earned in separate months in different market segments.

Data and Methodology

The OMX Baltic Benchmark, OMX Baltic and OMX Nordic 40 indices, which reflect the situation in the Baltic and Nordic stock markets, were used in this study to assess expression of seasonality at the market level. The sample covers the period from January 2, 2004, through December 31, 2019.

To assess seasonality in separate sectors of the Baltic, the following sectoral indices were used in the study: OMX Baltic Technology, OMX Baltic Telecommunications, OMX Baltic Health Care, OMX Baltic Financials, OMX Baltic Consumer Goods, OMX Baltic Consumer Services, OMX Baltic Basic Materials, OMX Baltic Industrials, OMX Baltic Utilities. The stock of companies that would be classified in the energy sector are not traded in the Baltic stock market, therefore this sector does not exist in the Baltic stock market. The following sectoral indexes were used in this study to assess seasonality in separate sectors of the Nordic stock market: N Technology, N Telecommunications, N Health Care, N Financials, N Consumer Goods, N Consumer Services, N Basic Materials, N Industrials, N Energy, N Utilities. Panel data was used for the research. All data used in the study was collected from the websites of the Nasdaq Nordic and Nasdaq Baltic stock exchanges.

On purpose to get more reliable test results and use a larger data sample, the daily log return of indexes of Nordic and Baltic stock exchanges was used in our research. The daily returns are computed as 100 × the natural log difference of the market index at day t and day t-1:

$$R_t = ln\frac{I_t}{I_{t-1}} \times 100 \qquad (1)$$

To study the month effect, some scientists (Floros, 2008; Marrett & Worthington, 2011; Obalade & Muzindutsi, 2019) used ordinary lest square regression (OLS) using dummy variable. The methodology employed in investigating seasonality in returns, entails estimating a regression with dummies to capture month of the year effects as:

$$R_t = \alpha_1 D_1 + \alpha_2 D_2 + \cdots + \alpha_{12} D_{12} + \varepsilon_t \qquad (2)$$

where R_t is the natural log of the daily return in month t. The D_1, D_2, … , D_{12} are dummy variables so that D_1=1 if month t is January and zero otherwise; D_2=1 if the month t is February and zero otherwise and so forth. The coefficients α_1 to α_{12} are the mean daily returns for January through December respectively and ε_t is the stochastic term. The presence of monthly seasonality implies H_0: $\alpha_1 = \alpha_2 = ... = \alpha_{12} = 0$ against $\alpha_i \neq 0$, for i=1, ... , 12. If the null hypothesis is rejected, then stock return must exhibit some form of monthly seasonality.

Despite the popularity of OLS, some researchers who have conducted research in this area (Giovanis, 2009; Georgantopoulos & Tsamis, 2014; Vasileiou & Samitas, 2015) claim that this method can give false results, since the errors can be unstable over a long period of time; in other words, the problem of heteroskedasticity is encountered. Due to this problem, a considerable number of researchers

(Giovanis, 2009; Georgantopoulos & Tsamis, 2014; Vasileiou & Samitas, 2015; Ahmed & Boutheina, 2017; Sawitri & Astuty, 2018; Xiong et al., 2019) have used GARCH models to study calendar anomalies, which include a conditional heteroscedasticity that captures time variation of variance in stock return. Using GARCH (1,1), one can estimate the influence of the return series of the index and dummy variable series of calendar effect in time *t* and time *t-1*, in order to eliminate the influence of returns of calendar effect series on the return of non-calendar effect. The conditional variance equation is:

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta h_{t-1} \quad (3)$$

Where h_t and h_{t-1} are the conditional variance of index return at time *t* and *t-1* respectively and α_0, α_1, β are the GARCH model coefficients. For the conditional variance to meet non-negativity constraints and be meaningful, the following conditions must be met: $\alpha_0 > 0$; $\alpha_1 \geq 0$; $\alpha_1 + \beta < 1$. According to Bollerslev (1986), the endurance of shocks on volatility is dependent on the sum of $\alpha_1 + \beta$. If the sum is lower than 1, it implies that variability persist over a longer period and if the sum is equal to 1 (or greater), it implies that the volatility tends to increase over time.

The Eviews software package was used for the research.

Research Results

Tables 1 and 2 provide descriptive statistics for the above-named sectoral indexes as well as for general market indexes, reflecting the number of observations, minimum and maximum daily returns by sector and for market during the period of the research, the average daily returns by sector and for market during the period of the research, and the standard deviation for these returns.

Table 1

Descriptive Statistics in Baltic Market

Industry sectors	N	Min return, %	Max return, %	Mean, %	Standard Deviation, %
Technology	3809	-16.27	15.54	-0.021	2.110
Telecommunications	4069	-7.17	7.67	0.040	0.876
Health Care	4068	-14.28	16.84	0.062	1.498
Financials	4082	-14.63	13.91	0.023	1.671
Consumer Goods	4082	-7.85	7.55	0.023	0.890
Consumer Services	4082	-11.12	12.14	0.034	1.573
Basic Materials	4080	-18.77	19.72	0.019	2.028
Industrials	4082	-9.29	12.81	0.011	1.131
Utilities	4082	-9.66	18.06	0.048	1.275
OMX Baltic Benchmark	4058	-8.82	8.96	0.033	0.895
OMX Baltic	4056	-7,59	10.39	0.033	0.810

The highest stock return in the Baltic countries during the research period was observed in the Health-Care sector, with an average daily return of 0.062 %, which was almost twice the average daily return in the Baltic market. Stock in the Utilities and Telecommunications sectors also outperformed the market-wide return. Meanwhile in the Technology sector, negative returns were observed during the research period, as well as the largest fluctuations of stock prices in this market. The return in the Industrials sector is almost 3 times lower than the average in the Baltic market.

Table 2

Descriptive Statistics in Nordic Market

Industry sectors	N	Min return, %	Max return, %	Mean, %	Standard Deviation, %
Technology	4061	-18.47	16.95	0.020	1.851
Telecommunications	4061	-20.00	18.21	0.047	1.456
Health Care	4061	-18.00	20.71	0.061	1.337
Financials	4061	-20.15	19.67	0.055	1.588
Consumer Goods	4061	-20.61	19.09	0.057	1.321
Consumer Services	4061	-17.28	19.59	0.044	1.417
Industrials	4061	-19.52	22.97	0.063	1.632
Basic Materials	4061	-21.11	23.63	0.043	1.786
Energy	4061	-22.54	27.36	0.057	2.126
Utilities	4061	-21.02	26.76	0.069	1.768
OMX Nordic 40	4086	-8.72	9.38	0.021	1.329

In the Nordic market, the average daily return during the research period was 0.021 %, i.e., 0.012 % lower than in the Baltic market (see Table 2). Unlike in the Baltic market, the Nordic countries had the highest returns in the Utilities and Industrials sectors though stock return in the Health-Care sector was also well above the market average and almost the same as in the same Baltic sector. In the Technology sector, the stock return though positive, was lowest in the Nordic countries as well.

The analysis of seasonality using the OMX Baltic Benchmark and OMX Baltic indexes evidenced that the dynamics of both indexes reveal the existence of the January effect in the Baltic market (see Table 3). In January, the average daily return in this market was 0.20 %. OLS results demonstrated that in the Baltic market, October distinguished by a statistically significant negative return but GARCH (1,1) analysis results did not confirm the existence of a significant negative return for this month. Based on the results of the GARCH (1,1) analysis, it can be stated that a statistically significant negative return is experienced in the stock markets of the Baltic countries in February. Both OLS and GARCH results proved the existence of seasonality in July. Although the OLS results indicated that it is possible to earn a statistically significant

higher return from the stock of the Baltic countries in August as compared to other months, the results of the GARCH analysis did not confirm such statistical significance. GARCH analysis evidenced that abnormal statistically significant positive return in the Baltic stock markets is earned in April and November. The conclusions about the existence of the January effect in the Baltic stock markets coincide with the conclusions of Milos and Milos (2019), who proved the existence of the January effect in Estonia and Latvia.

Significantly higher return earned in several months if compared to the rest of the year confirmed the statements of other researchers (Tilica, 2014; Marrett & Worthington, 2011; Garay & Demmler, 2019; Jaisinghani *et al.,* 2019) that the abnormal return can be earned more than one month per year.

Table 3

Results of the Research of the Market-Wide Month Effect in the Baltic and Nordic Markets

	Coefficients of OLS			Coefficients of GARCH(1,1)		
	OMX Baltic Benchmark	**OMX Baltic**	**OMX Nordic 40**	**OMX Baltic Benchmark**	**OMX Baltic**	**OMX Nordic 40**
January	0.1995***	0.2038***	0.0689	0.1854***	0.1895***	0.1330***
	[0.0000]	[0.0000]	[0.3351]	[0.0000]	[0.0000]	[0.0054]
February	0.0091	-0.0177	0.0899	-0.0299	-0.0567***	0.1291**
	[0.8553]	[0.6929]	[0.2242]	[0.0852]	[0.0022]	[0.0107]
March	0.0907*	0.0832*	0.0226	0.0503	0.0685**	0.0350
	[0.0574]	[0.0535]	[0.7522]	[0.0955]	[0.0147]	[0.4813]
April	0.0188	0.0314	0.0638	0.0594**	0.0759**	0.0228
	[0.7079]	[0.4886]	[0.3924]	[0.0249]	[0.0154]	[0.6206]
May	-0.0326	-0.0164	-0.0420	-0.0089	0.0211	-0.0079
	[0.5056]	[0.7104]	[0.5572]	[0.6836]	[0.2401]	[0.8681]
June	0.0339	0.0297	-0.0663	0.0350	0.0445	-0.0448
	[0.4896]	[0.5026]	[0.3561]	[0.2274]	[0.0929]	[0.3389]
July	0.0830*	0.0765*	0.0904	0.0616***	0.0681***	0.0768
	[0.0815]	[0.0757]	[0.2000]	[0.0065]	[0.0019]	[0.1743]
August	0.0872*	0.0854**	-0.0319	0.0179	-0.0204	0.0107
	[0.0657]	[0.0460]	[0.6504]	[0.5230]	[0.4349]	[0.8396]
September	-0.0275	0.0291	0.0301	0.0195	0.0256	0.1273**
	[0.5682]	[0.5051]	[0.6752]	[0.5082]	[0.3759]	[0.0168]
October	-0.0977**	-0.0835*	-0.0412	0.0308	0.0296	-0.0042
	[0.0400]	[0.0521]	[0.5601]	[0.2539]	[0.3140]	[0.9335]
November	-0.0171	-0.0529	0.0263	0.0615**	0.0556**	0.0681
	[0.7223]	[0.2250]	[0.7140]	[0.0269]	[0.0154]	[0.2038]
December	0.0407	0.0257	0.0589	0.0257	0.0095	0.1164**
	[0.4225]	[0.5745]	[0.4292]	[0.4471]	[0.7415]	[0.0429]
Variance Equation						
α_0				0.0071***	0.0051***	0.0191***
α_1				0.1706***	0.1418***	0.0854***
β				0.8238***	0.8581***	0.9024***

Notes: The values in brackets are p-values
**** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level*

Meanwhile, the analysis of the Nordic market-wide stock return in separate months using OLS evidenced that the market-wide month effect did not exist, as the regression equation was not statistically significant and any months when investors would earn a statistically significantly different return were not observed. However, the results of the GARCH (1,1) analysis proved that there is a significant January effect in Nordic stock markets, as well as significantly higher return can be earned in these markets in February, September, and December if compared to other months of the year. All the ARCH and GARCH coefficients are significant at the 1% level suggesting that the model is relevant to predict both the variance and error terms.

The analysis of the month effect in different sectors of this market gave quite differing results. The OLS analysis revealed that the January effect is observed in many sectors of the Baltic stock market: a statistically significant coefficient was assessed in January in the Telecommunications, Health Care and Utilities sectors (see Table 4). In these sectors, stock return averaged 0.23–0.24 % per day in January during the research period. The Consumer Services sector distinguished for obvious seasonality in the Baltic States, stock prices here increased on the average 0.29 % per day in January. The January effect is also characteristic of the Consumer Goods and Manufacturing sectors, only the average stock return in January in these sectors were almost twice lower than above mentioned and amounted to 0.12–0.14 % per day. The same return in the Baltic market was generated in July by investors in the stock of companies of the Manufacturing sector, and in August – by the investors in the stock of the Consumer Goods and Utilities sectors. It is worth noting that the highest return from stock of the companies in the Baltic Health Care sector is earned not in January but in May, moreover, statistically significantly higher stock return in this sector is earned in April and June if compared to other months. Meanwhile in October, stocks in this sector generated significant losses. The Financial sector distinguishes from other sectors in the Baltic market as its highest stock return was observed in July, however stock prices in this sector decreased by an average of 0.38 % per day in November. Stocks in the Technology sector generated the highest return in July as well, but the calculated ratio is

statistically significant only at the 10 % level. However, a statistically significant negative return (0.32 % per day) in the Technology sector was observed in February. In the Baltic Basic Materials sector, significantly different return was found in April if compared to other months.

Table 4

Coefficients of OLS Analysis in the Baltic Stock Market

	Technology	Telecommu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Utilities
January	0.0586	0.2350***	0.2318***	0.1483*	0.1204**	0.2913***	0.1384**	0.1538	0.2414***
	[0.6407]	[0.0000]	[0.0064]	[0.0992]	[0.0122]	[0.0006]	[0.0210]	[0.1602]	[0.0005]
February	-0.3167**	0.0214	0.0036	0.0229	0.0233	-0.0404	-0.0546	-0.0613	-0.1035
	[0.0137]	[0.6832]	[0.9669]	[0.8049]	[0.6379]	[0.6440]	[0.3852]	[0.5866]	[0.1442]
March	-0.0964	0.0904*	0.0071	0.1139	0.0089	0.0594	0.0570	-0.0822	0.0834
	[0.4364]	[0.0730]	[0.9328]	[0.2009]	[0.8505]	[0.4786]	[0.3449]	[0.4473]	[0.2200]
April	0.0779	-0.0133	0.2044**	-0.0307	-0.0042	0.0116	-0.0126	0.2564**	0.0489
	[0.5469]	[0.8000]	[0.0197]	[0.7408]	[0.9320]	[0.8945]	[0.8414]	[0.0231]	[0.4892]
May	0.0106	0.0344	0.2709***	-0.0629	-0.0004	-0.1084	-0.0555	-0.1653	0.0088
	[0.9338]	[0.5022]	[0.0017]	[0.4888]	[0.9932]	[0.2054]	[0.3673]	[0.1364]	[0.8996]
June	-0.0416	0.0029	0.1858**	0.0308	0.0130	-0.0216	0.0332	-0.0165	0.0024
	[0.7434]	[0.9554]	[0.0314]	[0.7358]	[0.7894]	[0.8021]	[0.5913]	[0.8861]	[0.9725]
July	0.2366*	0.0349	0.1009	0.2095**	0.0494	0.0856	0.1257**	0.1301	0.0370
	[0.0551]	[0.4878]	[0.2287]	[0.0184]	[0.2970]	[0.3062]	[0.0370]	[0.2457]	[0.5849]
August	0.0205	0.0935*	0.0952	0.1765*	0.1146**	0.1428*	0.0277	0.0115	0.1368**
	[0.8673]	[0.0626]	[0.2542]	[0.0460]	[0.0151]	[0.0864]	[0.6437]	[0.9181]	[0.0428]
September	0.0608	0.0406	0.0115	-0.0467	0.0315	-0.0501	0.0276	0.0889	0.0747
	[0.6276]	[0.4250]	[0.8930]	[0.6043]	[0.5124]	[0.5553]	[0.6516]	[0.4349]	[0.2785]
October	-0.0933	-0.0595	-0.2008**	-0.1707*	-0.0487	-0.0956	-0.0748	-0.0320	-0.0146
	[0.4478]	[0.2354]	[0.0165]	[0.0543]	[0.3035]	[0.2526]	[0.2130]	[0.7751]	[0.8289]
November	-0.0686	-0.0212	-0.0239	-0.1934**	-0.0344	0.0331	-0.0386	-0.0861	0.0240
	[0.5851]	[0.6784]	[0.7798]	[0.0318]	[0.4726]	[0.6958]	[0.5262]	[0.4485]	[0.7264]
December	-0.1216	0.0890*	-0.0386	0.0633	0.0012	0.0962	-0.0586	0.0362	0.0274
	[0.3510]	[0.0906]	[0.6615]	[0.4968]	[0.9809]	[0.2726]	[0.3535]	[0.7583]	[0.6999]

Notes: The values in brackets are p-values
**** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level*

Using the GARCH (1,1) model to investigate the monthly effect in the stock markets of the Baltic countries, allowed to confirm the existence of the January effect in many sectors (see Table 5). The results of this model confirmed a statistically significant higher return in February in the Telecommunications sector, in April-June in the Health Care sector, and in July in the Industrials sector. Like the results of the OLS analysis, the GARCH (1,1) results confirmed that negative returns are earned by Technology stocks in February and Telecommunications stocks in August. Unlike OLS, the results of GARCH (1,1) analysis evidenced that the highest statistically significant return is earned in October in the Utilities sector as well as in the Consumer Services sector. The sum of the ARCH and GARCH coefficients exceeding 1 in the Financials and Basic Materials sectors indicates that volatility tends to increase over time and the obtained equation coefficients in separate months, although statistically significant, are not reliable. In order to confirm the existence of the month effect in the mentioned sectors, asymmetric GARCH models should be used.

Table 5

Results of the Research of the Sector-Wide Month Effect in the Baltic Stock Market Using GARCH (1,1) Model

	Technology	Telecommu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Utilities
January	0.0862	0.0494	0.2145***	0.1932***	0.1519***	0.1901***	0.1647***	0.1061	0.2057***
	[0.4605]	[0.0682]	[0.0024]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.1789]	[0.0008]
February	-0.2749***	0.0586	0.0707	-0.1026***	0.0389	-0.0003	0.0116	-0.0755	-0.0382
	[0.0084]	[0.1793]	[0.1979]	[0.0022]	[0.1168]	[0.9950]	[0.7676]	[0.1981]	[0.5560]
March	-0.2319***	0.0788**	0.0436	0.0907	0.0317	0.0623	0.0258	0.0634	0.0921
	[0.0005]	[.0105]	[0.4774]	[0.1766]	[0.4174]	[0.2098]	[0.5234]	[0.3977]	[0.1143]
April	0.0406	-0.0092	0.3119***	-0.0209	-0.0407	0.0311	0.0079	0.2167***	0.0827
	[0.7162]	[0.8161]	[0.0000]	[0.7779]	[0.3077]	[0.5265]	[0.8709]	[0.0007]	[0.0775]

	Technology	Telecommu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Utilities
May	-0.1305	0.0859***	0.9105***	0.0298	0.0113	-0.0667	-0.0261	0.0105	-0.0047
	[0.0552]	[0.0000]	[0.0000]	[0.6261]	[0.7611]	[0.1960]	[0.4317]	[0.8984]	[0.9365]
June	-0.0248	-0.0334	0.1070**	0.1047**	0.0128	0.0496	-0.0398	-0.9308***	0.0235
	[0.8165]	[0.4231]	[0.0334]	[0.0471]	[0.7183]	[0.2751]	[0.3947]	[0.0000]	[0.6936]
July	0.1928	0.0058	0.0806	0.1386**	0.0427	0.0410	0.1225***	0.1582**	0.0197
	[0.0624]	[0.8743	[0.2982]	[0.0434]	[0.2527]	[0.3990]	[0.0072]	[0.0303]	[0.7216]
August	0.0440	-0.2041***	0.0702	0.1172**	0.0677	0.0007	-0.0057	0.0986	0.0442
	[0.6548]	[0.0000]	[0.2921]	[0.0199]	[0.0607]	[0.9875]	[0.8963]	[0.0668]	[0.4708]
September	0.1164	0.0207	0.0155	-0.0168	0.0077	-0.0307	-0.0061	0.0763	0.0632
	[0.3308]	[0.6107]	[0.8532]	[0.7516]	[0.8512]	[0.5494]	[0.9001]	[0.2665]	[0.1302]
October	-0.0445	0.0119	-0.0558	-0.0815	0.0195	0.0567	-0.0193	-0.0046	0.2315***
	[0.6421	[0.7570]	[0.5184]	[0.2204]	[0.6262]	[0.1671]	[0.6539]	[0.9540]	[0.0000]
November	0.0102	0.0454	0.0486	0.1836***	0.0412	0.0460	0.0437	0.0318	-0.0027
	[0.9253]	[0.0659]	[0.4832]	[0.0000]	[0.2851]	[0.3220]	[0.3384]	[0.4954]	[0.9587]
December	0.1217	0.0652	0.0659	0.1623**	0.0307	0.0969**	-0.0517	0.0191	0.0305
	[0.1331]	[0.1049]	[0.2694]	[0.0119]	[0.4312]	[0.0431]	[0.1901]	[0.8117]	[0.6559]
Variance Equation									
α_0	0.4395***	0.0412***	0.5465***	0.0295***	0.0252***	0.0119***	0.0188***	0.1213***	0.0963***
α_1	0.1829***	0.2364***	0.4580***	0.2727***	0.1297***	0.0898***	0.1455***	0.2444***	0.1509***
β	0.7492***	0.7549***	0.4348***	0.8151***	0.8428***	0.9089***	0.8525***	0.7848***	0.8014***

Notes: The values in brackets are p-values
**** significant at the 1 % level; ** significant at the 5 % level*

OLS results evidence that, unlike in the Baltic markets, most of the Nordic stock market sectors generate the highest return in April instead of January: Financial, Manufacturing, Basic Materials, Energy, and Utilities sectors earned 0.21-0.24 % per day on the average in April (see Table 6). The fact that significantly higher return in many European stock market sectors was earned in April if compared to the rest of months was also confirmed by Carrazedo et al. (2016). A seasonally higher statistically significant stock return in Nordic Financial sector was also found in July. Such seasonal fluctuations of stock prices in the Financial sector have also been observed in the Baltic States. Stock prices in the Telecommunications sector increased significantly in March and July during the research period. An interesting situation is observed in the Nordic Consumer Goods sector, where the stock return is significantly higher for three consecutive months if compared to other months, i.e., stock return of companies in this sector averaged 0.153–0.159 % per day in February, March, and April. Investors in the Nordic Basic Materials sector were successful not only in April, but also in March, while investors in Energy companies enjoyed the highest return in March, earning 0.26 % per day on the average. Unlike in the Baltic markets, the Nordic sectors did not have any months of seasonal decline of stock prices. It should be mentioned that based on the results of the OLS analysis, there were no statistically significant seasonal fluctuations of stock prices in the Nordic Consumer Services sector. In the Nordic Technology sector, higher returns if compared to other months were observed in September, however it was statistically significant at the 10 % level only.

Table 6

Coefficients of OLS Analysis in the Nordic Stock Market

	Technology	Tele-commu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Energy	Utilities
January	0.0627	-0.0960	0.1077	0.0126	0.0489	0.0359	0.0665	-0.0019	0.0751	0.0021
	[0.5341]	[0.2258]	[0.1395]	[0.8839]	[0.4965]	[0.6423]	[0.4542]	[0.9848]	[0.5168]	[0.9829]
February	0.1007	0.0146	0.1256	0.1169	0.1525**	0.0560	0.1615*	0.1005	0.1119	0.0951
	[0.3305]	[0.8575]	[0.0932]	[0.1875]	[0.0391]	[0.4803]	[0.0768]	[0.3140]	[0.3464]	[0.3364]
March	0.1091	0.1934**	0.1395*	0.1632*	0.1586**	0.0875	0.1431	0.1988**	0.2640**	0.2179
	[0.2727]	[0.0134]	[0.0521]	[0.0555]	[0.0254]	[0.2506]	[0.1025]	[0.0382]	[0.0208]	[0.0218]
April	-0.0473	0.0953	0.0897	0.2095**	0.1546**	0.1065	0.2380***	0.2203**	0.2339**	0.2218**
	[0.6491]	[0.2429]	[0.2317]	[0.0186]	[0.0370]	[0.1805]	[0.0093]	[0.0279]	[0.0498]	[0.0254]
May	-0.0069	0.0040	0.0356	-0.0488	0.0220	-0.0274	-0.0252	-0.0748	0.0022	0.0996

	Technology	Tele-commu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Energy	Utilities
	[0.9453]	[0.9596]	[0.6223]	[0.5693]	[0.7580]	[0.7205]	[0.7746]	[0.4382]	[0.9849]	[0.2973]
June	-0.0430	-0.0412	0.0463	-0.0786	-0.0370	-0.0003	-0.0485	-0.0960	-0.0417	-0.0064
	[0.6707]	[0.6038]	[0.5262]	[0.3637]	[0.6075]	[0.9968]	[0.5857]	[0.3246]	[0.7191]	[0.9473]
July	-0.0318	0.1572**	0.1085	0.1851**	0.0810	0.1039	0.0770	0.0381	0.0485	0.0496
	[0.7481]	[0.0431]	[0.1285]	[0.0289]	[0.2509]	[0.1700]	[0.3765]	[0.6894]	[0.6693]	[0.5994]
August	-0.0469	-0.0356	-0.0429	-0.0353	-0.0463	-0.0395	-0.0350	-0.0620	-0.0520	0.0535
	[0.6325]	[0.6445]	[0.5447]	[0.6750]	[0.5081]	[0.5989]	[0.6856]	[0.5124]	[0.6445]	[0.5682]
September	0.1754*	0.0824	0.0457	0.1146	0.0763	0.1238	0.0690	0.0641	0.1188	0.0774
	[0.0808]	[0.2967]	[0.5292]	[0.1831]	[0.2871]	[0.1076]	[0.4353]	[0.5080]	[0.3029]	[0.4200]
October	-0.1231	0.0256	-0.0269	-0.0303	-0.0420	0.0304	-0.0137	0.0715	-0.0295	-0.0538
	[0.2110]	[0.7404]	[0.7050]	[0.7193]	[0.5496]	[0.6869]	[0.8747]	[0.4514]	[0.7941]	[0.5675]
November	0.0683	0.1166	0.0754	0.0089	0.0992	0.0573	0.0758	0.0241	0.0175	0.0127
	[0.4944]	[0.1381]	[0.2963]	[0.9174]	[0.1644]	[0.4541]	[0.3895]	[0.8025]	[0.8788]	[0.8939]
December	0.0289	0.0459	0.0417	0.0627	0.0279	0.0006	0.1184	0.0455	-0.0521	0.0764
	[0.7814]	[0.5748]	[0.5791]	[0.4824]	[0.7073]	[0.9944]	[0.1597]	[0.6504]	[0.6633]	[0.4429]

Notes: The values in brackets are p-values
**** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level*

When the GARCH (1,1) model was used for the research of the monthly effect in the Nordic countries, the results confirmed the existence of the April effect which was also identified during the OLS analysis in many Nordic stock market sectors; the Consumer Goods and Industrials sectors had the highest statistically significant return in February and the Energy and Telecommunications sectors in March (see Table 7). Unlike the OLS analysis, the results of the GARCH (1,1) model evidenced the existence of seasonal anomalies in as many as five sectors of the Nordic stock market in January (Health Care, Consumer Goods, Consumer Services, Industrials and Energy), and in six sectors in October (Financials, Consumer Goods, Consumer Services, Industrial, Basic Materials, Utilities). The results of this analysis also confirmed that in four sectors (Financials, Consumer Goods, Consumer Services, and Industrials) a statistically significant positive abnormal return can be earned in December as well. Unlike the OLS analysis, the GARCH analysis revealed that stocks in the Nordic Financials, Consumer Services and Industrials sectors distinguish by an abnormal negative return in July.

Unlike in the Baltic countries, in all Nordic stock market sectors, the sum of the ARCH and GARCH coefficients is close to one and does not exceed it, which shows that variability persists over a longer period in the Nordic countries. The analysis also revealed that there is a larger ARCH effect in the stock markets of the Baltic countries than in the Nordic countries, which evidences that the volatility of stock prices in the Baltic countries is characterized by greater instability than in the Nordic countries.

Table 7

Results of the Research of the Sector-Wide Month Effect in the Nordic Stock Market Using GARCH (1,1) Model

	Technology	Tele-commu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Energy	Utilities
January	0.0828	0.0006	0.1902***	0.1332	0.1266***	0.1452***	0.1711***	0.0807	0.1949**	0.0164
	[0.2663]	[0.9912]	[0.0004]	[0.0069]	[0.0033]	[0.0029]	[0.0010]	[0.1684]	[0.0197]	[0.8133]
February	0.1366	0.0570	0.0911**	0.1454	0.1847***	0.0972	0.1815***	0.1346	0.1172	0.1297
	[0.1291]	[0.2915]	[0.0136]	[0.0086]	[0.0001]	[0.1464]	[0.0018]	[0.0620]	[0.2254]	[0.0882]
March	0.0919	0.1297**	0.1399**	0.0361	0.0884*	-0.0237	0.0932	0.1350	0.2994***	0.1520**
	[0.3252]	[0.0296]	[0.0134]	[0.5179]	[0.0500]	[0.6552]	[0.1098]	[0.0570]	[0.0015]	[0.0455]
April	-0.0320	0.0731	0.0995	0.1535***	0.1049**	0.0603	0.1637***	0.1469**	0.2310***	0.2169***
	[0.6280]	[0.1513]	[0.0671]	[0.0020]	[0.0110]	[0.3294]	[0.0030]	[0.0174]	[0.0035]	[0.0030]
May	0.0687	0.0362	0.0550	0.0034	0.0630	0.0430	0.0425	0.0068	0.0547	0.1311
	[0.4322]	[0.5378]	[0.3758	[0.9487]	[0.1697]	[0.4410]	[0.4478]	[0.9219]	[0.5803]	[0.0964]
June	-0.0673	-0.1058	0.1129***	-0.1793***	-0.0128	-0.0750**	-0.1120***	-0.0760	-0.0587	0.0300
	[0.3979]	[0.0091]	[0.0044	[0.0000]	[0.7704]	[0.0201]	[0.0046]	[0.2319]	[0.5363]	[0.6796]
July	-0.0162	0.1384	0.1127	0.1630***	0.0766	0.0814	0.0714	0.0462	0.0874	0.0923
	[0.8242]	[0.0239]	[0.0646]	[0.0034]	[0.0976]	[0.2427]	[0.2958]	[0.4921]	[0.3788]	[0.1663]
August	-0.0299	-0.0054	0.0270	0.0318	0.0049	0.0142	0.0286	-0.0037	-0.0512	0.0823
	[0.7468]	[0.9338]	[0.6131]	[0.5921]	0[.9144]	[0.7914]	[0.6379]	[0.9604]	[0.4949]	[0.2894]

	Technology	Tele-commu-nications	Health Care	Financials	Consumer Goods	Consumer Services	Industrials	Basic Materials	Energy	Utilities
September	0.2135**	0.0929	0.0587	0.1623***	0.0992**	0.1792***	0.1485**	0.1594**	0.0924	0.1523**
	[0.0222]	[0.1203]	[0.2990]	[0.0020]	[0.0321]	[0.0001]	[0.0191]	[0.0261]	[0.3734]	[0.0411]
October	-0.2191***	0.0648	-0.0309	-0.0028	-0.0026	0.0436	0.0452	0.1389**	-0.0041	-0.0242
	[0.0001]	[0.1712]	[0.4749]	[0.9599]	[0.9504]	[0.5282]	[0.4496]	[0.0354]	[0.9629]	[0.7453]
November	0.0541	0.0375	0.0601	0.0704	0.1094**	0.0536	0.1024	0.0850	0.0210	0.0479
	[0.6079]	[0.5587]	[0.3281]	[0.2277]	[0.0270]	[0.3822]	[0.1018]	[0.2329]	[0.8402]	[0.4988]
December	0.0934	0.0715	0.0996	0.1705***	0.1261**	0.1216**	0.1405**	0.1626	-0.0062	0.1353
	[0.3600]	[0.2292]	[0.0660]	[0.0047]	[0.0148]	[0.0264]	[0.0300]	[0.0526]	[0.9558]	[0.0790]
Variance Equation										
α_0	0.0265***	0.0255***	0.0798***	0.0242***	0.0196***	0.0509***	0.0293***	0.0321***	0.0604***	0.0605***
α_1	0.0316***	0.0760***	0.1330***	0.0875***	0.1001***	0.1027***	0.0973***	0.0894***	0.0704***	0.0737***
β	0.9592***	0.9110***	0.8184***	0.8997***	0.8861***	0.8679***	0.8891***	0.9006***	0.9190***	0.9032***

Notes: The values in brackets are p-values
**** significant at the 1 % level; ** significant at the 5 % level*

Such uneven seasonality across different stock market sectors reaffirms the findings of other researchers (Garay & Demmler, 2019; Jaisinghani *et al.,* 2019) that separate sectors are characterized by occurrence of a month effect in different months.

Conclusions

Investors are constantly striving to find such investment strategies that would allow to overtake others and maximize profits. One of such options is to take advantage of a month effect, which allows to earn abnormal returns in the stock market in separate months. Scientific research proposes not a little evidence to support the existence of the January effect in large developed markets, however the research results in smaller, less developed markets are quite controversial and dependent both on the research period, market conditions, as well as on the research methods chosen. In some markets, seasonal stock price fluctuations occur in months other than January.

Many of the reasons for the January effect are related to the behavior of investors at the end of the calendar year and at the beginning of the next year, as well as to the fluctuations in supply and demand in the stock markets caused by such behavior. Possibilities to earn higher-than-usual stock return in other months of the year are also often associated with a significant change of investors activity.

Even in markets where the existence of a market-wide month effect has not been proven, the abnormal return may be earned in separate market segments in different months as different seasonality is characteristic to separate industries.

The results of the research evidenced the existence of the January effect at the Baltic market-level, i.e., significantly higher returns are earned this month if compared to other months of the year. The results of both OLS and GARCH (1,1) analysis confirmed the existence of the January effect on the Baltic market scale, as well as a statistically significant higher return in July if compared to other months. Although the OLS results demonstrated that October distinguishes by a statistically significant negative return and August distinguishes by a statistically significant abnormal positive return in the Baltic market, the results of the GARCH (1,1) analysis did not confirm the existence of a significant abnormal return in these months. The results of GARCH analysis evidenced that abnormal statistically significant positive returns are earned in the stock markets of the Baltic countries in April and November. The results of both OLS analysis and GARCH (1,1) analysis proved that January effect is evident in many sectors of the Baltic market. Our research did not show other general trends in seasonal return variation, which would be characteristic to many Baltic stock market sectors but proved that separate sectors are characterized by quite different seasonality; therefore, it is possible to earn abnormal returns if this seasonality is assessed and investment sectors are chosen purposefully.

Although OLS analysis did not evidence any month effect in the Nordic countries at a market-level during the research period, the results of the GARCH (1,1) analysis proved that there is a significant January effect in the stock markets of Nordic countries, and significantly higher returns can be earned in these markets in February, September and December if compared to other months of a year. The results of both OLS and GARCH (1,1) analyzes confirmed the existence of the April effect in many Nordic stock market sectors. Unlike the OLS analysis, the results of the GARCH (1,1) model proved the existence of seasonal anomalies in as many as five Nordic stock market sectors in January, and in six sectors in October.

Our research has revealed that there is a larger ARCH effect in the Baltic stock markets than in the Nordic countries, which shows that the trends in the volatility of stock prices in separate months are not stable in the Baltic countries and are characterized by greater instability if compared to the Nordic countries.

These seasonal effects revealed in separate segments of the Baltic and Nordic stock markets can help investors to earn higher returns by using a sector rotation strategy and choosing the most appropriate period for investing.

We have assessed and compared the manifestation of the month effect in small and large European stock markets (Baltic and Nordic markets); moreover, we assessed the trends in the manifestation of the month effect in these stock markets at sector-level. One of the limitations that may have affected the results of this study is that we used stock index returns rather than individual stock returns, so the evidence

for the existence of calendar effects could be supplemented by researching stock returns. To verify the dynamics of the monthly effect over time, it would be purposeful to divide the research period into separate sub-periods, allowing to assess the existence of the effect in atypical market conditions or in the case of stock price volatility shocks. In this study, a symmetric GARCH (1,1) model was used, however it would be appropriate to expand the study by using asymmetric GARCH models as well, which are considered to capture a symmetric nature of volatility responses.

References

Abeysekera, S. P. (2001). Efficient Markets Hypothesis and the emerging capital market in Sri Lanka: evidence from the Colombo stock exchange. *Journal of Business Finance and Accounting*, 28(2), 249–261. https://doi.org/10.1111/1468-5957.00373

Agrawal, A., & Tandon, K. (1994). Anomalies or illusions? Evidence from stock markets in eighteen countries. *Journal of International Money and Finance*, 13, 83–106. https://doi.org/10.1016/0261-5606(94)90026-4

Ahmed, B., & Boutheina, R. (2017). Financial market anomalies: evidence from Tunisia stock market. *Asian Journal of Empirical Research*, 7(9), 238–250. https://doi.org/10.18488/journal.1007/2017.7.9/1007.9.238.250

Arendas, P., & Kotlebova, J. (2019). The turn of the month effect on CEE stock markets. *International Financial Studies*, 7(57). https://doi.org/10.3390/ijfs7040057

Asteriou, D., & Kovetsos, G. (2006). Testing for the existence of the January effect in transition economies. *Applied Financial Economic Letters*, 2(6), 375–381. https://doi.org/10.1080/17446540600706817

Awad, I., & Daraghma, Z. (2009). Testing the weak-form efficiency of the Palestinian securities market. *International Research Finance and Economics*, 32(1), 7–17.

Berges, A., McConnell, J. J., & Schlarbaum, G. G. (1984). The Turn-of-the-Year in Canada. *Journal of Finance*, 39, 185–192. https://doi.org/10.1111/j.1540-6261.1984.tb03867.x

Bhardwaj, R., & Brooks, L. (1992). The January Anomaly: Effects of Low Share Price, Transaction Costs, and Bid-Ask Bias. *The Journal of Finance*, 47(2), 553–575. https://doi.org/10.2307/2329115

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics*, 31(3), 307–327. https://doi.org/10.1016/0304-4076(86)90063-1

Bouman, S., & Jacobsen, B. (2002). The Halloween indicator, "Sell in May and go away": another puzzle. *American Economic Review*, 92(5), 1618–1635. https://doi.org/10.1257/000282802762024683

Carrazedo, T., Curto, J., & Oliveira, L. (2016). The Halloween effect in European sectors. *Research in International Business and Finance*, 37, 489–500. https://doi.org/10.1016/j.ribaf.2016.01.003

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383–417. https://doi.org/10.2307/2325486

Floros, C. (2008). The monthly and trading month effects in Greek stock market returns: 1996-2002. *Managerial Finance*, 34(7), 453–464. https://doi.org/10.1108/03074350810874415

Garay, M., & Demmler, M. (2019). Analysis of the January Effect in Time Series of Mexican Stock Market Indexes. *Mercados y Negocios*, 40, 43–62. https://doi.org/10.32870/myn.v0i40.7371

Georgantopoulos, A., & Tsamis, A. (2014). A comparative study on calendar effects: Greece vs Bulgaria. *International Journal of Economic Research*, 11(1), 1–14.

Giovanis, E. (2009). Calendar effects in fifty-five stock market indices. *Global Journal of Finance and Management,* 1(2), 75–98.

Gu, A. Y. (2006). The declining January effect: Experience of five G7 countries. *Academy of Accounting and Financial Studies Journal*, 2006, 10(1), 41–48.

Haugen, R. A., & Jorion, P. (1996). The January effect: Still there after all these years. *Financial Analysts Journal,* 52(1), 27–31. https://doi.org/10.2469/faj.v52.n1.1963

Jaisinghani, D., Kaur, M., & Inamdar, M. M. (2019). Analyzing seasonal anomalies for Israel: evidence from pre- and post-global financial crisis. *Managerial Finance*, 46(3), 435–450. https://doi.org/10.1108/MF-06-2019-0316

Kato, K., & Schallheim, J. S. (1985). Seasonal and Size Anomalies in the Japanese Stock Market. The *Journal of Financial and Quantitative Analysis*, 20(2), 243–260. https://doi.org/10.2307/2330958

Keim, D. B. (1983). Size- related anomalies and stock return seasonality. Further Empirical Evidence. *Journal of Financial Economics*, 1983, 12, 13–32. https://doi.org/10.1016/0304-405X(83)90025-9

Kiran, S., & Rao, P. R. (2019). Analysis of Stock Market Efficiency in Emerging Markets: Evidence from BRICS. *Romanian Economic Journal*, 72, 60–77.

Kuria, A. M., & Riro, G. K. (2013). Stock market anomalies: A study of seasonal effects on average returns of Nairobi securities exchange. *Research Journal of Finance and Accounting*, 4, 207–215.

Marrett, G., & Worthington, A. (2011). The month-of-the-year effect in the Australian stock market: a short technical note on the market, industry and firm size impacts. *Australasian Accounting Business and Finance Journal*, 5(1), 117–123.

Mehla, S., & Goyal, S. K. (2012). Empirical evidence on weak form of efficiency in Indian stock market. *Asia-Pacific Journal of Management Research and Innovation*, 8(1), 59–68. https://doi.org/10.1177/2319510X1200800107

Milos, L. R. & Milos, M. C. (2019). The January Effect on CEE Stock Markets - it is Real? University Reșița, Fascicle II, *Economic Studies*, 26, 157–163.

Norvaisiene, R., Stankeviciene, J., & Lakstutiene, A. (2015). Seasonality in the Baltic stock markets // Procedia social and behavioral sciences : *20th international scientific conference economics and management 2015* (ICEM-2015), Kaunas, Lithuania, May 06-08, 2015. Amsterdam: Elsevier, 213, 468–473. https://doi.org/10.1016/j.sbspro.2015.11.435

Obalade, A. A., & Muzindutsi, P. F. (2019). Calendar Anomalies, Market Regimes and the Adaptive Market Hypothesis in African Stock Markets. *Central European Management Journal*, 27(4), 71–94. https://doi.org/10.7206/cemj.2658-0845.10

Ogden, J. P. (1990). Turn-of-month Evaluations of Liquid Profits and Stock Returns: A Common Explanation for the Monthly and January effects. *The Journal of Finance*, 45(4), 1259–1272. https://doi.org/10.2307/2328723

Rossi, M., & Gunardi, A. (2018). Efficient market hypothesis and stock market anomalies: Empirical evidence in four European Countries. *Journal of Applied Business Research*, 34(1), 183–192. https://doi.org/10.19030/jabr.v34i1.10111

Rozeff, M., & Kinney, W. (1976). Capital market seasonality: The case of stock returns. *Journal of Financial Economics*, 3(4), 379–402. https://doi.org/10.1016/0304-405X(76)90028-3

Sander, P., & Veiderpass, R. (2013). Testing the turn-of-the-year-effect on Baltic stock exchanges. *The Review of Finance and Banking*, 5(2), 145–154.

Sawitri, N. N., & Astuty, P. (2018). Market Anomalies and Effect on Returns. *European Research Studies Journal,* 2, 630–649. https://doi.org/10.35808/ersj/1029

Shiller, I., & Radikoko, I. (2014). Testing weak-form market efficiency on the TSX. *Journal of Applied Business Research*, 30(3), 647–658. https://doi.org/10.19030/jabr.v30i3.8550

Singh, S. P. (2014). Stock market anomalies: Evidence from emerging BRIC markets. *The Journal of Business Perspective*, 18(1), 23–28. https://doi.org/10.1177/0972262913517329

Smith, G., & Ryoo, H. J. (2003). Variance ratio tests of the random walk hypothesis for European emerging stock markets. *The European Journal of Finance*, 9(3), 290–300. https://doi.org/10.1080/1351847021000025777

Svrtinov, V. G., Todevski, D., Boskovska, D., & Gjorgieva-Trajkovska, O. (2017). New evidence for Monday's and January's effects on the Macedonian stock exchange index (MBI10) returns. *Economic Development*, 19(1/2), 117–130.

Tilica, V. E. (2014). The month-of-the year effect in post-communist East European stock markets. *The Review of Finance and Banking*, 6(1), 29–40.

Vasileiou, E., & Samitas, A. (2015). Does the financial crisis influence the month and the trading month effects? Evidence from the Athens stock exchange. *Studies in Economics and Finance*, 32(2), 181–203. https://doi.org/10.1108/SEF-01-2014-0002

Van Dijk, M. (2011). Is size dead? A review of the size effect in equity returns. *Journal of Banking & Finance*, 35(12), 3263–3274. https://doi.org/10.1016/j.jbankfin.2011.05.009

Vatrushkin, S. V. (2018). Evaluation of the Month-of-the-Year Effect on the Securities Markets of the BRICS Nations. *Digest Finance*, 23(2), 172–181. https://doi.org/10.24891/df.23.2.172

Weigerding, M., & Hanke, M. (2018). Drivers of seasonal return patterns in German stocks. *Business Research*, 11, 173–196. https://doi.org/10.1007/s40685-017-0060-0

Xiong, X., Meng, Y., Li, X., & Shen, D. (2019). An empirical analysisof the Adaptive Market Hypothesis with calendar effects:Evidence from China. *Finance Research Letters*, 31, 321–333. https://doi.org/10.1016/j.frl.2018.11.020

Author's Biographies

Rasa Norvaišienė is doctor of Social sciences (Management and business administration), Associate Professor at the School of Economics and Business, Kaunas University of Technology, Lithuania. She is coordinator of Finance study programmes. She works in areas of company financial analysis and financial management, investment management. She is Researcher of the research group "Sustainable Economy". Her scientific interests include capital structure decisions, capital investment management, investment portfolio management, efficiency and liquidity of stock markets.

Jurgita Stankevičienė is Lecturer at the School of Economics and Business, Kaunas University of Technology, Lithuania. She is Researcher of the research group "Sustainable Economy". Her area of scientific interests is financial analysis of companies, budgeting of companies, investment and financing decisions, impact of company decisions, internal as well as external factors on financial results and stock price.

The article has been reviewed.

Received in December 2020; accepted in October 2022.