Seasonal Trends in Lithuanian Stock Market

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Abstract

Purpose of the article is to disentangle different calendar effects which leave efficiency holes in Lithuanian market. This paper presents and tests if commonly described seasonal patterns exist in Lithuanian stock market. Analysis of three different sections: period-of-the-year; week-of-the-month and day-of-the-week, suggests that calendar effects do exist in this market. The multitude of explanations for the seasonal effect leaves the reader confused about its primary cause(s): is it tax-loss selling, window dressing, information, bid-ask bounce, or a combination of these causes? The confusion arises, in part, because evidence has generally been presented in support of a particular hypothesis though the same evidence may be consistent with another hypothesis.

Methodology/methods are logical and systemic analysis of research literature based on the comparative and generalization methods as well as statistical methods.

Scientific aim of the article is the lack of arguments questioning if market prices operating system is fully effective. Novelty of the paper is to the answer to the question what seasonal anomalies are also present in the stock market of new open economy countries.

Findings show that using this modified strategy investor could achieve 20.7% compounded annual growth rate versus 7.8% achieved using simply holding stocks throughout. The hypothesis asserts that returns generally will be greater following the "January effect". There is **limited** amount of data for constructing robust seasonal strategies so we modified Buy and Hold strategy with simple rules of using best and worst months to show how they influence OMXV index performance.

In the **conclusions,** empirical results using stock index returns for 2000 - 2010 support the hypothesis in Lithuaian stock market. Abnormal activity of OMXV index's performance is found in the end of summer and throughout autumn. August is best performer of the year while October is performing worst.

Key words: Stock return seasonality, seasonal component, calendar effect.

JEL Classification: G10, G14, G19

Introduction

Over the past several decades, a sound number of scientific publications addressing a variety of calendar trends in financial markets appeared. These seasonal trends are often a subject for discussions about market efficiency. There are several trend types, including day-of-the-week, week-of-the-month and time-of-the-year seasonality. Some well-known anomalies are the Monday effect, the Friday effect, the Tum of the Month effect, the Holiday effect and the January effect. However, due to transaction costs it is generally difficult to exploit these anomalies (Gabriel Hawawini and Donald B. Keim , 1995).

One of the causes of seasonal anomalies remain a significant mass of players who prefer irrational trading patterns and techniques and rational market participants are unable to eliminate the effects of psychology driven market price movements. In order to understand asset prices' behavior and successfully operate in the financial markets it is useful to examine these long lasting anomalies which could suggest some advantage in creating long term investment strategies.

Novelty of the paper – the answer to the question what seasonal anomalies are also present in the stock market of new open economy countries.

Scientific problem of the article is the lack of arguments questioning if market prices operating system is fully effective.

Purpose of the paper is to investigate whether anomalies are also present in emerging markets and in what scale of significance.

Object of the paper is to analize existence of seasonal trends in Lithuanian stock market.

Tasks raised in the article are to present a theoretical view the seasonalioty features of stock market and to analyze related statistical data in Lithuania.

Research methods are systemic analysis of research literature based on the comparative.

1 Literature review

There a many scientists who searched for seasonal anomalies and tried to explain what are the main reasons causing them to appear and to last. Josef Lakonishok and Seymour Smidt (1988) used 90 years of daily data on the Dow Jones Industrial Average and looked for the existence of persistent seasonal patterns in the rates of return. In their work they conclude that there is evidence of persistently anomalous returns around the turn of the week, around the turn of the month, around the turn of the year, and around holidays.

Agrawal and Tandon (1994) tested if seasonal patterns exist in other stock markets. By testing eighteen stock market indexes they found that daily seasonality exists in nearly all tested countries, but weekend seasonality existed only in nine countries. They also found that last trading day of the month had large returns and low variance in most countries. Majority of them had large December pre-holiday and inter-holiday returns. Furthermore, tests showed that January returns are large in most countries and a conclusion was made that a significant monthly seasonal anomalies exist in ten countries. These seasonal findings coincide with other scientists' (French 1980, Haugen and Jorion 1996, Rozeff and Kinney 1976, Hawawini and Keim 1995) conclusions.

Day-of-the-week tests (Keim and Stambaugh 1984, Abraham and Ikenberry 1994) show that on Friday stock market returns are much greater than on Monday. Jay Kaeppel (2009) in his book states that negative news flow occurring on weekend plays a big role in weak Monday returns. Lakonishok and Maberly (1990) in their work found that trading volume on average Monday is lower than any other day of the week, but individual investors tend to trade more than other days. Abraham and Ikenberry (1994) tests show that institutional investors' trading activity is lower on Mondays. This divergence between individual and institutional traders' activities creates room for higher than average volatility resulting in weak average Monday performance.

Testing intra month seasonality Ariel (1987) concluded that "The mean return for stocks is positive only for days immediately before and during the first half of calendar months, and indistinguishable from zero for days during the last half of the month. This 'monthly effect' is independent of other known calendar anomalies such as the January effect documented by others and appears to be caused by a shift in the mean of the distribution of returns from days in the first half of the month relative to days in the last half." Cosby and Ratner (1992) found that monthly rotation

points (last couple and first couple of days and in the month) generate higher returns than other days of the month.

Looking for time-of-the-year anomalies Brown and Luo (2004) tested monthly seasonality in stock market returns found that January has a characteristic to predict a tendency for the year. Their tests show that "if an investor wishes to invest in the stock market for one calendar month only, he or she is better off being in the stock market during January than during any other calendar month". They also concluded that when stock prices rise (fall) in a particular calendar month, they rise by more (fall by less) in January than they do in any other calendar month so the January effect works both conditionally and unconditionally.

One of the most interesting phenomenon found in stock exchange is called "Sell in May and Go Away" effect. Bouman and Jacobsen (2002) revealed that a trading strategy of tactical asset allocation based on the old saying "Sell in May and go away" generated abnormal returns in comparison with stock market indices in most countries in their study. They tried to find the explanation for this anomaly by testing if various popular hypotheses show any scientifically significant evidence. They tested if January effect causes this anomaly or it is only sector-specific anomaly and also if trading volume and interest rates during that period showing some divergence with other months of the year. These tests did not explained this anomaly, but one thing they did find was that "the size of the effect is significantly related to both length and timing of vacations and also to the impact of vacations on trading activity in different countries".

2 Data and metodology

The monthly total returns for analysis of Lithuanian stock market are taken from Nasdaq OMXV index. The closing bid-ask quotes are obtained from the NasdaqOMX database, which is available from January 2000. Accordingly, our study covers 2000 through March 2010.

We used the natural logarithm of one plus these returns in our analysis. A shortened version of the X-11 procedure (Dagum, 1980) is applied to the returns data from January 2000 to March 2010 for estimating the seasonal components. The basic model used in our study is the traditional three-component additive version:

$$\ln[1 + R(t)] = SF(t) + TC(t) + IR(t) \qquad (1)$$

where

$R(t)$ = total return during the month t;
$SF(t)$ = the seasonal component of $\ln[1 + R(t)]$;
$TC(t)$ = the nonseasonal systematic component of $\ln[1 + R(t)]$, commonly referred to as the trend-cyclical component;
$IR(t)$ = the irregular component of $\ln[1 + R(t)]$.

It is assumed that both *SF* and *TC* move stochastically but gradually through time. Thus, for example, the seasonal components of January returns across years could vary due to changes in their expected values and/or seasonal noises. The irregular component represents random variation other than that generated ty the stochastic movement of *SF* and *TC*. It is assumed that the seasonal and the trend-cyclical noises are not correlated with the irregular component either contemporaneously or temporally.

Return seasonality exists if the expected values of the seasonal components of at least two calendar months differ. A positive (negative) seasonal component, also known as a seasonal high (low), indicates positive (negative) seasonal pressure or higher (lower) stock returns than what would have been if there were no special influence of events which repeatedly occur in that month. In other words, there is predictable surge in demand for stocks in some month(s) which, however, is balanced by slack in demand in some other month(s). The surge and slack in demand are relative to the average situation over the year. Hence, a seasonally neutral month (zero seasonal component) represents the average situation.

The economic meaning of the X-11 systematic and seasonal components should thus be clear. The return one can expect during a calendar month is equal to the sum of expected TC and expected SF for that month; we refer to the sum as the systematic component of return. Since TC is expected to be the same for all months over an extended period of time, the average seasonal component of a month would represent the difference between it's expected (unconditional) return or

systematic component from the grand or common average of all moths (Dudzeviciute, 2004).

3 The empirical evidences

Monthly seasonality

Historical monthly changes of OMXV index are shown in the Table 1 and graphic representation in Figure 1.

Table 1. Monthly OMXV index changes (2000-2010).

Year/ Month	1	2	3	4	5	6	7	8	9	10	11	12	Yearly change
2010	20.40%	-4.25%	4.19%										
2009	6.70%	-15.37%	-1.24%	1.41%	9.88%	1.28%	7.37%	43.44%	11.75%	-8.45%	-7.26%	-0.72%	46.04%
2008	-11.10%	9.47%	-6.71%	-5.38%	-2.30%	-1.69%	-5.49%	5.80%	-24.40%	-29.60%	-16.98%	-4.39%	-65.14%
2007	5.00%	-4.92%	0.35%	-0.25%	-0.01%	8.26%	5.28%	-2.65%	4.19%	-0.64%	-9.83%	0.86%	4.38%
2006	-2.85%	-8.03%	9.51%	-4.29%	-4.13%	-4.33%	0.99%	0.10%	7.82%	-0.59%	9.90%	7.32%	9.78%
2005	9.86%	4.36%	2.96%	15.12%	-1.59%	5.34%	2.18%	3.86%	19.23%	-7.25%	-7.80%	0.32%	52.93%
2004	9.84%	6.45%	6.76%	1.59%	-5.74%	-1.07%	0.24%	2.18%	5.87%	6.79%	9.97%	11.69%	68.18%
2003	3.55%	5.16%	4.74%	11.59%	12.81%	10.88%	14.34%	8.20%	5.53%	-7.46%	2.06%	4.84%	105.80%
2002	2.75%	8.53%	6.55%	5.16%	-9.05%	-2.74%	2.86%	3.28%	-1.71%	-1.88%	2.90%	-3.71%	12.20%
2001	3.68%	-3.71%	-5.57%	-1.30%	-2.20%	-2.63%	-9.00%	-8.28%	0.38%	6.10%	4.00%	-0.49%	-18.49%
2000	2.10%	-1.89%	2.17%	-1.54%	-0.45%	-7.63%	-2.37%	1.69%	0.29%	-2.95%	6.02%	-2.35%	-7.30%

Source: Vilniaus Vertybinių Popierių Birža http://www.nasdaqomxbaltic.com data

Table. 2 provides statistical information that helps to analyze the monthly seasonality. In this and in the following tables maximum and minimum values of key indicators are highlighted.

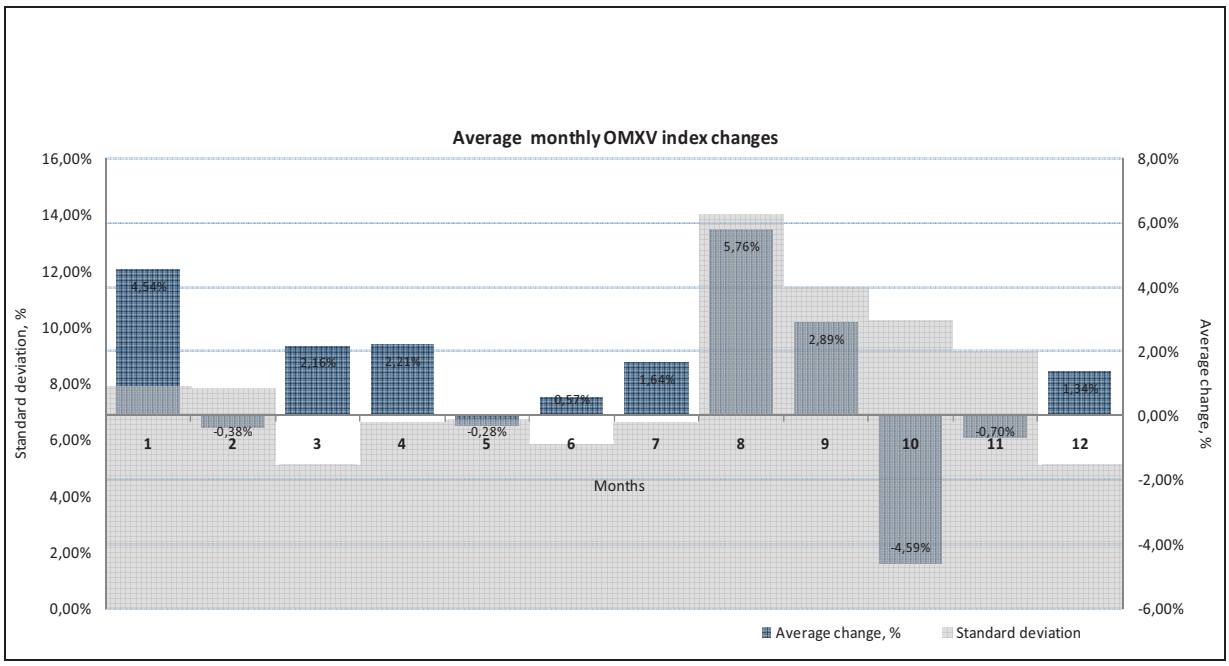
Table 2. The statistical information of OMXV index average monthly changes (2000-2010).

Month	1	2	3	4	5	6	7	8	9	10	11	12
Number of observations	11	11	11	10	10	10	10	10	10	10	10	10
Average change, %	4.54%	-0.38%	2.16%	2.21%	-0.28%	0.57%	1.64%	5.76%	2.89%	-4.59%	-0.70%	1.34%
Positive / negative change	1.02	1.07	1.03	2.73	3.56	1.92	0.85	1.57	0.53	0.88	0.55	2.15
Average positive change, %	7.10%	6.79%	4.65%	6.97%	11.34%	6.44%	4.75%	8.57%	6.88%	6.45%	5.81%	5.01%
Average negative change, %	-6.97%	-6.36%	-4.50%	-2.55%	-3.18%	-3.35%	-5.62%	-5.47%	-13.1%	-7.35%	-10.5%	-2.33%
Positive months during the period, %	81.82%	45.45%	72.73%	50.00%	20.00%	40.00%	70.00%	80.00%	80.00%	20.00%	60.00%	50.00%
No. of positive months	9	5	8	5	2	4	7	8	8	2	6	5
No. of negative months	2	6	3	5	8	6	3	2	2	8	4	5
Standard deviation	7.89%	7.80%	5.09%	6.64%	6.71%	5.86%	6.60%	14.00%	11.38%	10.22%	9.16%	5.12%
Average change / Standard deviation	57.52%	-4.90%	42.36%	33.30%	-4.14%	9.68%	24.86%	41.15%	25.43%	-44.90%	-7.66%	26.12%

Source: Vilniaus Vertybinių Popierių Birža http://www.nasdaqomxbaltic.com data

As you can see from the Table 2, historically largest index gains are generated in January, August and September. These months were positive 8 times of 10 and OMXV index gained on average 2.95%, 5.76% and 2.89% respectively. It should be noted that volatility in

August and September comparing to other months reaches highest levels too.



Source: authors' compilation

Figure 1. Average monthly changes of OMXV index (2000-2010)

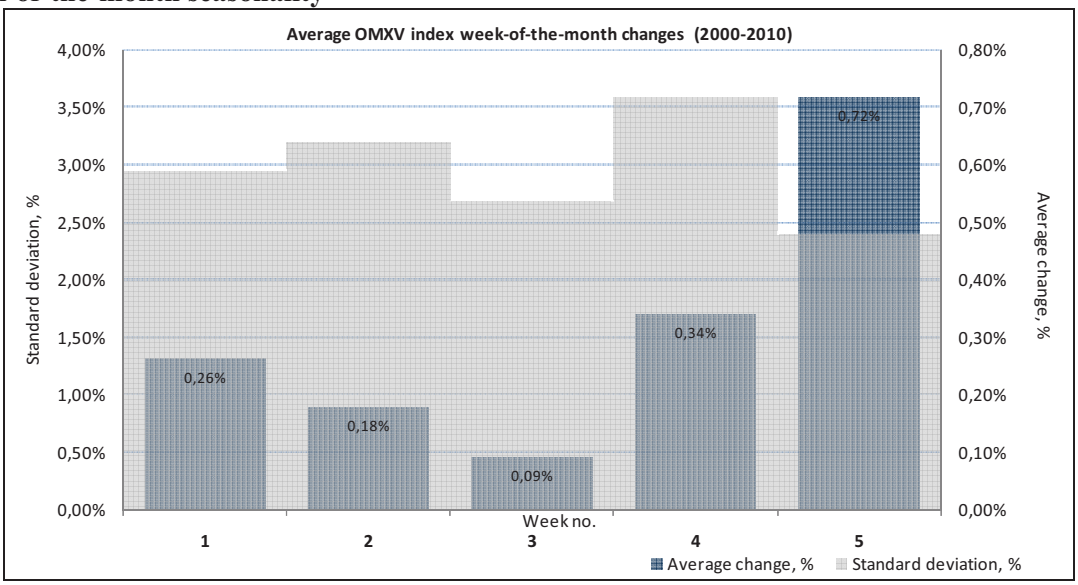
Interestingly, even knowing that August and September are best months of the year, period from May to November is less favorable for Lithuanian stock market than the rest of the year and this tendency held 70% in the last 10 years. It is hard to miss the fact that this tendency failed to hold when significant economical events were in play. May-November period outperformed the rest of the year in 2004 (year when Lithuania entered European Union), 2007 and 2009 (2007-2009 global financial crisis). The January barometer test showed that the tendency when January predicts year-end results worked 7 times out of 10. We also found that there is a significant correlation between last month of the year and the first 11 months. Over the past 10 years OMXV index recorded a positive change in 7 years. All those three years, when total change in the first eleven months was negative, OMXV index result in December also failed to reach positive territory. This can be explained by the so called "window dressing" effect when at the end of the fiscal year investors registering a negative result which reduces payable taxes (Rutkauskas & Stasytyte, 2008). However, it should be noted that during the remaining 7 years which were positive, five times December followed the trend and was also positive. Summing up all ten years we get December followed the first 11 months' trend 80% of the time. The summary of seasonal anomalies discussed above is shown in Table 3.

Table 3. Seasonal anomalies' summary in Lithuanian stock market

Year	January barometer	Helloween indicator	December mimic
2010	?	?	?
2009	1	X	X
2008	1	1	1
2007	1	X	1
2006	X	1	1
2005	1	1	1
2004	1	1	1
2003	1	X	1
2002	1	1	X
2001	X	1	1
2000	X	1	1

Source: http://www.nasdaqomxbaltic.com data

Week-of-the-month seasonality



Source: authors' compilation

Figure 2. Average weekly OMXV index changes (2000-2010)

Looking if there are any calendar effects in weekly seasonality we found that second half of the month is statistically better for stocks than the first part. As we see from Figure 2 in the middle of the month market stays comparably calm and less profitable than the beginning and the end of the month.

Analysis shows that fifth week of the month generates abnormal returns compared with the rest. Lithuanian index was positive 67% of the time and during that week standard deviation was lowest. More detail view we represent in Table 4.

Table 4. The statistical information of OMXV index average weekly changes (2000-2010).

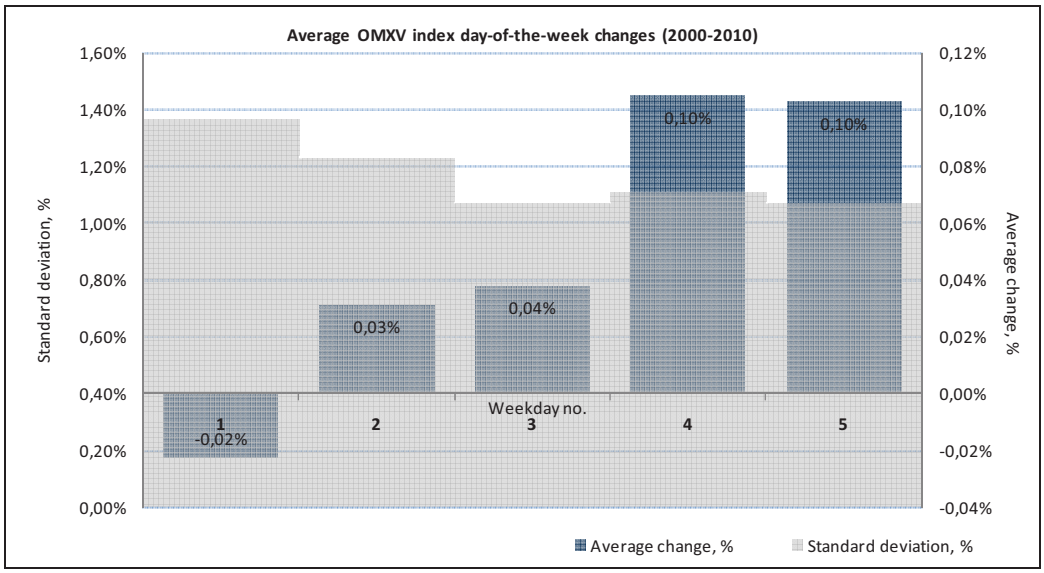
Week no.	1	2	3	4	5
Number of observations	123	123	123	123	45
Average change, %	0.26%	0.18%	0.09%	0.34%	0.72%
Positive / negative change	1.19	1.09	1.01	1.30	1.11
Average positive change, %	2.25%	2.24%	2.01%	2.24%	1.98%
Average negative change, %	-1.89%	-2.06%	-1.99%	-1.72%	-1.79%
Positive weeks during the period, %	52%	52%	52%	52%	67%
No. of positive weeks	64	64	64	64	29
No. of negative weeks	59	59	59	59	14
Standard deviation	2.95%	3.20%	2.68%	3.58%	2.39%
Average change / Standard deviation	8.89%	5.55%	3.38%	9.47%	30.04%

Source: http://www.nasdaqomxbaltic.com data

Day-of-the-week seasonality

Analyzing intraweek returns we found that the end of the week generates much better results than the beginning of the week. In figure 3 we see that volatility is also lower in the second half of the week suggesting that Thursday and Friday are those days when investors can achieve highest returns with lowest risk.

From Table 5 we see that this day is most dramatic time of the week for stocks not only because its average return is negative but also it is most volatile.



Source: authors' compilation

Figure 3. Average daily OMXV index changes (2000-2010)

Analysis shows that Lithuanian stock market also has so called Monday effect.

Table 5. The statistical information of OMXV index average daily changes (2000-2010).

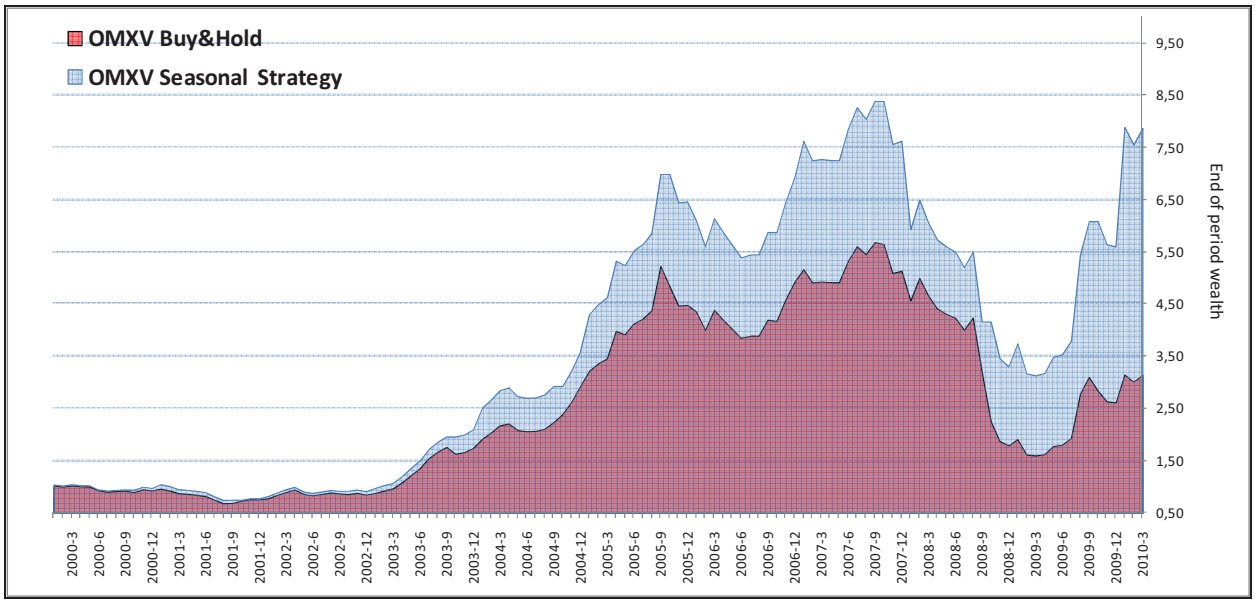
Day no.	1	2	3	4	5
Number of observations	503	523	526	523	515
Average change, %	-0.02%	0.03%	0.04%	0.10%	0.10%
Positive / negative change	1.00	1.03	0.93	1.09	0.97
Average positive change, %	0.81%	0.80%	0.73%	0.76%	0.72%
Average negative change, %	-0.81%	-0.77%	-0.78%	-0.70%	-0.74%
Positive days during the period, %	49%	51%	54%	55%	58%
No. of positive days	238	264	280	282	292
No. of negative days	252	251	236	230	213
Standard deviation	1.36%	1.23%	1.07%	1.11%	1.07%
Average change / Standard deviation	-1.63%	2.54%	3.52%	9.41%	9.59%

Source: Vilniaus Vertybinių Popierių Birža http://www.nasdaqomxbaltic.com data

4 Trading strategies

We compared annual returns of two trading strategies: the Seasonally modified and a Buy and Hold strategy (Pabedinskaite, 2006):

- *Seasonal strategy:* We assume that an investor who would like to profit from monthly seasonal extremes holds OMXV index throughout the year with simple modification: during January which is statistically best month of the year (after adjustment for risk) he holds twice as much of stocks as usual and in October which is the worst year he stays in cash.
- *Buy and Hold strategy:* This strategy holds the stock market portfolio throughout.



Source: Vilniaus Vertybinių Popierių Birža http://www.nasdaqomxbaltic.com data

Figure 4. End of period wealth (2000-2010) (authors' compilation)

Figure 4 shows how these two strategies performed during the existence of Lithuanian stock market index OMXV. Seasonal strategy outperformed Buy and Hold strategy by more than three times in total return. Compounded annual return of Seasonally

modified strategy is nearly three times higher than achieved by Buy and Hold strategy. Test shows that simple modification of Buy and Hold concept resulted in 50% higher average annual return while experiencing slightly more than 14% increase in volatility.

Conclusions

Our study suggests the following about the study of asset return seasonality in Lithuanian stock market:

Abnormal activity of OMXV index's performance is found in the end of summer and throughout autumn. August is best performer of the year while October is performing worst.

Analysis showed that mostly reviewed monthly seasonal anomalies also do exist in Lithuanian stock market. January barometer worked 70% of the time and Halloween effect existed also 70% during last 10 years. Study also revealed that December followed previous 11 months' trend 8 times out of 10. All three times when OMXV index experienced negative end-of-year return, December also was negative which is explained with "Window dressing" and Tax-loss selling processes.

Analyzing intraweek calendar effects we found that average Monday is negative and most volatile day of the week. This anomaly is so called Monday effect and is commonly found in other markets.

By modifying Buy and Hold strategy with simple rules: "in January buy twice as much as usually and in October stay in cash", we calculated that average annual returns would be 50% greater than simply holding stock throughout while volatility improved 14%.

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