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THE INFORMATION EFFICIENCY OF THE STOCK MARKETS IN LITHUANIA AND LATVIA

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The Information Efficiency of the Stock Markets in Lithuania and Latvia

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ABSTRACT

Previous research of the stock markets in Lithuania and Latvia shows that the markets are approaching weak-form efficiency, while other forms of EMH have not yet been examined. The aim of this paper is to examine whether the stock markets in Lithuania and Latvia react inefficiently to the announcements of earnings, and, if so, whether it is possible to profit from inefficiencies. The standard event-study methodology with daily trading data from 2001-2004 is used to address the following issues: firstly, Patell's Standardised Residual Test is used to investigate whether earnings announcements contain any valuable information for the market; secondly, with the help of the Standardised Cross-Sectional Model, market reaction with respect to increase and decrease in earnings is analysed; finally, by looking at Cumulative Abnormal Returns the investment strategies that would exploit inefficiencies and earn risk adjusted abnormal returns are simulated. The findings show that in the economic sense the Lithuanian market is semi-strong form efficient and strong form inefficient; whereas in Latvia even semi-strong form efficiency does not hold. Financial brokerages have many opportunities to exploit inefficiencies; however, private investors suffer from relatively large fees and taxes. The findings imply that both markets could benefit from lower trading costs, introduction of market-makers, larger free-float requirements, and stricter enforcement of insider trading prohibitions.

Keywords: Stock Markets, Event Studies, Information Efficiency, Semi-Strong Form Efficiency, Strong Form Efficiency, Abnormal Returns.

1. INTRODUCTION

Information efficiency of capital markets has been a topic of wide discussion and study. Ball and Brown (1968) and Fama et al. (1969) were the first to notice that there is a delay in the stock market's response to events that contain relevant information. Consequently, Fama (1970) defined an informationally efficient capital market as one in which prices reflect all information, and distinguished among three forms of market efficiency: weak, semi-strong, and strong. In case of sub-efficient markets, the share price may fail to fully reflect all relevant information and abnormal returns may be obtained by taking advantage of public information, because there is a significant time lag between announcement and full incorporation of the information (Fama, 1991). Particularly interesting in this case are the announcements of earnings, dividends, and changes in capital structure that can have a direct impact on the value of a company, hence, its stock price.

The efficiency of stock markets is closely related to their development. The Lithuanian and Latvian stock markets are small and still far from being comparable to the developed stock markets[1], which suggests that the inefficiencies in these markets also should be apparent. During the 90's researchers found that even the weak form of efficient market hypothesis did not hold in Lithuania and Latvia; however, the latest papers show that the Baltic markets are approaching the weak form of efficiency (Milieska, 2004; Kvedaras and Basdevant, 2002). This means that it is not possible to gain abnormal returns, by analysing past stock prices.

In our paper we investigate the information efficiency of the Lithuanian and Latvian stock markets for the period from January 2001 to November 2004. We use the news archives of Lithuanian and Latvian stock exchanges as sources of quarterly earnings announcements of companies listed on the First and Current list in Lithuania and the Main and I-list in Latvia and apply the standard event study methodology with daily trading data to analyse the effects of earnings announcements on the stock returns. Our aim is to examine whether the **Lithuanian and Latvian stock markets react inefficiently to the announcements of earnings,** and, if so, whether **it is possible to profit from inefficiencies.**

In order to answer the proposed research questions, we address the following issues:

[1] On July 1 2004, the capitalization figures were: EUR 3.3 billion in VSE and EUR 1.0 billion in RSE (VSE home page; RSE home page). On December 31 2004, NYSE had a capitalization of EUR 9.18 trillion; LSE - EUR 2.07 trillion, and Deutsche Bank - EUR 0.89 trillion (NYSE home page).

- Firstly, by applying *Patell's Standardised Residual Test* we investigate whether earnings announcements contain any valuable information for the market;
- Secondly, with the help of the *Standardised Cross-Sectional Test* we analyse how the market reaction differs with respect to increase and decrease in earnings;
- Finally, by looking at *Cumulative Abnormal Returns* we simulate the investment strategies that would exploit inefficiencies and earn risk adjusted abnormal returns.

We expect the answers to the above questions to contribute to the existing literature on information efficiency of the Lithuanian and Latvian stock markets, by providing conclusions about semi-strong form and some insights about strong form of efficient market hypothesis. We are not aware of any research that has yet covered these issues. However, we also believe that our findings could have a practical applicability for investors and an effect on the development of the Lithuanian and Latvian stock markets. The history of research on market efficiency shows that after discoveries of market imperfections markets seem to correct themselves (e.g. January effect, Day of the week effect). Thus, we hope that after identifying inefficiencies and creating profitable strategies some of the market participants would employ them. Consequently, the inefficiencies should be diminished. Furthermore, we hope to provide suggestions for policy makers on how to increase the information efficiency of the stock markets and stimulate their development.

Section 2 provides a brief background on the Lithuanian and Latvian stock markets; *Section 3* reviews theoretical concepts and previous researches, *Section 4* presents the methodology; *Section 5* provides information about data and sampling procedures. *Section 6* discusses the empirical results of the study and *Section 7* concludes. *Section 8* presents the implications of findings, while *Section 9* provides suggestions for further research.

2. BACKGROUND ON LITHUANIAN AND LATVIAN STOCK MARKETS

Vilnius and Riga stock exchanges are the sole licensed stock exchanges in Lithuania and Latvia, respectively. Both stock exchanges are a part of the OMX Group, which also operates exchanges in Stockholm, Helsinki, Tallinn, and Copenhagen.[2]

In Lithuania, there are eight companies listed on the Official list and thirty-five companies listed on the Current list. In Latvia the Main list consists of four and the I-list of eight companies. On July 1, 2004 companies on the Official list made up about 27% of the

[2] With about 93% stake of interest, OMX Group is the major shareholder of both exchanges (Guide to Baltic markets, 2004, 7).

total capitalisation and about 59% of the turnover of equities in Lithuania. In Latvia these percentages amounted to 75% and 77%, respectively. The large concentration in RSE suggests that trading of some stocks listed on the I-list is rather infrequent. Even though the capitalisation in VSE is larger for the companies listed on the Current list, the fact that the eight companies of the first list capture more than 50% of the total turnover indicates that the problem of infrequent trading is also present in VSE.

All companies listed on the VSE are required to publish their annual and semi-annual reports. Only those companies that are listed on the Official list are obliged to publish their quarterly results (Lithuanian Securities Commission, 2002). All companies listed on the RSE are required to publish their annual earnings reports. Companies on the Main list are also required to submit their semi-annual and quarterly reports, which consist of a balance sheet and a P/L statement. Semi-annual announcements should also include management's report about the company's performance (Finansu instrumentu tirgus likums, 2004, 57.1-57.3).

In May 2005 the common trading platform SAXESS was to be launched in VSE (VSE home page). The platform is already used in all other OMX exchanges where it provides lower costs for investors and the opportunity to trade in stocks listed in all member countries. The launch was expected to increase liquidity in VSE and attract more foreign investors.

3. LITERATURE REVIEW

This section provides a brief theoretical background on the concept of efficient markets, followed by an overview of empirical studies on information efficiency, with a particular focus on the studies examining the relation between EAs and stock prices.

3.1. EFFICIENT MARKET CONCEPT

Fama (1970) defines an informationally efficient capital market as one in which prices "fully reflect" all available information[3]. Or alternatively, in an informationally efficient market it is not possible to systematically earn excessive risk-adjusted returns (Kaehler, 1999, 1).
According to Fama, three levels of market efficiency can be distinguished.

- *Weak form market efficiency* states that current security prices should reflect all available historic price and return information, implying that it is not possible to make abnormal profits from technical analysis.

[3] It is important to distinguish between informational and operational efficiency (Kaehler, 1999, 1). See also market microstructure studies (e.g. Gerke and Rapp, 1994), which strictly distinguish several types of market efficiency, suggesting that Fama's definition only refers to information efficiency.

- *Semi-strong form market efficiency* suggests that the current share price should contain all publicly available information, implying that fundamental analysis of publicly available data would not help achieve excess returns.
- *Strong form market efficiency* states that current share price should contain all information on the market – both publicly available and private information. In a strong form efficient market even insiders do not have the possibility to achieve abnormal profits by using their informational advantage (Schredelseker, 2002, 418).

For our study it is necessary to distinguish between the *semi-strong* and *strong-form* of efficient market hypothesis (EMH). We assume that the market is semi-strong form efficient if the price adjusts itself already on the earnings announcement day and there is no significant effect afterwards. The strong form of EMH would hold if there was no effect on the announcement day, meaning that the market would have correct expectations about the profit.

In order to test market efficiency it is necessary to specify how prices are determined in equilibrium; this implies that a market model is required. Hence, any test of EMH is simultaneously a test of efficiency and of assumptions about the characteristics of market equilibrium – a *joint hypothesis* has to be considered[4] (Fama, 1976, 133-136). Therefore, any evidence that is found against market efficiency might imply either that the market is inefficient or that the model used is mis-specified (Smant, 2004, 3).

An assumption of the Efficient Market Hypothesis (EMH) introduced by Fama is that information and trading costs are always zero. We assume that public information is cost-free; thus, Fama's assumption of no information costs holds. In further sections we also adjust our findings for trading costs and taxes in order to test the economic validity of EMH.

3.2. EMPIRICAL STUDIES ON SEMI-STRONG FORM OF EMH

A large number of empirical studies have been testing semi-strong form of EMH. The most commonly used technique for testing the interaction between publicly available information and security price movements is event study methodology. This section presents a brief overview of the development of event study methodology and reviews studies on the information content of EAs; special attention is devoted to empirical research concerning the Lithuanian and Latvian stock markets.

Standard event study methodology was introduced by the studies of Ball and Brown (1968), Beaver (1968), and Fama, Fisher, Jensen, and Rolls (FFJR) in 1969 (Campbell et al.,

[4] The first hypothesis is that the market is informationally efficient, whereas the second is that the market model is correctly specified.

1997, 149). Beaver and Ball and Brown examined the information content of EAs; in contrast, FFJR considered share price reaction to stock splits (Beaver, 1968; Ball and Brown, 1968; Fama, 1976, 154-164). In the years after the pioneering studies, some modifications of the basic methodology have been suggested; these are related to complications that arise from violations of the assumptions behind the traditional models used in event studies.[5] Two important papers to be mentioned here are Brown and Warner (1980; 1985), which provide a discussion on the viability of many previously suggested methodological modifications.

The studies at the end of the 1960s were followed by a large number of research papers, testing semi-strong form of EMH. Even though the majority of these studies do agree that the stock markets are "reasonably efficient", the debate on market efficiency is still alive due to discovery of a number of market anomalies[6].

The prevailing majority of event studies on the relation between EAs and stock prices have been conducted on the US stock market; empirical evidence on the European stock markets is limited to a few countries. European studies show similar findings to the Beaver study on the US stock market in 1968: EAs tend to lead to significant changes in prices or increases in trading volumes (Beaver, 1968; Dumontier and Raffournier, 2002, 3). Firth (1981) examined the UK stock market from 1976-1978 and found that there are both abnormal absolute stock returns and significant increases in trading volumes at annual EA dates. A more recent study on the UK stock market by Hew et al. (1996) confirms that EAs possess information content, and that positive (negative) unexpected annual EAs are associated with significant positive (negative) abnormal returns. The studies on Finnish, Spanish, French, and Danish stock markets also show similar findings.

Kallunki (1996) examines the stock price reaction of annual EAs in the Finnish stock market. He also finds that positive (negative) EAs cause positive (negative) abnormal returns. Furthermore, he shows that a delay in market reaction to negative unexpected earnings is longer than that for positive unexpected earnings. He partly associates this with the fact that short-selling is not possible on the Helsinki Stock Exchange. Odabasi (1998) investigates stock return reaction associated with EAs from 1992-1995 in Turkey. He confirms that there

[5] The assumptions behind the standard event study methodology are to a large extent violated due to the characteristics of the higher frequency data (e.g. daily data) used in later studies. For instance, the pioneering studies assumed normal distribution of individual company stock returns, continuous trading, no change in the variance of abnormal returns after the occurrence of the event, no event clustering, etc. Many of these assumptions might not hold with the use of higher frequency data (Brown and Warner, 1985).

[6] Schwert provides a summary of the latest findings of the market anomalies discovered during the 1980s. Some examples of these are day of the week effect, January effect, overreaction of stock markets, under-reaction of stock markets, and size effect (2003).

is information content in the EAs; however, he does not find that the security prices come to new equilibrium levels after EAs. Pellicer and Rees (1999) examine the volatility of stock returns around annual EAs in Spain. These show that the volatility of returns is the largest in the two days surrounding the EAs.

In France, Gajewski and Quere (2001) find that stock prices significantly react to annual and semi-annual EAs; by contrast, there is almost no reaction to quarterly announcements. They attribute this difference to the fact that the former and latter reports differ with respect to their information content, and make suggestions for regulations on information disclosure on the Paris Stock Exchange.

Sponholtz (2004), examines the Danish stock market in 1999-2001. She finds abnormal volatility in the days surrounding the EAs; which indicates inefficiency of the Danish market. The abnormal volatility persists for up to four days after the announcements; it is accompanied by large and significant positive returns.

Thus, it can be seen that while the studies agree on the fact that the EAs do convey information, the extent of the relation between earnings and stock prices differs due to differences across the markets with respect to stock market efficiency, quality of EAs, stock market regulations, and other factors.

3.3. EMPIRICAL STUDIES ON THE EMH IN LITHUANIA AND LATVIA

There have been very few studies testing the information efficiency of the Baltic stock markets; moreover, most of them have examined the weak-form of the EMH.

Initial studies on weak-form efficiency focus on individual analysis of the most liquid companies. Klimasauskiene and Moscinskiene (1998) find that companies on the Lithuanian Official list tend to follow random walk and seem to be weak-form efficient. Butkute and Moscinskas (1998) in a similar study on all three Baltic countries also find that the companies in their sample tend to comply with weak-form efficiency. Kvedaras and Basdevant (2002) examine the period from 1996-2001 and conclude that the financial markets in Lithuania and Estonia are clearly approaching weak-form efficiency, whereas the Latvian market is inefficient even at the end of the analysed period.

Mihailov and Linowski (2001) test weak-form EMH in the Latvian stock market from November 1997 to January 2001, using technical trading rule simulation. Their considered technical strategies outperform the passive buy-and-hold strategy in terms of cumulative returns; however, considering transaction costs none of these positive returns is significant. Similarly, Januskevicius (2003) uses a trading rule simulation to investigate Lithuanian stock

markets. He examines the period from January 2001 to October 2002 and finds that in most cases Neural networks were able to generate excess returns over the passive "buy-and-hold" strategy, even after accounting for transaction costs. This implies that the weak form of EMH might not hold.

In Lithuania the latest study on weak-form efficiency was conducted by Milieska (2004). He concludes that from 2001-2004 the most liquid part of the stock market can be considered weak-form efficient, while the whole market has been non-random and weak-form inefficient during the whole period; however, the situation seems to be slightly improving with time.

To our knowledge, currently there is only one study on the Baltic stock markets, which was examining the relationship between earnings and stock prices. In an association study[7] Jarmalaite-Pritchard (2002) analyses the relationship between accounting data and market price returns in the Baltic stock markets with the aim of evaluating the relevance of accounting numbers in investors' investment decisions. Her results show that this relationship differs quite substantially among the three countries, with Lithuania showing the weakest link, Estonia - the strongest, and Latvia having similar results to Estonia, only a larger variation. She suggests that stock prices lead accounting earnings in the Baltic States and that information reflected in prices contains information about future earnings changes.

All in all, from previous research it can be seen that the Lithuanian and Latvian stock markets tend to approach weak-form efficiency, at least in the economic sense. Furthermore, the study of Jarmalaite-Pritchard shows a link between accounting earnings and stock prices in the Baltic stock markets. This suggests that investors take into account the company's earnings when evaluating the company; therefore, EAs could be valuable for examining the semi-strong form of EMH in Lithuania and Latvia. By looking at the relationship between EAs and stock returns from a shorter-term perspective, we hope to capture the aspects of dynamic efficiency that could not have been captured by the study of Jarmalaite-Pritchard[8], and we also try to draw conclusions with respect to semi-strong form of EMH and provide some insights to strong form of EMH in Lithuania and Latvia.

[7] Association studies are focused on examining the long-term relation between accounting earnings and stock prices (Sponholtz, 2004, 2).

[8] The concept of dynamic efficiency refers to the fact that information may be relatively quickly reflected in prices; however, some investors might still have a preferential position via the information flow; and these investors might be able to earn abnormal profits when acting on the information first. Given the rapid speed at which price adjustments are made in the stock markets, higher frequency data (daily or even intra-day) should be used in order to detect this phenomenon (Schwartz, 1991, 408-09), .

4. METHODOLOGY

This section presents the methodology used in the research. The first subsection introduces event study methodology. This is followed by a description of the market models used in the study and the estimation of their respective parameters. Lastly, the tests used to answer our research questions are presented.

4.1. EVENT STUDIES

In this study we use standard event study methodology. Event studies are typically used to examine market response to a well-defined event through the observation of security prices around the event (Peterson, 1989, 36). In our study, the events examined are quarterly earnings announcements (EAs) of listed companies in Lithuania and Latvia.

Event study methodology is based on the assumption that it is possible to isolate the part of a security return which is related to the event of interest (Sponholtz, 2004, 6). Based on this assumption, by using a model we can estimate a normal return for the stock if the event had not happened. More exactly, the normal return is estimated from the estimation period and compared to actual return in the event window.

The event study concept is depicted in *Figure 1*. On the variable event time line, the time when the event happens is set on the axis as t_0; a time period, lasting x days before and y days after the event is observed; this period is referred to as the *event window.* The normal return is estimated over the period from t_{est} to t_x, which is termed as *estimation period* (Schredelseker, 2002, 454-455).

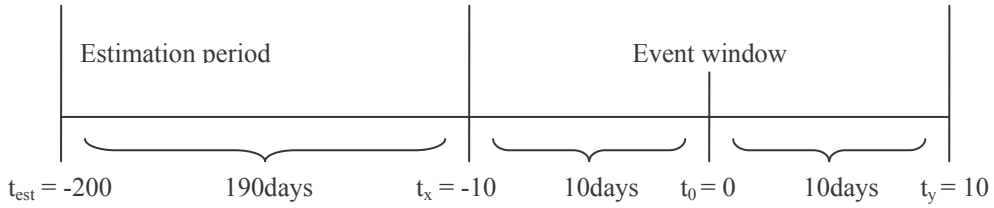

Figure 1: **Event study concept**

The event window should be selected so that any wealth effect upon the stock would be expected to occur within this period. The selection of the length of the event window is a choice of the researcher. This could depend on several institutional factors and findings of previous studies (Peterson, 1989, 38). Since we are not aware of any event studies on the Baltic stock markets (*see Section 3*), we have no benchmark to rely on. Thus, for the standard tests we use the commonly applied 21-day event window with 10 days before and 10 days

after the event, equivalent to two trading weeks. However, for cumulative return analysis we also examine a longer event window, which includes 20 after-event days (one month).[9]

When selecting the estimation period, the benefits (improved prediction model) of taking a longer estimation period should be weighed against the costs (instability of model parameters). Typically the length of an estimation period ranges from 100 to 300 days (Peterson, 1989, 38). The length of the estimation period used in our study is 190 days, which is a compromise also used in other studies (see *Figure 1*).

In order to be able to use the event study concept for answering the research questions, abnormal returns in the event window need to be defined and calculated. The following two sections deal with these issues.

4.2. DEFINING ABNORMAL RETURNS

The **abnormal return** (AR) is the actual return of the security over the event window minus the normal return of the firm from the estimation period. For each company *i* and event date t_0 we have:

$$\varepsilon_{it}^{*} = R_{it} - E\left[R_{it} \mid X_t\right], \tag{1}$$

where ε_{it}^{*}, R_{it}, and $E(R_{it})$ are abnormal, actual, and normal returns, respectively, for the period t. X_t is the conditioning information for the normal performance model. The actual returns are known; however, the normal returns need to be modelled and estimated.

4.2.1. Modelling Normal Returns

Two most common methods for modelling *normal returns* are: the *constant-mean-return model* and the *market model* (Campbell et al., 1997, 151).

The first model assumes that the returns for a company are constant in equilibrium, whereas the second relates the systematic variation of returns to market returns. Hence, the market model should be able to reduce the variance of abnormal returns caused by systematic factors (Campbell et al., 1997). Moreover, Brown and Warner suggest that under conditions of event clustering the constant-mean-return model may be mis-specified. Event clustering is likely to be observable for EAs, since many of them appear on approximately the same dates for all companies, which induces a positive autocorrelation between the time-series of mean-

[9] The respective lengths of the event window were chosen mostly based on previous studies of other stock markets (Sponholtz, 2004; Battacharya et al., 1998; Kallunki, 1996).

adjusted returns (1985, 19-20). Considering these issues, we use the market model to represent the return generating process in our study.

In the market model the company's *i* stock returns are regressed on market returns at any given point of time *t*. This model assumes normality of asset returns. For any security *i* the normal returns can be defined as follows:

$$\begin{aligned} &R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \\ &E[\varepsilon_{it}] = 0 \quad Var[\varepsilon_{it}] = \sigma^2_{\varepsilon_i}, \end{aligned} \tag{2}$$

where R_{it} and R_{mt} are period *t* returns on security *i* and the market portfolio. α_i and β_i are coefficients to be estimated; $\sigma^2_{\varepsilon_i}$ is the variance of residuals ε_{it} (Campbell et al., 1997, 155).

4.2.2. Choice of Market Returns

As proxies for market returns we use two different portfolios: following Brown and Warner[10], we construct equally weighted portfolios (EWP) and we also use the capitalisation weighted portfolios (CWP) VILSE and RIGSE that are provided by the stock exchanges (1985, 7). Both portfolios include all companies that were listed on the Official and Current lists in VSE and Main and I-lists in RSE at any point in time from January 2000 to December 2004. The EWPs are constructed to avoid bias towards any particular (e.g. large) companies that might be present in CWPs.

4.3. ESTIMATION OF MODEL PARAMETERS

Normally, the market model can be estimated cross-sectionally for each firm, using ordinary least squares (OLS). However, due to many stocks traded infrequently, i.e. *thin trading*, the usual OLS method might be mis-specified and needs to be adjusted.

A particularly important aspect of this problem concerns *non-synchronous trading*. This arises from the fact that prices for most securities are recorded at distinct, random time intervals, meaning that the registered closing price can result from trades made earlier in the day. This can result in biased and inconsistent OLS estimates (Brown and Warner, 1985, 5).

Some authors (e.g. Brown and Warner, 1985; Cowan and Sergeant, 1996) find that the adjusted market models do not provide significantly better results than OLS but McInish and Wood show that these procedures can reduce about 29 percent of the bias which is caused by thin trading and delays in price adjustments (Peterson, 1989, 39). Therefore, complementary

[10] This is also a common procedure in event studies see e.g. Scholes and Williams, 1977; Brown and Warner 1985; Cowan and Sergeant, 1996.

to OLS we use one of the most widely recognised methods proposed by Scholes and Williams (1977).

The estimation of parameters from both OLS and Scholes-Williams models is presented in the following two sub-sections.

4.3.1. Estimation of Parameters from the OLS Regression

The OLS parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated by regressing security returns on market returns during estimation period (see *equation 2*). These parameters are implicitly assumed to be constant over the whole estimation period.

The abnormal return (AR) for an individual security can be expressed as follows:

$$\hat{\varepsilon}_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}, \tag{3}$$

where $\hat{\varepsilon}_{it}$ denotes the abnormal security return or prediction error for security *i* at the time *t* in the event window; R_{it} and R_{mt} denote actual return on security *i* and the market return in period *t* (Peterson, 1989, 42).

The variance of the excess returns $\hat{\sigma}^2_{\varepsilon_i}$ is calculated as follows:

$$\hat{\sigma}^2_{\varepsilon_i} = \frac{\sum_{t=1}^{T_i}\left(\hat{\varepsilon}^2_{it}\right)}{T_i - 2}, \tag{4}$$

where *T* is the length of the estimation period (Sponholtz, 2004, 7). Since the errors are estimated from observations that were not used in the estimation of $\hat{\alpha}_i$ and $\hat{\beta}_i$, they are not residuals in strict OLS sense. C_{it} reflects the increase in variance due to prediction outside the estimation period and takes into account sampling errors in $\hat{\alpha}_i$ and $\hat{\beta}_i$ (Patell, 1976, 276).

$$C_{it} = 1 + \frac{1}{T} + \frac{(R_{mt} - \overline{R}_m)^2}{\sum_{r=1}^{T}(R_{mr} - \overline{R}_m)^2}, \tag{5}$$

where *T* is the number of days in the estimation period; $\overline{R}_m$ is the average market return in the estimation period and R_{mr} is the return on the market on day *r* in the estimation period. Thus, the variances for ARs can be denoted as:

$$\hat{V}_i = \sigma_i^2 \cdot C_{it} \tag{6}$$

4.3.2. Estimation of Parameters from the Adjusted Market Model

Using the Scholes-Williams (SW) procedure, three OLS regressions using *t* daily security returns within the estimation period have to be estimated (Scholes and Williams, 1977, 316):

$$R_{it} = \alpha_{i1} + \beta_{i1} R_{mt} + \varepsilon_{1j} \; for \; t = 1,2, ..., T \tag{7.1}$$

$$R_{it} = \alpha_{i2} + \beta_{i2} R_{m,t+1} + \varepsilon_{2,t} \; for \; t = 1,2,..., T \tag{7.2}$$

$$R_{it} = \alpha_{i3} + \beta_{i3} R_{m,t-1} + \varepsilon_{3,t} \; for \; t = 2,3, ..., T \tag{7.3}$$

The SW beta is formed as follows:

$$\hat{\beta}_{iSW} = \left(\hat{\beta}_{i1} + \hat{\beta}_{i2} + \hat{\beta}_{i3}\right) / \left(1 + 2\hat{\rho}_m\right), \tag{8}$$

where $\hat{\beta}_{ik}$ are estimated OLS coefficients for *k=1,2,* and *3*; $\hat{\beta}_{iSW}$ is the estimated SW beta (SWB); $\hat{\rho}_m$ is the estimated first order serial correlation of R_{mt} from *t=2* to *t=T-1*, $R_{m,t-1}$ is the return of the market in period *t-1*, and $R_{m,t+1}$ is the return on market in period *t+1*.

The SW intercept $\hat{\alpha}_{iSW}$ is calculated as:

$$\hat{\alpha}_i = \frac{1}{T-2} \sum_{t=2}^{T-1} R_{it} - \hat{\beta}_{iSW} \frac{1}{T-2} \sum_{t=2}^{T-1} R_{mt} \tag{9}$$

The residual error (or AR), thus, can be calculated as:

$$\hat{\varepsilon}_{i,t} = R_{i,t} - \hat{\alpha}_{iSW} - \beta_{iSW} R_{mt}, \tag{10}$$

Even though the SW and OLS standard deviations differ, since the abnormal returns are different, we do not apply any adjustments to the standard deviation formula to reflect the lagged and leading returns in parameter estimation. The idea behind this is that when calculating SW parameters, the adjustments should capture the true sensitivity of the security return to the market returns. Thus, we include only the contemporaneous market return on the event date in the calculation of the residual. The same is applicable also for the calculation of the standard deviation of the abnormal returns (Cowan and Sergeant, 1996, 8).

4.4. TESTING INFORMATION EFFICIENCY

Event study methodology with estimated abnormal returns can be used to analyse the information efficiency of the Lithuanian and Latvian stock markets. In order to answer our research questions, whether the Lithuanian and Latvian stock markets react inefficiently to announcements of earnings, and, if so, whether it is possible to profit from inefficiencies, we address the following issues:

- Firstly, by applying *Patell's Standardised Residual Test* we investigate whether the earnings announcements contain any valuable information for the market.

- Secondly, with the help of the *Standardised Cross-Sectional Test* we analyse how the reaction of the market differs with respect to increase and decrease in earnings.
- Finally, by looking at *Cumulative Abnormal Returns* we simulate the investment strategies that would exploit inefficiencies and earn risk-adjusted abnormal returns.

The following subsections present the tests listed above and show the adjustments that are made to test the economic validity of EMH.

4.4.1. Patell's Standardised Residual Test

In order to test whether there is any information content in EAs and what period is affected, we compare the squared abnormal returns with the variance estimated from *Equation (6)*, using Patell's standardised residual test.

This test is constructed to examine the magnitude of price changes without respect to the sign of price changes. Thus, there is no need to make any assumptions about market expectations. The abnormal returns are squared, because positive and negative residuals would compensate each other, which would reduce the power of the test (Odabasi, 1998, 10). If the earnings possess information content, then the squared abnormal returns (AR^2) should be greater on the event day than during the estimation period.

The relationship between AR^2 on the event day and the average squared abnormal return during the estimation period (variance) can be expressed, using the following ratio:

$$U_{it} = \frac{AR_{it}^2}{\hat{V}_{it}} \cdot \frac{T_i - 4}{T_i - 2}, \tag{11}$$

where $\hat{V}_{it}$ is defined as in *Equation (6)*, and T_i is the number of days in the estimation period.

The individual residuals are assumed to be cross-sectionally independent and normally distributed; thus, each standardised residual follows a Student t distribution (Cowan and Sergeant, 1996, 6). By applying the Central Limit Theorem, this ratio can be approximated to the standardised normal distribution (Patell, 1976, 258):

$$Z_{U_t} = \frac{\sum_{i=1}^{N}(U_{it} - 1)}{\left[\sum_{i=1}^{N}\frac{2(T_i - 3)}{T_i - 6}\right]^{1/2}} \; approx.\; N(0,1), \tag{12}$$

The test statistic Z_{U_t} can be also interpreted as a test of the hypothesis that the variance of excess returns does not change in the days surrounding the event. In case EAs have

information content, adjustments in stock prices can be observed, which in turn leads to large squared average abnormal returns.

4.4.2. Standardised Cross-Sectional Test

If we find that there is information content in the earnings announcements, we proceed further to test whether the market has different reactions with respect to "good" and "bad" news, and if so, how this reaction differs across the two sub-samples.

In order to perform the Standardised Cross-Sectional test, the dataset is divided in two sub-samples: "good" and "bad" news. This is done based on the "naïve" assumption that the market expects this year's earnings be the same as last years. Thus, the news is considered to be "good" if $earnings_t \geq earnings_{t-1}$ where the subscript *t-1* indicates the respective period in the previous year. Analogous assessment is made for "bad" news. One alternative way as suggested by Sponholtz would be to use consensus analysts' forecasts as a proxy for market expectations (2004, 13). This is, however, not possible for Lithuania and Latvia, since continuous analyst information is not available on these markets. Furthermore, Sponholtz finds that in Denmark both approaches reveal similar outcomes (2004, 25). Hence, we assume that previous year's earnings is a reasonably good proxy for market expectations.

Large positive (negative) abnormal returns *after the event* concern the semi-strong form market efficiency and indicate that the market needs time to adjust (i.e. find the right price) after the news became public. The rejection of the null hypothesis that $E(AR_{it})=0$ on any day in the event window after the EA day implies delays in the adjustment process, which indicates semi-strong form market inefficiency (Sponholtz, 2004, 10).

Significant abnormal returns *on the event day*, would point to strong-form inefficiency, and could suggest that the market had unrealistic expectations regarding the earnings figures. However, even if the null hypothesis cannot be rejected, strong form efficiency is not necessarily proved. No reaction on the event day could be caused by perfect market expectations (the news was already known by the market or insiders were trading in the market). However, Bhattacharya et al. suggest that there are two other reasons why stock prices on the event day might not change in response to EAs. First, the stock market may be semi-strong form inefficient, meaning that there is no relation between firm value and stock returns, or that the effect is delayed. Second, the companies in the market might not post relevant news announcements. In this case, even if the markets are informationally efficient, prices have nothing to react to and inferences about the EMH cannot be made (1998, 1-2).

Significant abnormal returns *before the event* are more ambiguous. Several explanations can be found: large positive returns indicate buying activity, which can be related to speculative behaviour of the market participants or even some insider trading. Large negative returns might suggest that risk-averse investors sell the stock before the EAs or that some insiders sell their stock before the announcement of bad news. However, these effects cannot be fully explained by using our methodology, thus, we refrain from drawing strict conclusions regarding this issue.

To test the market's reaction with respect to "good" and "bad" news, we use the standardised cross sectional test proposed by Boehmer et al., which assumes an increase in variance caused by the event[11]. Boehmer et al. point out that the tests that assume constant variance reject the null hypothesis too often, if there is an event-induced increase in variance (1991, 158). However, in case there is no change in variance, the standardised cross sectional test is almost as powerful as the tests that do not assume a variance change (Cowan and Sergeant, 1996, 8).

The test statistics can be calculated as follows:

$$J_t = \frac{\frac{1}{N}\sum_{i=1}^{N} SAR_{it}}{\sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N}\left(SAR_{it} - \frac{1}{N}\sum_{i=1}^{N} SAR_{it}\right)^2}} \quad approx.\ N(0,1), \tag{13}$$

where $SAR_{it} = \frac{AR_{it}}{\sqrt{\hat{V}_{it}}} = \frac{AR_{it}}{\hat{\sigma}_i \sqrt{C_{i,t}}}$ (Boehmer et al., 1991, 271; Patell, 1976, 256).

Lastly, it should be pointed out that the speed with which the market adjusts to news can be affected by the fact that short-selling is not possible on VSE and RSE. Thus, delay in price reaction to negative news may be larger, because there is no direct way for speculators to make profits from decrease in price.[12]

4.4.3. Testing for Cumulative Abnormal Returns

The Cumulative Abnormal Return test is used to simulate possible trading strategies that would enable traders to benefit from market inefficiencies.

In order to simulate a strategy employing semi-strong form market inefficiencies, the returns are accumulated from the end of the event day throughout the period of 20 days after

[11] The test is based on the assumption that event induced variance is proportional to the variance in the estimation period (Cowan and Sergeant, 1996, 7)

[12] See Kallunki (1996) who finds this effect in the Finnish stock market.

the event. A semi-strong form efficient market should fully incorporate news in prices already on the event day (all publicly available information should be priced). Hence, no-one should be able to earn abnormal profits by buying (or short-selling) a stock at the end of the event day and selling (buying back) later.

The test adjusts for possible increase in variance in the event window and requires calculation of normalized cumulative prediction error:

$$W_{iL} = \sum_{t=1}^{L} \frac{\hat{\varepsilon}_{it}}{\hat{\sigma}_i \sqrt{LC_{it}}} \sim t(T\text{-}2), \tag{14}$$

where L $(L \leq 17)$ denotes the number of days in accumulation. The number of observations T in the estimation period may vary across companies, due to differences in data availability. Each t statistic has an expected value of zero and a variance equal to $(T_i\text{-}2)/(T_i\text{-}4)$.

W_{it} are assumed to be independent variables with known expected value. According to the Central Limit Theorem, a normalized sum can be formed (Patell, 1976, 257):

$$Z_{WL} = \frac{\sum_{i=1}^{N} W_{iL}}{\left| \sum_{i=1}^{N} \frac{T_i - 2}{T_i - 4} \right|^{1/2}}, \tag{15}$$

The null hypothesis is that $Z_{WL}=0$, meaning that cumulative abnormal returns after the event are expected to be zero. The semi-strong form of efficiency would be verified if there are no significant cumulative returns from the end of the event day till any other day in the event window.

However, a less restrictive case that considers a period from the beginning of day 0 is also analysed. Although it cannot be used for directly assessing the semi-strong form of EMH, it is still worth considering as an indication of market expectations and strong-form of EMH. In this case it is assumed that the investor is able to buy the stock at a price which is not yet affected after the EA. In general, if the market had correct expectations before the EA, the price should not be affected after the announcement (also including the EA day).

4.4.4. Verifying Economic Significance

Even though the cumulative abnormal returns from the previously described model might be statistically significant, in order to be able to draw any conclusions with respect to market efficiency, it is necessary to verify the economic significance of the findings.

We do this by adjusting the W_{iL} values from *Equation (14)* with taxes and stock exchange or brokerage fees. Two cases are considered: a private investor who faces a brokerage fee of

1.0% and a tax of 15% in Lithuania and a brokerage fee of 0.70% and tax of 25% in Latvia, and a broker who faces a stock exchange fee of 0.3% and a tax of 15% in Lithuania and 0.1% stock exchange fee and 15% tax in Latvia[13] (VSE home page; RSE home page).

The economic significance of "bad" news announcements is not considered, as there is no way of directly profiting from the decrease in price due to prohibited short-selling.

5. DATA AND SAMPLING

In order to conduct the intended event study, two datasets have to be matched: the list of earnings announcements (events) and the list of transactions on the market (reactions). Both datasets are described in more detail in the following sub-sections.

5.1. EARNINGS ANNOUNCEMENT DATA

The earnings announcement sample is constructed of 807 quarterly EAs in Lithuania and 203 EAs in Latvia for the period from January 2001 to November 2004. The EAs are recorded for 45 companies in Lithuania and 12 companies in Latvia that were listed on the stock exchanges on November 31, 2004.

5.1.1. Data Collection

We use the news archives of VSE (VSE homepage) and RSE (RSE homepage) in Lithuania and Latvia, respectively, as news sources. According to the law on Financial Securities markets in both countries, listed companies are required to provide the market regulator with important[14] news "immediately but not later than the news is announced to the mass media" (Lithuanian Securities Commission, 2002; Finansu Instrumentu tirgus likums, 2003). This suggests that, legally, the stock exchange should be the primary source of public news.

The following criteria are recorded and used to extract different cross-sections:

- Date of announcement;
- Time of the announcement;
- Company involved;
- Related time period (e.g. 1Q 2001 or 3Q 2004);
- Actual earnings figure.

[13] Here we assume that the investor does not have any stock inventory; thus, s/he needs to both buy and sell the stocks in order to perform a trading strategy, hence, pay fees for buying and for selling.

[14] An important event, according to the law, is any event concerning the issuer, which is known or should have been known to the issuer and which can affect the price of the issuer's financial instruments on the regulated market or the investor's choice to buy or sell these financial instruments

The cross-sections used in the presentation of the results are chosen to reflect differences in results with respect to the companies involved (Official List and Current List in Lithuania; Main List and I-List in Latvia), frequency of the announcements (quarterly, semi-annual, annual), and period (2001-2002 and 2003-2004).

5.1.2. Data Adjustments

The news announcements are posted throughout the whole working day, whereas continuous trading on both exchanges takes place only from 10:00 to 14:00. This suggests that an assumption with respect to the minimum time it takes to perform a transaction should be made in order to be able to allocate the news announcements to their respective trading days.

We assume that 13:55 is the latest time when announced news can still be reflected in the stock price[15] and we adjust the dates of the announcement as follows. If the news is posted before 13:55, we allocate the event to the current trading day, but if the news is posted at 13:55 and later, the event is allocated to the next trading day. We check the validity of this assumption by constructing a news sample that excludes all news announced from 13.30 to 14.00 and find similar results for all main tests[16].

5.2. TRADING DATA

Trading data for the period from January 1, 2000 to December 31, 2004 for all the companies currently listed on the Official and Current trading list in Lithuania and Main and I-list in Latvia were obtained from the national stock exchanges in Lithuania and Latvia, respectively. The initial datasets were transformed to include only daily trading data, with the closing price. Hence, in total in the sample period there are 1267 trading days and 87 companies in Lithuania and 1264 days and 28 companies in Latvia.

5.2.1. Adjustments for Dividends and Changes in Capital Structure

Firstly, we adjust data for dividends by adding the amount of the dividend to the stock price on the ex-dividend date[17]. However, the stock exchanges do not provide sufficient information to be able to adjust the returns for the changes in capital structure. Nevertheless, both markets have trading restrictions that do not allow the stock price to vary by more than 15% during the day unless there are changes in the capital structure (VSE homepage; RSE

[15] According to A.Variakojis it takes not more than 5 minutes to complete a full transaction (2005).
[16] The results are available from the authors upon request.
[17] This method is used by the Lithuanian and Latvian stock exchanges in calculating VILSE and RIGSE indices.

homepage)[18]. Therefore, we introduce a rule that any return that exceeds 15% is omitted from the dataset, as being affected by changes in capital structure.[19]

5.2.2. Adjustments for Thin Trading

The VSE and the RSE contain many stocks that are traded infrequently and, thus, there are days when no trading in a particular security has taken place, i.e. missing trades. There are two basic methods for treating this problem. We combine these methods to adjust the dataset.

Firstly, following Sponholtz, we put restrictions on trading frequency (2004, 15). Our minimal requirement for an event to be included in the sample is that the stock is traded at least 1/3 of the days in the estimation period and at least 1/2 of the time in the event window. This reduces our sample to 351 EAs in Lithuania and 127 EAs in Latvia.

Secondly, we adjust the days with missing trades for the remaining events, by allocating a multi-period return on a given day over previous periods with no transactions (Sponholtz, 2004, 8). We use the *"lumped"* procedure, according to which the entire return is allocated to the day when the stock is traded, while for non-trading days the returns are set zero. The reason for choosing this procedure is that it is easy to compute and it also has been found analogous to other methods like *"trade-to-trade"* and *"uniform"* (Sponholtz, 2004, 28).

6. ANALYSIS OF RESULTS

The following section presents the results of the study. First, we investigate the information content of earnings announcements. Second, we analyse the reaction of the markets with respect to "good" and "bad" news. Finally, we simulate possible trading strategies by using the Cumulative Abnormal Return test and verify the economic significance of our findings.

6.1. INFORMATION CONTENT OF EARNINGS ANNOUNCEMENTS

As already mentioned in the methodology part, the information content of EAs can be tested using the average squared abnormal returns in the test statistic Z_{Ut} from *Equation (12)*. The result tables for Lithuania and Latvia are presented in the section and in Appendix 1.

6.1.1. Information Content of Earnings Announcements in Lithuania

From *Table 1* it is rather obvious that earnings announcements do possess information content in Lithuania. The squared abnormal returns on the event day are significant, with Z

[18] The only exceptions refer to companies that have their nominal prices smaller than LTL 0.20 in Lithuania LVL 0.06 in Latvia.
[19] This rule removes 73 returns in Lithuania and 48 returns in Latvia.

values exceeding 22 for all four combinations of betas and market portfolios considered. However, there are more days around the announcement that show significant Z values and exhibit large price fluctuations that could be caused by the EAs. In general, the results for Lithuania seem to be robust across the four combinations of betas and market portfolios.

Table 1: **Results for the Test of Information Content in Lithuania**

	EWP				**CWP**			
	OLS beta		**SWB**		**OLS beta**		**SWB**	
Day	Z		Z		Z		Z	
-10	-0.82		-0.94		-0.56		-0.93	
-9	-0.68		-0.82		-1.17		-1.26	
-8	-2.08	**	-2.06	**	-2.3	**	-2.2	**
-7	-1.42		-1.53		-1.64		-1.43	
-6	2.55	**	2.61	***	2.45	**	2.4	**
-5	-0.85		-0.88		-0.82		-1.16	
-4	-2.96	***	-3.02	***	-2.15	**	-1.99	**
-3	-3.39	***	-3.23	***	-3.18	***	-3.03	***
-2	-1.83	*	-1.69	*	-1.3		-1.44	
-1	-3.62	***	-3.52	***	-3.66	***	-3.61	***
0	**22.42**	***	**22.46**	***	**21.61**	***	**21.48**	***
1	4.99	***	5.34	***	4.73	***	4.7	***
2	1.44		1.16		1.95	*	1.73	*
3	1.58		1.42		2.51	**	2.45	**
4	0.3		0.34		0.91		1.02	
5	-1.31		-1.3		-1.49		-1.57	
6	-0.37		-0.52		0.1		0.24	
7	0.37		0.32		0.77		0.87	
8	-0.83		-0.92		-0.17		-0.23	
9	-0.84		-0.97		-0.54		-0.52	
10	-3.65	***	-3.6	***	-3.38	***	-3.39	***

Notes: The table presents the test statistic Z_{Ut} from *(12)* for the full sample of quarterly news announcements (N=351). Columns 2 and 3 present the results for the equally weighted portfolio, while columns 4 and 5 present the results for the capitalisation weighted portfolio. OLS beta and SWB denote the two different betas used in the estimation of normal returns.

*denotes significance at 10% level;
**denotes significance at 5% level;
*** denotes significance at 1% level.

The market starts to react eight days before the announcement, and the reaction continues for about one to three days after the event, depending on the betas and market portfolios used. The significant values on day 10 could be induced by concurrent non-earnings disclosures or other non-event related factors; however, it might also be caused by slower reaction to the bad news due to prohibited short-selling.

Many significant values before the event could imply speculation activities on the market, selling by risk-averse investors, or even some trading, based on insider information. Insider trading is likely, because in many cases market participants do not know in advance when exactly the EAs will be publicly announced.

The significant values on days 0 to 3 when using CWP could indicate adjustments of the market after the announcement and thus imply inefficiencies. Additionally, this can be caused by the fact that risk-averse investors may buy the stock after the EAs, since there is less risk involved after the profit figures are known. Or alternatively, this could be related to the "reminding" effect, meaning that some investors are "reminded" of a particular company when it appears in the headlines.

We examine the previously discussed issues further, by looking at the results from various sub-samples described in *Section 5.1*, which are presented in *Appendix 1*.

It can be seen from *Table 3* in *App. 1* that for Official list companies the Z statistics are significant at 1% level from days -2 to 0, whereas, for Current list companies the Z values are significant from days 0 to 4. This indicates that Official list companies adjust to the news much faster than Current list companies after the announcement. This could be caused by several factors. First, the market might have better expectations with respect to the earnings of Official list companies, which means that there is less "news" component in these EA; thus, there is less adjustment needed. Second, this could be due to the higher liquidity of the Official list companies, suggesting that it takes less time for the market to find a new price. Third, this could support our assumption that the "reminding" effect plays an important role, since it should be stronger for the Current list companies that are traded less.

The significance on days -1 and -2 for Official list companies most likely indicates speculation and selling of risk-averse investors before the EAs as the announcement days are known more precisely for the largest companies. However, significant effects on days -3 to -5 for the Current list would be more attributable to insider trading.

With respect to the different announcement frequencies, our results contradict the results of Gajewski and Quere (2001) in France, who find that the quarterly EAs do not possess information content, since they are not standardised and include less information. In Lithuania, only Official list companies are required to submit quarterly earnings figures; therefore, we would expect similar results to the study of Gajewski and Quere (*see Section 3.2.*). However, our results show that annual and semi-annual earnings announcements possess less information content than the quarterly EAs (see *Table 4* in *App. 1*). We attribute this difference to the fact that the earnings comparison to the previous year can be better captured in the case of quarterly results: the expectations of investors with respect to annual announcements are more sophisticated, since they may include analyst forecasts, and the possibility to compare with the budgeted and 9-month earnings figures. This suggests that the quarterly earnings figures should have more information content.

Contrary to our expectations[20], it took more time for the market to adjust to the EAs in 2003-2004 than in 2001-2002 (see *Table 5* in *App. 1*). The days with significant values around the EA are -2 to 1 for 2001-2002 and 0 to 5 for 2003-2004, respectively. There are more days with significant *Z* values during the 2003-2004 period; however, no consistent reaction before day 0 can be observed. The *Z* values for the announcement day are about four times larger for the later period (while the sample size differs only two times). These

[20] Several studies find that Lithuanian and Latvian markets are becoming more efficient. Based on these findings we also expected that the adjustment should take less time in the later time period (2003-2004).

differences could be caused by several reasons. First, the fact that there are significant values before the announcement in 2001-2002 indicates that there might have been some trading based on insider information during this period. This could have been eliminated by stricter regulations and their enforcement in later years. This would also help explain why it takes more time for the market to adjust from 2003-2004, suggesting that there is more "news" component in the EAs in this period. Also, the quality of EAs might have improved with time, suggesting that they possess more value to investors, or that with the development of the stock market, the link between earnings and stock prices has become more obvious.

6.1.2. Information Content of Earnings Announcements in Latvia

In Latvia the test results presented in *Table 2* show that EAs contain relevant information.

Table 2: **Results for the Test of Information Content in Latvia**

	EWP				**CWP**			
	OLS beta		**SWB**		**OLS beta**		**SWB**	
Day	Z		Z		Z		Z	
-10	-2.5	**	-2.63	***	-0.94		-0.47	
-9	-1		-1.47		-0.63		-0.99	
-8	0.72		0.38		0.33		-0.12	
-7	0.64		1.14		1.55		1.7	*
-6	-0.13		-0.06		0.76		0.98	
-5	0.64		0.85		2.4	**	2.67	***
-4	-3.62	***	-3.69	***	-3.84	***	-3.77	***
-3	2.24	**	2.48	**	4.29	***	6.56	***
-2	-0.66		-0.61		1.13		1.25	
-1	3.31	***	3.38	***	3.33	***	2.96	***
0	**4.69**	***	**4.6**	***	**8.14**	***	**10.25**	***
1	-0.47		-0.61		3.29	***	5.21	***
2	1.47		1.81	*	2.24	**	2.58	***
3	4.28	***	4.49	***	5.08	***	5.13	***
4	6.86	***	6.48	***	1.74	*	4.05	***
5	7.62	***	7.7	***	7.55	***	8.86	***
6	1.7	*	1.49		1.49		1.04	
7	3.68	***	4.01	***	0.63		3.52	***
8	5.14	***	4.88	***	2.25	**	4.44	***
9	-0.72		-0.77		0.83		0.61	
10	11.57	***	11.31	***	11.78	***	11.87	***

Notes: The table presents the test statistic Z_{Ut} from *(12)* for the full sample of quarterly news announcements (N=127). Columns 2 and 3 present the results for the equally weighted portfolio, while columns 4 and 5 present the results for the capitalisation weighted portfolio. OLS beta and SWB denote the two different betas used in the estimation of normal returns.

*denotes significance at 10% level;
**denotes significance at 5% level;
*** denotes significance at 1% level.

There is a consistent significant reaction of the market on the event day, which indicates the information content of EAs. However, other days show even larger *Z* values, and it seems that almost all days in the event window can have large price movements depending on the betas and market portfolios used.

Significant values from day -5 to -1 indicate speculation activities, selling by risk-averse investors, information leakages, or even insider trading. This observation is similar to the Lithuanian market. The difference in reactions, however, can be seen after the event. For Latvia we see that the market exhibits significant price movements for almost all ten days after the event, which means that the adjustment process is very slow and inefficient.

However, the significant values on day 10, for instance, can also be influenced by concurrent announcements or other factors not related to the event.

While analysing the Main list companies, we observe differences in the results from EWP and CWP on the event day (*Table 6* in *App. 1*). However, it is rather clear that the adjustment process for Main list companies is longer than for the I-list. This contradicts the findings in Lithuania; however, due to the small sample size of the Main list, we refrain from drawing any conclusions with respect to the possible causes of these effects.

Similarly to Lithuania there is a consistent significant reaction of annual and semi-annual announcements on the event day (*Table 7* in *App. 1*). However, the results differ with respect to the quarterly announcements: there is no significance on day 0, whereas, the Z values are significant for 6 days before trading and 3 days after trading, which is difficult to interpret.

The results from the samples with respect to different periods show that the Z values on the event day were substantially larger for the period from 2001-2002, which indicates that the EAs might have possessed larger informational value during this period. This could be caused by the fact that in later years the market had better expectations. This conclusion, however, should be interpreted cautiously, because the days after the event still have large fluctuations for both periods, which might imply that the adjustment is really slow.

The findings seem to be robust with respect to the betas used; however, the two different market portfolios lead to rather different results. The capitalisation-weighted index RIGSE usually produces larger Z-values on the event day than EWP, which makes us believe that EWP explains the systematic variation of returns better. This could arise from the fact that the CWP is considerably biased towards a few large companies (*see Section 2*).

6.1.3. Summary

For both countries, the findings of the Standardised Abnormal Return Test show that the EAs do possess information content, since the event day is significantly affected almost in all cross-sections. The Latvian market is affected for up to 10 days after the announcement, whereas in Lithuania abnormal squared returns are observed for not more than a week. The fact that Official list companies incorporate prices in one day leads to the conclusion that the liquid part of the Lithuanian stock market might be efficient in semi-strong form. However, the illiquid part of the Lithuanian market and all the Latvian market exhibit long adjustments, which means semi-strong form inefficiencies.

We also find that there is increased trading activity in both countries before the event with about a week before the EA being affected. Comparison of the Official and Current lists on

VSE provides some support for insider trading with Current list stocks, but we refrain from drawing conclusions due to many other factors that could cause such findings.

In line with many other studies, the OLS beta and SWB provide very similar results, while the results from using the different market portfolios tend to differ, especially for Latvia. Therefore in the next section we differentiate results according to CWP and EWP but use only the Scholes-Williams procedure for estimating parameters.

6.2. MARKET REACTION TO "GOOD" AND "BAD" NEWS ANNOUNCEMENTS

The "naïve" assumption that the market expects the profit for the year to be equal to the profit of the last year is used to test whether the market reacts differently to increase in earnings ("good" news) and decrease in earnings ("bad" news).

The following two sub-sections present the test results for both countries. The average abnormal returns for each day in the event window are depicted in the figures throughout the section; the results of the standardised cross-sectional test are presented in *App. 2*.

6.2.1. Reaction to "Good" News Announcements in Lithuania

In Lithuania after the announcement of "good" news, the event day exhibits large positive abnormal returns, which are significant at 1% level (see *Table 9* in *App. 2*).

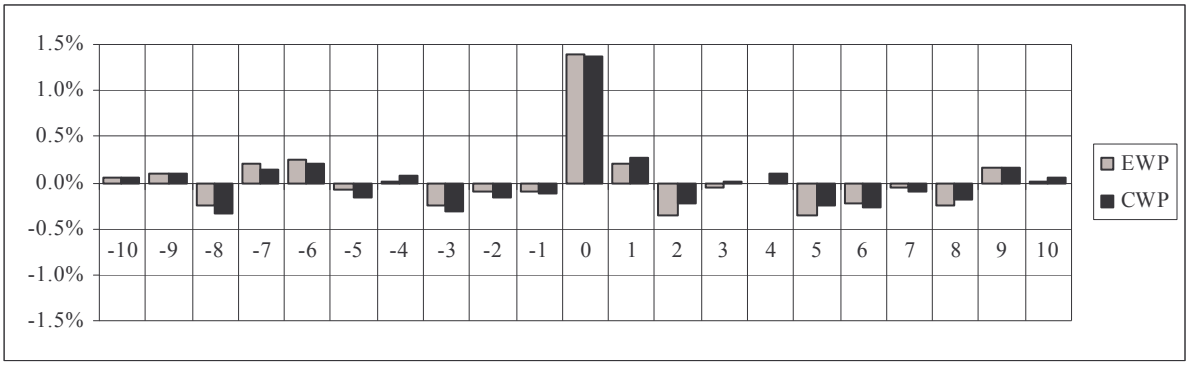

Figure 2: **Abnormal Returns in the Event Window for "Good" News Sample in Lithuania**

The average ARs on the event day are about 1.4% while the absolute returns are about 1.7%. Negative abnormal returns can be observed three days before the event, suggesting that this might be caused by risk-averse investors who sell securities in anticipation of the EAs. Positive abnormal returns of about 0.2-0.3% can be also seen on the first day after the announcement; however, they are not significant. The second day after the announcement exhibits negative abnormal returns of about 0.3%; the J-Test statistic is significant at 5% if

EWP is used to proxy market returns. The negative correction seems to continue for about eight days after the event, which indicates overreaction on days 0 and 1.

The significant reaction on the event day and negative abnormal returns several days before the event can be observed in all sub-samples considered in the study. However, differences with respect to the length of the correction effect can be seen across the sub-samples, especially with respect to the periods. For the period from 2001-2002 it takes eight days until the J-statistics becomes significantly negative, whereas for the period 2003-2004 it takes from 2 to 5 days, depending on the market portfolio used *(see Table 12 in App. 2).*

Although in the previous test we found that the Official list in Lithuania adjusts to the EAs very fast, the Standardised Cross Sectional Test shows that there is a significant overreaction of the market with respect to "good" news, since the negative abnormal returns are significant on day 2 at 1% level (*Table 10 in App. 2)*. The Current list also exhibits overreaction and correction, but it seems that the effect is slower (only day 6 is significant).

Similarly to our findings in *Section 6.1.1.*, the quarterly announcements (1Q and 3Q) seem to possess more informational value than the annual and semi-annual EAs (see *Table 11* in *App. 2)*. The average abnormal returns on the event day for the quarterly announcement sample are about 1.5%; whereas for the annual announcement sample these numbers are about 0.8%-0.9%. This might be caused by the fact that our definition of "good" news might not hold for the yearly earnings reports, since expectations with respect to the annual figures may include analyst forecasts, comparison with the budgeted - or 9-month earnings - figures. We construct an additional sample, consisting of 1Q announcements to verify this assumption. We hypothesise that the first quarter EA should have the largest informational value, because investors have no other measures, only the last year's earnings figures to base their expectations on. From *Table 11* in *App. 2* we can see that the 1Q EAs do indeed result in the largest average abnormal returns of about 2.4% on the event day.

The pattern of overreaction and reversal that is rigid for all cross-sections considered, suggests that the "reminding" effect could be very important. Therefore, we test this by running the standardised cross-sectional test on the data sample with all quarterly announcements. In case the reminding effect is present, the test should still provide significant J-statistics on the event day. Indeed, we find that even if all news is taken into

account, the positive effect on the announcement day is still apparent; hence, the reminding effect is very likely (*see Table 17 in Appendix 2*).[21]

We also test the hypothesis that the reminding effect should be stronger for the current list companies, by examining "full" samples of the news concerning Official list and Current list companies. However, we do not find any support for the hypothesis since both samples exhibit similar behaviour on the event day.

All in all, we can conclude that in Lithuania the market participants react to the increase in earnings by buying the respective stock on the announcement day. This can be caused by a news component in the announcement – if the market has expected lower figures (e.g. equal to the last year) or by increased attention to the stock (reminding about the stock to investors). Additionally, risk-averse investors, who were not willing to purchase the stock until the announcement, could become more active when they find out the profit figures. The overreaction implies that semi-strong market efficiency in the Lithuanian stock market might not hold.

6.2.2. Reaction to "Good" News Announcements in Latvia

Rather unexpectedly, there is no significant effect of the "good" news announcement in Latvia on the event day. Although positive average abnormal returns of 0.33% (EWP) can be observed on the market, they are very small (see *Table 13* in *App. 2*).

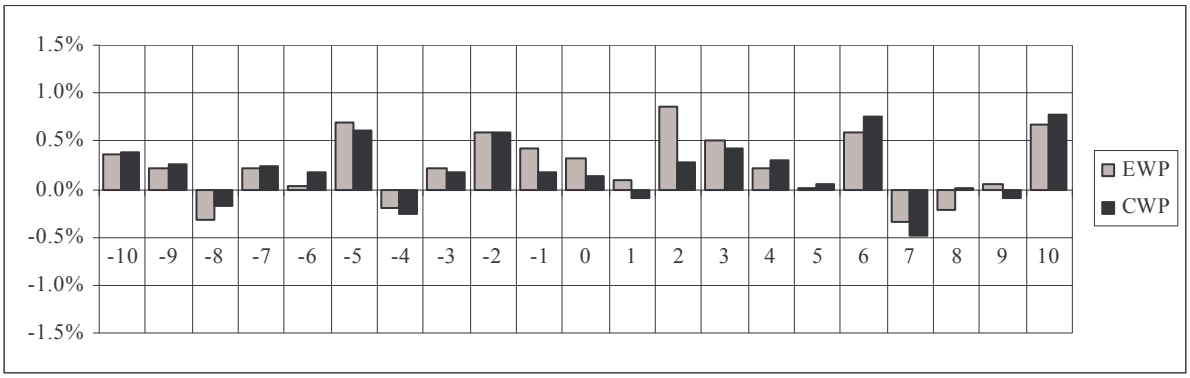

Figure 3: **Abnormal Returns in the Event Window for the "Good" News Sample in Latvia**

A significant return increase (at 5% level) can be observed five days before the event and two days before the event. This effect could be induced by investors who have correct expectations about the earnings figures or even by "better informed" investors, who know these figures before their public appearance. The announcement day is followed by six days

[21] However, we should interpret the results cautiously, since this effect may also be caused by the fact that there is simply more "good" than "bad" news in our sample.

of positive abnormal returns with the exception of day 1 (CWP), while a slight indication of correction can only be seen after 7 days of the announcement. The J-statistics are significant at 5% on day 2 with the average abnormal return of 0.86%.

Due to the small sample size (49 observations in total in the "good news" sample), we are unfortunately not able to test the consistency of the results, by examining all cross-sections that were used for Lithuania.

In general, the market reaction to the "good" news announcements is very slow for Latvian companies, indicating substantial information inefficiency of the Latvian stock market. However, in contrast to Lithuania the Latvian market does not exhibit overreaction to the "good" news announcements.

6.2.3. Reaction to "Bad" News Announcements in Lithuania

In Lithuania, on the "bad" news announcement day returns are negative (about -0.60%) and remain negative for five consecutive days after the EA. However, during this period the J-Test statistic is not significant even at 10% level (see *Table 14* in *App. 2*).

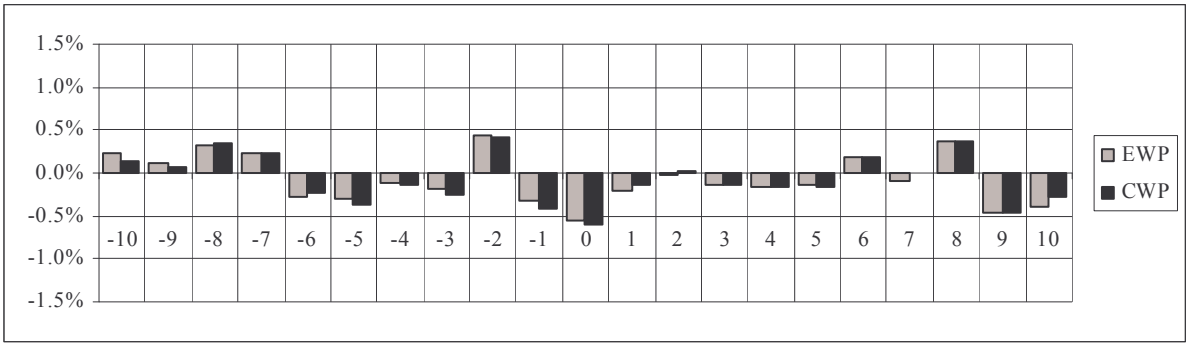

Figure 4: **Abnormal Returns in the Event Window for "Bad" News Sample in Lithuania**

We can also observe negative abnormal returns for six days before the announcement, which could imply selling in expectation of "bad news", some information leakages or insider trading. On day -1 this effect is also significant at 10% level, if CWP is used as a market portfolio. However, an exception is day -2, when abnormal returns turn significantly positive (at 10% level), probably indicating speculative buying from investors who expect positive news to be published or think that the market has already overreacted.

The significant figures on days 8, 9, and 10 seem to fall out from the picture – most probably due to announcement of concurrent news or other factors that are not considered. However, the reaction of the market to "bad news" might also be very slow and still observed two weeks after the event.

The results slightly differ with respect to the different cross-sections. For the Official list companies, the J-test statistic is significantly negative on the event day, whereas the results for the Current list companies are very similar to those for the full sample (*see Table 15 in App. 2*). This difference could be caused by the fact that more investors hold in companies from the Official list, and they can, therefore, react more quickly to the occurrence of negative EAs.

In general, it seems that bad news does not contain much significant information for the traders, since there is almost no significant reaction. However, from the analysis of the Official and Current lists, we see that such reaction may also be related to the low liquidity of the market. Combining low liquidity with no possibility of short-selling, the small reaction to "bad" news seems to be more attributable to these two factors than perfect expectations of the market.

6.2.4. Reaction to "Bad" News Announcements in Latvia

In contrast to Lithuania, announcements of "bad news" in Latvia have more significant effects than announcements of "good news" (*see Table 18 in App.*). Although the event day is still insignificant, on the first day we observe average ARs of -1.10% for EWP (and -1.95% for CWP) and the J statistic is significant at 1% level. Negative ARs also can be observed on day 2; however, the effect seems to be small. This implies that the effect is delayed at least for 1 trading day.

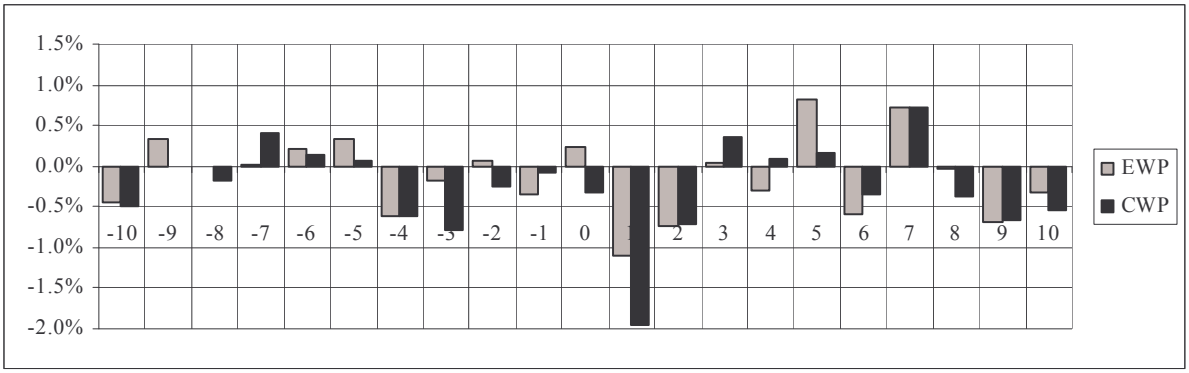

Figure 5: **Abnormal Returns in the Event Window for the "Bad" News Sample in Latvia**

We also find significant negative abnormal returns on days -4 and 6. The significance on day -4 could be caused by selling by investors in anticipation of the news (risk-averse investors or insiders). However, our findings can be substantially influenced by the small sample size (34 EAs); therefore, we refrain from drawing strict conclusions with respect to the possible causes of these significant values.

6.2.5. Summary

The findings of the Standardised Cross-Sectional Test show that "good" news and "bad" news cause very different reactions in the markets. Moreover, there are differences in reactions between Lithuania and Latvia.

The "good" news in Lithuania results in a clear upward overreaction of the market on day 0 and a correction, lasting more than a week after the event. In Latvia, however, the reaction to the "good" news is delayed and positive abnormal returns can be seen for about a week, which shows that the market reacts slowly. Both cases indicate inefficiencies.

The "bad" news, as expected, causes a slower reaction of the Lithuanian market and also reveals possible speculation or insider trading before the event. In Latvia, bad news seems to have a very significant effect on the first day after EA, implying a delay in reaction. The event day, however, is insignificant in both countries with the exception of the Official list in Lithuania, which makes us conclude that the delays are called by low liquidity.

6.3. SIMULATION OF POSSIBLE TRADING STRATEGIES

In the following section we present two types of trading strategies that could be used to exploit market inefficiencies. First we present the results with respect to the sample when the returns are accumulated from the end of the event day, trying to make inferences with respect to the semi-strong form of EMH. Second, we present the results for the "less-restrictive" case, which considers the period from the beginning of day 0 and reflects market expectations and strong form inefficiencies. In both cases, Cumulative Abnormal Return Tests are used to determine the significance of the results. The findings are also adjusted for fees and taxes. The result tables are provided in *Appendix 3,* and figures within the section are provided to illustrate the cases.[22]

6.3.1. Exploiting Semi-Strong Form Inefficiencies in Lithuania

The results for the test that accumulates returns from the end of day 0 to day 20 [1; 20] indicate that it is not possible to earn abnormal returns, by investing in the stock at the end of the event day, and selling it any other day in the event window (*see Table 18 in App.3)*. The results are even stronger after accounting for fees and taxes. Interestingly, for "good" news after six days cumulative returns become significantly negative, which indicates that correction of the market is apparent and that the market is semi-strong form inefficient.

[22] For these tests we only show the results, based on the EWP. The findings for CWP are similar and can be acquired from the authors upon request.

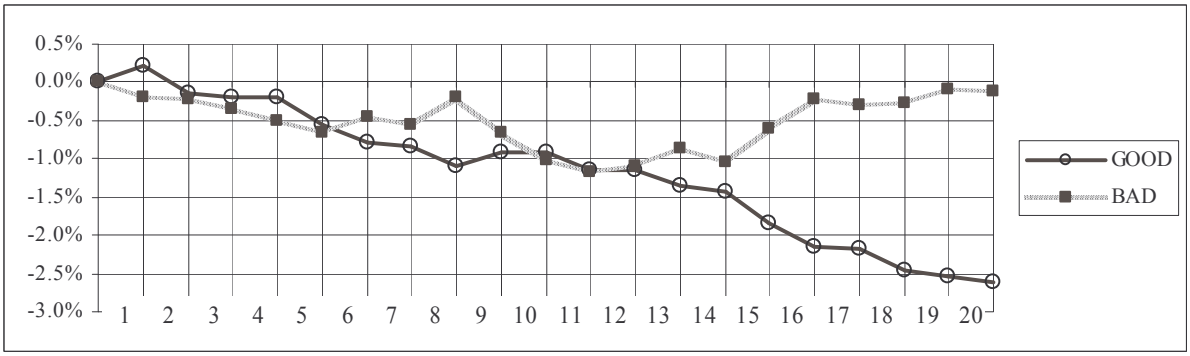

Figure 6: **Cumulative Abnormal Returns from Day 1 to Day 20 in Lithuania**

For the "bad" news, slow adjustment downwards can be seen, with significant cumulative negative returns on day 11. With some interruptions it can be observed for almost 3 weeks (i.e. 14 days). Similarly to the "good news", we observe a reversal on day 23; however, the effect is not significant. Although the semi-strong form inefficiencies exist, they cannot be exploited due to prohibited short-selling and do not have an economic meaning.

The results for the sub-sample of Official list companies and the period from 2003-2004 show significant (at 5%) positive excess returns on day 1. However, after accounting for fees and taxes, the strategy becomes not profitable for both a broker and a private investor.

The findings regarding the semi-strong form of market efficiency are rather ambiguous. Although the tests show that the negative cumulative returns are significant, they cannot be economically verified. Therefore, we cannot reject the semi-strong form efficiency in VSE.

6.3.2. Exploiting Strong Form Inefficiencies in Lithuania

The results are considerably different for the sample where the abnormal returns are accumulated, starting from the beginning of the day [0; 20] (*see Table 19 in App. 3)*.

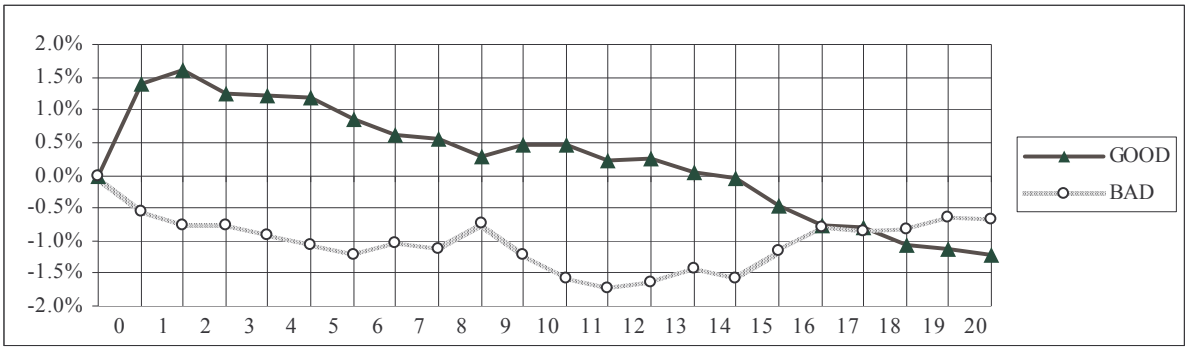

Figure 7: **Cumulative Abnormal Returns from Day 0 to Day 20 in Lithuania**

The positive effect of a "good" news announcement seems to remain for about 5-6 days. The test statistics are significant at 1% level for the first 5 days, and at 10% level on day 6. The large positive effect on the event day is reduced by negative abnormal returns, which are

observed starting from day 2. We even see a negative reversal in cumulative returns after day 14; however, these observations are not significant; therefore, we are reluctant to draw any conclusions in this respect.

The results presented above also hold when different sub-samples are used.[23] Minor differences in the length of significant periods can be observed but the conclusions are in line with *Sections 6.1.* and *6.2.* For instance, for Official list companies, the strategies are significant only for the period [0;3], while for the annual EA sample, cumulative abnormal returns are significant only for [0;1]. Interestingly, for the period from 2001-2002, cumulative abnormal returns are significant only for the first 3 days: [0;2], whereas the longest significant period (10 days) can be observed for the period of 2003-2004.

After adjusting for fees and taxes, the results show that for a broker there are possibilities to earn risk-adjusted excess returns by buying the stock on day 0 and selling it on days 2-4 (the only exception is the case of annual earnings announcements, which does not provide any economically significant trading strategies). However, an individual investor does not seem to be able to profit from these transactions. The only significant strategy can be observed in the period from 2003-2004 when the investor buys the stock on day 0 and sells it on day 1; however, the cumulative abnormal return is only 0.37%. Moreover, the positive figure could be totally diminished if the market spread was taken into consideration.

The findings of the test show that the market is not efficient in the strong form and that it is even possible for brokers to make risk-adjusted excess returns. The profit opportunities for private investors, however, are very small, which makes us doubt the economic validity of the findings.

As shown in *Section 6.2*, the "bad news" announcements have small effect on the event day; thus we cannot distinguish between semi-strong and strong form efficiency. The CAR tests for both efficiency forms show very similar results.

6.3.3. Exploiting Semi-Strong Form Inefficiencies in Latvia

The test statistics for the "good" news sample in Latvia show significant positive values for about three weeks after day 1 *(see Table 20 in App. 3)*. This suggests that the news is very slowly incorporated in prices. Moreover, there seems to be no evidence that the market finds a new equilibrium after the event in 20 days, which complies with the findings of Odabasi on the Turkish market (1998).

[23] The result tables for sub-sections are available from the authors upon request.

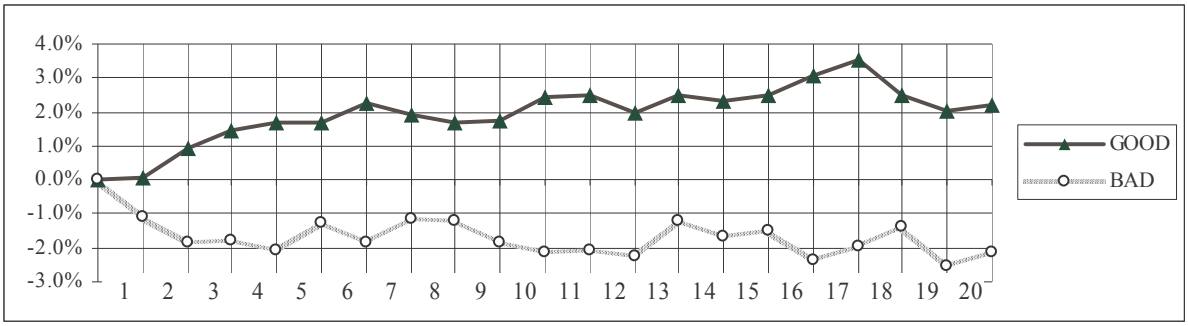

Figure 8: **Cumulative Abnormal Returns from Day 1 to Day 20 in Latvia**

Consequently, in Latvia, brokers have many choices of profitable strategies even after accounting for taxes and stock exchange fees. The highest cumulative abnormal return of 3.89% can be achieved by holding a stock for 17 days. Profitable opportunities seem to exist for all 20 days after the event. The individual investor case considerably reduces the economic significance of the results but still leaves a profitable strategy of holding a stock for 16 or 17 days. The largest expected cumulative abnormal return for days 0-17 is 2.22%.

Thus, we conclude that with respect to "good" news the Latvian market is semi-strong form inefficient. The conclusion regarding the "bad" news is similar to the case of Lithuania. There are significant negative cumulative abnormal returns for about 2-3 weeks; however, we cannot check the economic validity of the findings.

6.3.4. Exploiting Strong Form Inefficiencies in Latvia

When examining the period of accumulation from the beginning of day 0 in Latvia, the positive effect of the "good" news remains for the whole period in consideration *(see Table 21 in App. 3)*. This might imply that the news contains a significant unexpected component, according to which the market participants revaluate the stocks. However, the conclusions about the strong form of efficiency are not meaningful, if the semi-strong form of EMH does not hold (see *Section 6.3.3*).

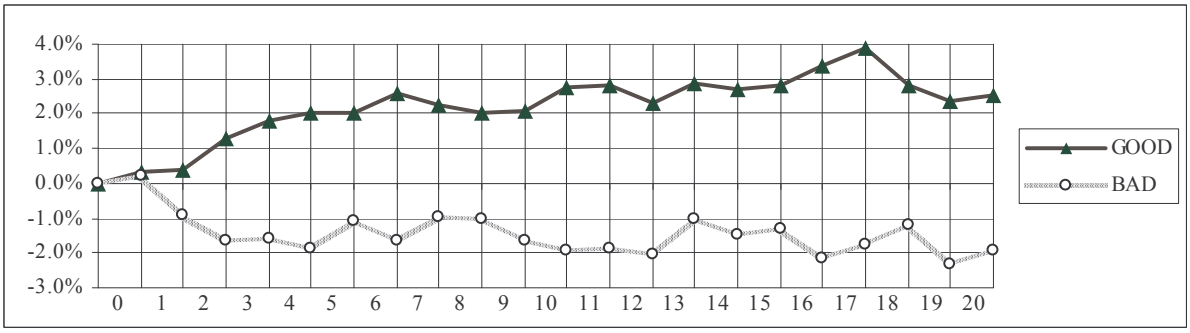

Figure 9: **Cumulative Abnormal Returns from Day 0 to Day 20 in Latvia**

Regarding the "bad" news, we can conclude that inefficiencies seem to exist for a few weeks after the event; however, it is not possible to separate strong-form and semi-strong form efficiency and check the economic validity of our findings.

6.3.5. Summary

After simulating possible trading strategies we can conclude that the Lithuanian market is not efficient in strong-form and that market participants are able to profit from these inefficiencies. However, the results regarding semi-strong form are ambiguous. Although there is no way of profiting from semi-strong form inefficiencies, the negative CARs are significant, which makes us think that the market is distracted by short-selling prohibitions.

In Latvia we find that the market is not efficient in semi-strong form and investors can exploit the inefficiency and earn abnormal returns. The negative CARs for the "bad" news sample are also significant. Thus, no conclusion regarding the strong-form can be drawn.

7. CONCLUSIONS

This study aimed to examine whether the Lithuanian and Latvian stock markets react inefficiently to announcements of earnings, and, if so, whether it is possible to profit from these inefficiencies.

First, from Patell's Standardised residual test we find that, similarly to other studies that have examined the information content of EAs, the quarterly EAs in Lithuania and Latvia do possess information content. This implies the importance of news related to earnings for company valuation. The event day shows significant test statistics at 1% level in all considered cross-sections and test modifications; however, the significance on the other days is not uniform.

Second, from the sub-samples, which are constructed based on the "naïve" assumption that the market participants expect the earnings this year to be equal to last year, we find that the market reaction differs with respect to "good" and "bad" EAs. The Lithuanian market experiences a significant increase in price on the event day after the announcement of "good" news, with the average abnormal return of about 1.40%. After two days, the market experiences a reversal. And in total the effect lasts for about 5 days. The phenomenon of overreaction and correction suggests that the market does not react efficiently to earnings announcements. The downward movement following a decrease in profits is less extreme on the event day, but the effect pertains longer. In Latvia, abnormal returns on the event day are

not significant both for the “good” and “bad” news samples, and the effect of EAs seems to hold for longer periods without any signs of reversals.

Third, by simulating possible trading strategies we show that the semi-strong form of market efficiency holds in Lithuania, since it is not possible to earn abnormal returns, by investing on day 1, and selling on any other day in the event window. However, inefficiencies seem to exist for downward price movements. Our findings regarding the strong-form of efficiency in Lithuania show that it does not hold and it is possible to earn risk-adjusted excess returns. The Latvian market seems to provide many profitable opportunities by buying the stock on day 1, and selling it on any other day in the event window, even adjusting for fees and taxes, suggesting a clear semi-strong form inefficiency (which makes us refrain from any conclusions about the strong form). In both cases brokers have much more opportunities than private investors to exploit the inefficiencies and earn profits.

In general, the outcomes of the tests for both markets differ: the findings for Lithuania are more explainable and comparable to previous studies, whereas some findings in Latvia are rather unexpected and difficult to interpret. The differences might arise from the fact that the Latvian market was found to be less efficient in the weak form in previous studies, which casts some doubts over whether other forms of efficiency can be distinguished. Additionally, the major companies on the RSE are largely influenced by political events, which can be more important than EAs. Furthermore, given the small number of securities on RSE, the whole market can be affected by a single company, which can bias the results.

Finally, we admit that all our conclusions must be considered with caution. First, there could have been cases when EAs were posted in other sources earlier than in stock exchanges, despite the legal issues. Second, the small sample sizes in Latvia or in some cross-sections in Lithuania mean that the test statistics that use the Central Limit Theorem might be mis-specified. Third, concurrent non-earnings announcements or other factors could affect stock prices in the event-window. Fourth, our naïve assumption regarding market expectations might not be correct, as the emerging markets are usually associated with high risk but also significant increases in earnings. Finally, all studies of EMH have to test the joint-hypothesis and assume that the market model is correct, which might not always be true.

8. IMPLICATIONS OF FINDINGS

The findings of our study might have several implications for different stakeholders:

The apparent theoretical inefficiencies of both markets could be reduced by **lower fees and taxes** that currently do not allow market participants to build profitable strategies.

Especially, private investors would benefit from lower fees, because in this case it would be possible to profit from trading based on information. This would ensure more trading and more efficient market reaction to EAs. Another solution for reducing inefficiencies would be to **introduce market-makers in VSE** (as already done in RSE), who would face lower trading costs and would be obliged to provide liquidity.

Some leakage of information or insider trading, although not proven, can be implied from our findings in both countries. Thus, the EAs posted by the stock exchange lose value for investors and the average investor is put in a disadvantageous position. Consequently, **stricter insider trading prohibition** should be enforced.

Faster market reaction to EAs could be achieved by **stricter requirements regarding the free-float**, which would increase the number of shares available for trading. Consequently, market efficiency could be increased, especially with respect to "bad" news announcements.

The findings also imply that efficiency of the markets could be improved by **permission of short-selling**, whereby the reaction to "bad" news could become much faster. However, the negative effects of this policy must also not be forgotten. First, it enables manipulating the prices of illiquid stocks. Second, it makes it possible to profit from bad performance of companies, whereby managers of listed companies could aim for bad results and short-sell stocks if the insider trading prohibition does not function well.

Finally, simulated **profitable trading strategies could be employed** by some investors. Thereby, the remaining profit opportunities would be seized and the efficiency of the markets would be improved.

9. SUGGESTIONS FOR FURTHER RESEARCH

New insights into the topic of EMH could be gained by analysing the effects of other types of announcements, for instance dividends or changes in capital structure. Other methods for testing the semi-strong form of EMH, such as EGARCH, which accounts for the magnitude of the change in the earnings, would also be valuable to use as they can suggest more sophisticated trading strategies.

A new perspective towards dynamic market efficiency could be gained by analysing the intra-day adjustment of prices. This seems to be relevant, since we found that in many cases the event day exhibits the largest abnormal returns. With intra-day data, insider trading could be investigated in more detail by looking at single trades and not the closing figures.

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APPENDIX 1: RESULTS OF THE TEST FOR INFORMATION CONTENT

Table 3: **Results for the Test of Information Content for Companies from the Official and Current lists in Lithuania**

	Official List (N=121)				Current List (N=230)			
	EWP		CWP		EWP		CWP	
	OLS beta	SWB	OLS beta	SWB	OLS beta	SWB	OLS beta	SWB
Day	Z	Z	Z	Z	Z	Z	Z	Z
-10	-1.49	-1.41	-2.22 **	-2.65 ***	0.09	-0.07	0.91	0.78
-9	-0.89	-0.85	-1.79 *	-1.71 *	-0.23	-0.43	-0.16	-0.32
-8	-0.41	-0.48	-0.60	-0.57	-2.41 **	-2.30 **	-2.54 **	-2.43 **
-7	-2.05 **	-2.05 **	-1.74 *	-1.52	-0.14	-0.29	-0.66	-0.57
-6	1.19	1.01	1.19	0.98	0.08	0.24	-0.11	-0.05
-5	1.25	1.22	1.08	0.59	-2.23 **	-2.21 **	-2.01 **	-2.08 **
-4	1.19	1.01	2.45 **	2.75 ***	-4.41 ***	-4.36 ***	-4.24 ***	-4.27 ***
-3	-0.85	-0.63	-0.50	-0.37	-3.65 ***	-3.62 ***	-3.74 ***	-3.67 ***
-2	-2.24 **	-2.07 **	-1.64	-1.83 *	-0.68	-0.66	-0.54	-0.58
-1	-3.40 ***	-3.30 ***	-3.74 ***	-3.66 ***	-1.71 *	-1.66 *	-1.61	-1.61
0	**15.23** ***	**15.29** ***	**14.36** ***	**14.03** ***	**16.91** ***	**16.94** ***	**16.56** ***	**16.66** ***
1	2.00 **	2.17 **	1.61	1.59	4.83 ***	5.12 ***	4.74 ***	4.70 ***
2	-0.85	-1.02	-0.51	-0.64	2.46 **	2.21 **	2.64 ***	2.47 **
3	-0.52	-0.47	-0.04	0.05	2.34 **	2.07 **	2.96 ***	2.80 ***
4	-0.37	-0.25	-0.55	-0.53	0.32	0.24	1.18	1.33
5	-1.30	-1.18	-1.92 *	-1.80 *	-0.79	-0.87	-0.52	-0.69
6	1.25	0.96	1.94 *	1.93 *	-1.27	-1.25	-1.18	-1.01
7	1.45	1.11	1.93 *	1.93 *	-0.54	-0.34	-0.34	-0.22
8	1.33	1.18	2.38 **	2.14 **	-1.73 *	-1.71 *	-1.66 *	-1.57
9	-1.56	-1.65 *	-0.70	-0.56	0.45	0.45	0.24	0.20
10	-2.89 ***	-2.82 ***	-2.00 **	-1.79 *	-2.26 **	-2.22 **	-2.54 **	-2.69 ***

Notes: The table presents the test statistic Z_{Ut} from *(12)* with different combinations of market portfolios and beta estimation procedures. The results for the Official list companies are presented in columns 2 to 4, while columns 5 to 8 present the results for the Current list companies.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 4: **Results for the Test of Information Content for EA of Different Frequencies in Lithuania**

	Annual (N=94)	Annual and Semi-annual (N=179)	1Q and 3Q (N=172)
Day	Z	Z	Z
-10	0.01	-0.30	-1.05
-9	1.42	0.05	-1.25
-8	-2.74 ***	-2.84 ***	-0.14
-7	-1.38	0.33	-2.72 ***
-6	0.75	-1.63	5.28 ***
-5	-1.74 *	-3.53 ***	3.74 ***
-4	-1.93 *	-3.28 ***	-0.91
-3	-3.28 ***	-3.75 ***	0.50
-2	-0.71	-1.09	-0.26
-1	-0.83	-3.10 ***	-0.92
0	**12.60** ***	**14.68** ***	**18.08** ***
1	1.59	0.32	7.38 ***
2	-0.56	-1.55	3.65 ***
3	-0.80	2.06 **	0.40
4	5.67 ***	1.75 *	-1.38
5	0.44	-0.84	-1.02
6	-0.87	-1.54	0.73
7	-3.25 ***	-3.25 ***	3.68 ***
8	0.47	-0.92	-0.47
9	-1.00	0.52	-1.94 *
10	-0.93	-1.87 *	-3.33 ***

Notes: The table presents the test statistic Z_{Ut} from *(12)* with SWB and EWP. Column 2 presents results for the sample of Annual EAs; Column 3 presents results for the sample including Annual and Semi-annual EAs; Column 4 presents the results for the sample of EAs concerning first and third quarters of the year.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 5: **Results for the Test of Information Content for 2001-2002 and 2003-2004 in Lithuania**

	2001-2002 (N=114)								**2003-2004 (N=237)**							
	EWP				**CWP**				**EWP**				**CWP**			
	OLS beta		**SWB**		**OLS beta**		**SWB**		**OLS beta**		**SWB**		**OLS beta**		**SWB**	
Day	Z		Z		Z		Z		Z		Z		Z		Z	
-10	0.91		0.78		0.82		0.41		-1.62		-2.12	**	-1.24		-1.78	*
-9	-1.88	*	-1.82	*	-2.71	***	-2.76	***	0.48		-0.06		0.45		-0.01	
-8	-1.18		-1.22		-1.15		-1.10		-1.71	*	-1.99	**	-2.00	**	-2.12	**
-7	-1.48		-1.62		-1.58		-1.55		-0.70		-1.04		-0.90		-0.89	
-6	-0.27		-0.27		-0.48		-0.67		3.29	***	2.99	***	3.32	***	3.05	***
-5	-0.58		-0.56		-0.55		-0.41		-0.64		-0.92		-0.62		-1.32	
-4	-1.75	*	-1.79	*	-1.49		-1.37		-2.39	**	-2.56	**	-1.59		-1.57	
-3	0.11		0.15		0.60		0.82		-4.20	***	-4.17	***	-4.28	***	-4.36	***
-2	-2.16	**	-2.17	**	-2.27	**	-2.38	**	-0.73		-1.67	*	-0.01		-1.16	
-1	-3.59	***	-3.55	***	-3.84	***	-3.84	***	-1.91	*	-2.42	**	-1.80	*	-2.42	**
0	**5.88**	***	5.80	***	**6.07**	***	**5.99**	***	**23.20**	***	**21.29**	***	**22.07**	***	**19.84**	***
1	2.73	***	2.86	***	2.67	***	2.51	**	4.18	***	3.73	***	3.90	***	3.29	***
2	-1.31		-1.42		-1.36		-1.41		2.65	***	1.82	*	3.32	***	2.57	**
3	-1.90	*	-1.78	*	-1.48		-1.41		3.23	***	2.74	***	4.08	***	3.78	***
4	-3.38	***	-3.19	***	-3.52	***	-3.48	***	2.70	***	2.50	**	3.55	***	3.39	***
5	0.99		0.90		0.62		0.63		-2.28	**	-2.59	***	-2.24	**	-2.68	***
6	-2.36	**	-2.45	**	-2.27	**	-2.31	**	1.18		1.04		1.69	*	1.85	*
7	-0.45		-0.36		-0.56		-0.53		0.75		0.25		1.32		1.05	
8	-1.01		-0.97		-0.59		-0.55		-0.31		-0.62		0.20		-0.11	
9	-0.02		-0.10		0.17		0.22		-1.01		-1.20		-0.78		-0.86	
10	-3.71	***	-3.76	***	-3.83	***	-3.68	***	-1.87	*	-1.99	**	-1.46		-1.76	*

Notes: The table presents the test statistic Z_{Ut} from *(12)* with different combinations of market portfolios and beta estimation procedures. Columns 2 and 3 present the results for the period from 2001-2002, while the results for the period from 2003-2004 are presented in Columns 4 and 5.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 6: **Results for the Test of Information Content for Companies from the Main and I-Lists in Latvia**

	Main list (N=38)								**I-list (N=89)**							
	EWP				CWP				EWP				CWP			
	OLS beta		SWB		OLS beta		SWB		OLS beta		SWB		OLS beta		SWB	
Day	Z		Z		Z		Z		Z		Z		Z		Z	
-10	-0.41		-0.66		2.17	**	2.31	**	-2.65	***	-2.66	***	-2.45	**	-2.05	**
-9	-0.54		-0.95		0.18		-0.21		-0.91		-1.21		-0.97		-1.14	
-8	0.24		-0.26		-0.49		-1.19		0.90		0.80		0.89		0.84	
-7	-2.65	***	-2.67	***	-2.23	**	-2.41	**	2.11	**	2.55	**	3.29	***	3.20	***
-6	-2.86	***	-2.81	***	-1.96	*	-1.66	*	1.36		1.43		1.65	*	1.78	*
-5	-1.33		-0.83		2.55	**	2.53	**	0.94		0.80		0.81		0.96	
-4	-2.56	**	-2.51	**	-2.47	**	-2.51	**	-2.12	**	-2.21	**	-2.55	**	-2.48	**
-3	0.55		0.72		4.20	***	6.85	***	2.64	***	2.82	***	2.67	***	3.65	***
-2	-2.84	***	-2.85	***	-0.77		0.17		0.99		1.03		1.91	*	1.64	
-1	-0.20		-0.15		-0.20		-0.81		3.99	***	4.06	***	3.96	***	3.94	***
0	**0.87**		**1.14**		**5.87**	***	**8.94**	***	**5.10**	***	**4.81**	***	**6.02**	***	**6.63**	***
1	-2.10	**	-2.15	**	4.74	***	7.98	***	0.88		0.73		0.84		1.03	
2	-2.20	**	-2.07	**	-1.45		-1.25		3.76	***	4.04	***	4.15	***	4.48	***
3	4.07	***	4.11	***	4.30	***	4.43	***	2.73	***	2.96	***	3.28	***	3.28	***
4	9.84	***	9.71	***	0.34		4.71	***	1.82	*	1.47		1.71	*	1.64	
5	8.51	***	8.42	***	6.95	***	8.68	***	3.56	***	3.72	***	4.47	***	4.91	***
6	6.79	***	6.63	***	4.72	***	3.69	***	-2.50	**	-2.62	***	-1.49		-1.29	
7	6.17	***	6.18	***	-0.42		4.26	***	0.17		0.55		0.70		1.05	
8	9.19	***	9.35	***	2.22	**	6.81	***	0.22		-0.19		1.10		0.71	
9	-1.63		-1.82	*	0.04		-0.34		0.22		0.23		1.06		0.94	
10	15.73	***	15.88	***	16.22	***	16.85	***	3.79	***	3.37	***	3.60	***	3.16	***

Notes: The table presents the test statistic Z_{Ut} from *(12)* with different combinations of market portfolios and beta estimation procedures. The results for the Main list companies are presented in Columns 2 to 4, while Columns 5 to 8 present the results for the I-list companies.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 7: **Results for the Test of Information Content for EA of Different Frequencies in Latvia**

Day	Annual (N=51) Z		Annual and semi-annual (N=74) Z		Quarterly (N=54) Z	
-10	-1.58		-2.07	**	-1.45	
-9	-0.46		-1.00		-1.15	
-8	-0.68		-0.39		1.91	*
-7	0.99		0.65		0.91	
-6	-1.61		-2.51	**	2.43	**
-5	-2.52	**	-2.81	***	4.67	***
-4	-2.54	**	-2.00	**	-3.36	***
-3	-1.06		-1.17		5.09	***
-2	0.97		-0.05		-1.04	
-1	0.96		-0.20		5.40	***
0	**4.75**	***	6.21	***	-0.38	
1	1.04		0.82		-1.97	**
2	-0.99		-1.32		4.28	***
3	2.95	***	1.75	*	4.74	***
4	0.24		8.71	***	-0.42	
5	4.47	***	4.97	***	5.97	***
6	2.22	**	0.95		1.25	
7	-1.54		6.63	***	-2.04	**
8	2.12	**	8.21	***	-1.86	*
9	-0.69		-1.27		0.22	
10	12.19	***	10.00	***	5.59	***

Notes: The table presents the test statistic Z_{Ut} from *(12)* using SWB and EWP. Column 2 presents results for the sample of Annual EAs; Column 3 presents the results for the sample including Annual and Semi-annual EAs; Column 4 presents the results for the sample of EAs concerning the first and third quarters of the year.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 8: **Results for the Test of Information Content for 2001-2002 and 2003-2004 in Latvia**

	2001-2002 (N=46)								2003-2004 (N=81)							
	EWP				CWP				EWP				CWP			
	OLS beta		SWB		OLS beta		SWB		OLS beta		SWB		OLS beta		SWB	
Day	Z		Z		Z		Z		Z		Z		Z		Z	
-10	-0.94		-0.98		-0.76		-0.82		-2.31	**	-2.44	**	-0.45		0.18	
-9	0.47		0.05		0.14		-0.23		-1.61		-1.89	*	-0.91		-1.07	
-8	1.39		0.91		1.36		0.42		-0.07		-0.13		-0.54		-0.39	
-7	0.28		0.50		1.27		1.06		0.31		0.59		1.11		1.05	
-6	-1.21		-1.10		-1.30		-1.17		0.54		0.55		1.54		1.74	*
-5	-0.76		-0.45		0.61		0.89		0.61		0.58		2.15	**	2.10	**
-4	-1.74	*	-1.81	*	-1.67	*	-1.60		-3.10	***	-3.15	***	-3.44	***	-3.44	***
-3	5.24	***	5.50	***	9.01	***	13.29	***	-1.01		-0.91		-1.28		-1.67	*
-2	1.87	*	2.00	**	4.18	***	4.83	***	-2.32	**	-2.34	**	-1.80	*	-2.07	**
-1	5.23	***	5.30	***	5.11	***	5.13	***	0.26		0.32		0.32		-0.14	
0	**4.70**	***	**4.63**	***	**9.47**	***	**13.53**	***	**2.40**	**	**2.34**	**	**3.15**	***	**2.71**	***
1	0.92		0.91		5.48	***	8.92	***	-1.26		-1.43		-0.04		-0.21	
2	1.48		1.93	*	1.57		1.73	*	0.56		0.62		1.59		1.84	*
3	-0.17		-0.09		0.19		0.40		5.36	***	5.62	***	5.85	***	5.80	***
4	10.90	***	10.70	***	2.76	***	6.97	***	0.45		0.13		-0.04		-0.32	
5	6.39	***	6.58	***	6.89	***	9.01	***	4.94	***	4.89	***	4.47	***	4.50	***
6	-1.89	*	-2.03	**	-2.00	**	-2.21	**	3.64	***	3.50	***	3.37	***	3.00	***
7	7.33	***	7.46	***	1.11		6.04	***	-1.24		-0.93		-0.48		-0.62	
8	11.27	***	11.04	***	3.83	***	7.68	***	-1.97	**	-2.12	**	-0.16		-0.33	
9	-1.73	*	-1.84	*	-1.84	*	-2.00	**	0.24		0.25		2.36	**	2.14	**
10	4.57	***	4.43	***	5.69	***	6.73	***	11.19	***	10.99	***	10.55	***	9.81	***

Notes: The table presents the test statistic Z_{Ut} from *(12)* with different combinations of market portfolios and beta estimation procedures. Columns 2 and 3 present the results for the period from 2001-2002, while the results for the period from 2003-2004 are presented in columns 4 and 5.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

APPENDIX 2: RESULTS OF THE STANDARDISED CROSS-SECTIONAL TEST

Table 9: **Results of the Standardised Cross-Sectional Test for the "Good" News Sample in Lithuania**

	EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.05%	0.17		0.04%	0.10	
-9	0.09%	-0.10		0.09%	-0.02	
-8	-0.24%	-0.97		-0.32%	-1.26	
-7	0.20%	1.43		0.13%	1.11	
-6	0.24%	1.12		0.21%	1.09	
-5	-0.07%	-0.33		-0.16%	-0.75	
-4	0.02%	0.02		0.07%	0.30	
-3	-0.25%	-1.37		-0.32%	-1.87	*
-2	-0.11%	-0.33		-0.16%	-0.53	
-1	-0.10%	-0.93		-0.12%	-0.98	
0	**1.39%**	**5.19**	***	**1.37%**	**5.11**	***
1	0.21%	1.23		0.28%	1.35	
2	-0.35%	-2.23	**	-0.22%	-1.58	
3	-0.05%	-0.29		0.02%	0.01	
4	0.00%	-0.33		0.10%	0.23	
5	-0.36%	-2.46	**	-0.26%	-1.83	*
6	-0.23%	-1.13		-0.27%	-1.41	
7	-0.06%	0.39		-0.09%	0.31	
8	-0.25%	-1.15		-0.17%	-0.74	
9	0.16%	0.99		0.15%	1.04	
10	0.02%	-0.56		0.05%	-0.11	

Notes: The table presents the test statistic J_t from *(13)* for the sample of "good" news announcements (N=165) with SWB. The average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 and 3 present the results for the equally weighted portfolio, while Columns 4 and 5 present the results for the capitalisation weighted portfolio.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 10: **Results of the Standardised Cross-Sectional Test for the "Good" News Sample of Official and Current list companies in Lithuania**

	Main list (N=59)						**Current list (N=106)**					
	EWP			CWP			EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.08%	-0.36		0.01%	0.02		0.03%	0.18		0.06%	0.25	
-9	0.04%	-0.39		-0.01%	-0.30		0.12%	0.11		0.15%	0.27	
-8	-0.11%	-0.66		-0.22%	-0.51		-0.31%	-0.84		-0.38%	-1.09	
-7	0.11%	0.77		0.09%	0.78		0.24%	1.20		0.15%	0.80	
-6	0.24%	0.62		0.20%	0.80		0.24%	0.80		0.22%	0.90	
-5	0.11%	0.42		0.06%	0.68		-0.18%	-0.88		-0.27%	-1.19	
-4	0.29%	0.78		0.30%	0.66		-0.13%	-0.68		-0.06%	-0.39	
-3	-0.68%	-2.08	**	-0.66%	-2.06	**	-0.01%	-0.02		-0.13%	-0.70	
-2	-0.03%	-0.42		0.00%	-0.58		-0.15%	0.03		-0.26%	-0.36	
-1	-0.06%	-0.18		0.03%	-0.70		-0.12%	-0.65		-0.20%	-1.04	
0	**1.38%**	**3.40**	***	**1.39%**	**3.44**	***	**1.40%**	**3.88**	***	**1.36%**	**3.81**	***
1	0.31%	1.80	*	0.47%	1.51		0.16%	0.39		0.17%	0.35	
2	-0.65%	-2.78	***	-0.61%	-3.05	***	-0.19%	-0.71		-0.01%	-0.12	
3	-0.21%	-0.66		-0.24%	-0.71		0.04%	0.20		0.16%	0.54	
4	-0.30%	-1.20		-0.24%	-1.73	*	0.17%	0.45		0.29%	0.80	
5	-0.59%	-1.76	*	-0.48%	-2.23	**	-0.22%	-1.25		-0.13%	-0.85	
6	0.23%	0.42		0.12%	0.77		-0.48%	-2.79	***	-0.48%	-3.06	***
7	0.25%	1.13		0.21%	1.29		-0.24%	-0.68		-0.26%	-0.72	
8	-0.24%	-0.65		-0.19%	-0.77		-0.26%	-0.85		-0.17%	-0.38	
9	0.23%	1.20		0.28%	1.07		0.13%	0.38		0.09%	0.30	
10	0.17%	1.08		0.30%	0.36		-0.07%	-1.03		-0.08%	-1.04	

Notes: The table presents the test statistic J_t from *(13)* with SWB for the samples of "good" EA of Official and Current list companies. The average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 to 5 present the results for Official list companies, while Columns 6 and 9 present the results for the Current list companies.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 11: **Results of the Standardised Cross-Sectional test for the "Good" EAs of Different Frequencies in Lithuania**

	Annual (N=35)			Annual and Semi-Annual (N=80)			1Q and 3Q (N=85)			1Q (N=40)		
Day	$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.28%	0.88		0.35%	1.05		-0.23%	-0.70		-0.24%	-0.20	
-9	-0.12%	-0.25		0.27%	0.70		-0.08%	-0.84		-0.78%	-2.50	**
-8	-0.06%	-0.14		-0.09%	-0.37		-0.38%	-0.96		-0.03%	0.27	
-7	0.37%	1.39		0.45%	1.98	**	-0.04%	-0.24		-0.01%	0.15	
-6	0.53%	1.15		0.39%	1.33		0.10%	0.38		0.17%	0.35	
-5	0.29%	0.74		0.34%	1.54		-0.46%	-1.64		-0.36%	-0.64	
-4	-0.44%	-1.02		-0.16%	-0.51		0.18%	0.51		0.38%	1.13	
-3	-0.42%	-0.86		-0.43%	-1.66	*	-0.08%	-0.22		0.12%	0.48	
-2	0.35%	1.01		0.18%	0.97		-0.37%	-1.48		-0.28%	-1.04	
-1	0.17%	0.53		0.15%	0.60		-0.34%	-1.68	*	-0.49%	-1.84	*
0	**0.83%**	**1.78**	*	**1.26%**	**3.93**	***	**1.52%**	**3.45**	***	**2.43%**	**4.34**	***
1	0.13%	0.43		0.15%	0.85		0.27%	0.89		0.29%	0.88	
2	-0.32%	-0.72		-0.14%	-0.67		-0.56%	-2.35	**	-0.86%	-2.19	**
3	-0.12%	-0.42		0.13%	0.35		-0.22%	-0.85		-0.40%	-0.75	
4	-0.06%	-0.40		-0.15%	-0.84		0.14%	0.20		0.25%	0.32	
5	-0.20%	-0.45		-0.10%	-0.37		-0.60%	-3.02	***	-0.81%	-3.26	***
6	-0.03%	-0.09		-0.20%	-0.82		-0.25%	-0.77		-0.52%	-1.15	
7	-0.29%	-0.36		-0.29%	-0.59		0.16%	0.94		0.04%	0.54	
8	-0.40%	-0.47		-0.45%	-1.51		-0.07%	-0.18		-0.52%	-0.80	
9	0.36%	0.87		0.26%	1.02		0.08%	0.36		-0.23%	-0.41	
10	0.20%	0.29		0.11%	0.05		-0.08%	-0.82		-0.28%	-1.31	

Notes: The table presents the test statistic J_t from *(13)* with SWB for the samples of "good" earnings announcements for EA of different announcement frequencies. Average abnormal returns are provided along with *J* values for each day in the event window. Columns 2 and 3 present the results for the sample of annual EAs; Columns 4 and 5 present the results for the sample including annual and semi-annual EA; Columns 6 and 7 present the results for the sample of EA concerning first and third quarters; while, Columns 7 and 8 present the results for the sample of EAs concerning the first quarter of the year.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 12: **Results of the Standardised Cross-Sectional Test for the "Good" News Announcements for 2001-2002 and 2003-2004 in Lithuania**

	2001-2002 (N=43)						2003-2004 (N=122)					
	EWP			CWP			EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.88%	2.06	**	0.89%	1.97	**	-0.24%	-1.03		-0.25%	-1.13	
-9	0.18%	-0.08		0.11%	-0.18		0.06%	-0.06		0.08%	0.11	
-8	-0.33%	-0.37		-0.47%	-0.53		-0.21%	-0.91		-0.27%	-1.15	
-7	-0.03%	0.36		-0.04%	0.36		0.27%	1.44		0.19%	1.07	
-6	0.13%	0.19		-0.04%	-0.20		0.28%	1.16		0.30%	1.31	
-5	0.39%	1.20		0.15%	0.60		-0.24%	-0.95		-0.26%	-1.12	
-4	0.33%	0.76		0.38%	0.88		-0.09%	-0.49		-0.04%	-0.25	
-3	-0.60%	-1.44		-0.58%	-1.38		-0.12%	-0.59		-0.22%	-1.28	
-2	0.02%	0.14		0.02%	0.14		-0.15%	-0.48		-0.23%	-0.73	
-1	0.00%	-0.22		0.06%	-0.05		-0.14%	-0.98		-0.18%	-1.14	
0	**1.31%**	**2.50**	**	**1.54%**	**2.90**	***	**1.42%**	**4.53**	***	**1.31%**	**4.22**	***
1	-0.49%	-0.36		-0.22%	-0.02		0.46%	1.73	*	0.46%	1.63	
2	0.05%	-0.38		0.06%	-0.41		-0.49%	-2.31	**	-0.32%	-1.55	
3	-0.25%	-0.89		-0.12%	-0.58		0.02%	0.11		0.07%	0.28	
4	-0.20%	-0.70		-0.17%	-0.54		0.07%	-0.07		0.19%	0.44	
5	-0.81%	-1.51		-0.78%	-1.48		-0.19%	-1.93	*	-0.07%	-1.16	
6	-0.30%	-0.81		-0.43%	-1.05		-0.20%	-0.85		-0.21%	-1.05	
7	-0.20%	0.25		-0.26%	0.13		-0.01%	0.30		-0.03%	0.29	
8	-1.30%	-3.26	***	-1.25%	-2.99	***	0.11%	0.52		0.21%	0.85	
9	0.01%	-0.24		-0.04%	-0.41		0.22%	1.16		0.23%	1.26	
10	0.26%	0.67		0.20%	0.55		-0.07%	-1.10		0.00%	-0.44	

Notes: The table presents the test statistic J_t from (*13)* with SWB. Average abnormal returns are provided along with *J* values for each day in the event window. Columns 2 to 5 present the results for the period from 2001-2002, while the results for the period from 2003-2004 are presented in Columns 6 to 9.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 13: **Results of the Standardised Cross-Sectional Test for the "Good" News Sample in Latvia**

	EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.36%	1.06		0.39%	1.08	
-9	0.22%	0.46		0.26%	0.52	
-8	-0.33%	-0.89		-0.17%	-0.53	
-7	0.22%	0.38		0.23%	0.43	
-6	0.03%	0.17		0.17%	0.61	
-5	0.70%	2.18	**	0.60%	1.90	*
-4	-0.19%	-0.74		-0.26%	-0.87	
-3	0.22%	0.73		0.17%	0.69	
-2	0.59%	2.02	**	0.59%	1.96	**
-1	0.42%	0.67		0.17%	0.34	
0	**0.33%**	0.75		**0.14%**	**0.42**	
1	0.09%	-0.01		-0.10%	-0.39	
2	0.86%	2.10	**	0.27%	0.71	
3	0.51%	1.46		0.43%	1.54	
4	0.22%	0.88		0.29%	1.05	
5	0.02%	0.09		0.04%	0.22	
6	0.58%	0.74		0.76%	1.28	
7	-0.34%	-1.13		-0.48%	-1.35	
8	-0.22%	-0.27		0.02%	0.59	
9	0.05%	0.11		-0.09%	-0.12	
10	0.67%	1.61		0.79%	1.81	*

Notes: The table presents the test statistic J_t from *(13)* for the sample of "good" news announcements (N=49) with SWB. Average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 and 3 present the results for the equally weighted portfolio, while Columns 4 and 5 present the results for the capitalisation weighted portfolio.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

***Table 14*: Results of the Standardised Cross-Sectional Test for the "Bad" News Sample in Lithuania**

	EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.24%	1.18		0.13%	0.64	
-9	0.11%	0.80		0.07%	0.52	
-8	0.32%	1.61		0.35%	1.55	
-7	0.23%	0.95		0.23%	0.98	
-6	-0.28%	-1.52		-0.23%	-1.44	
-5	-0.30%	-1.53		-0.37%	-1.72	*
-4	-0.12%	-1.15		-0.15%	-1.17	
-3	-0.19%	-0.42		-0.25%	-0.44	
-2	0.43%	1.88	*	0.41%	1.71	*
-1	-0.33%	-1.36		-0.42%	-1.89	*
0	**-0.56%**	**-1.52**		-0.60%	-1.61	
1	-0.20%	-1.37		-0.13%	-1.11	
2	-0.01%	-0.06		0.02%	0.21	
3	-0.14%	-0.40		-0.13%	-0.32	
4	-0.16%	-0.46		-0.17%	-0.43	
5	-0.15%	-0.43		-0.17%	-0.51	
6	0.19%	0.72		0.17%	0.63	
7	-0.09%	-0.11		-0.01%	0.37	
8	0.37%	1.76	*	0.38%	1.85	*
9	-0.47%	-2.39	**	-0.46%	-2.27	**
10	-0.38%	-1.99	**	-0.28%	-1.46	

Notes: The table presents the test statistic J_t from *(13)* for the sample of "bad" news announcements (N=126) with SWB. The average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 and 3 present the results for the equally weighted portfolio, while Columns 4 and 5 present the results for the capitalisation weighted portfolio.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 15: **Results of the Standardised Cross-Sectional Test for the "Bad" News Sample of Official and Current List Companies in Lithuania**

	Official list (N=38)						**Current list (N=88)**					
	EWP			CWP			EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J		$\overline{AR}$	J	
-10	0.10%	0.88		-0.02%	0.70		0.30%	0.79		0.20%	0.25	
-9	0.21%	1.19		0.10%	0.69		0.06%	0.26		0.06%	0.25	
-8	0.08%	0.42		0.16%	0.63		0.42%	1.66	*	0.44%	1.44	
-7	-0.42%	-2.10	**	-0.55%	-2.53	**	0.52%	1.95	*	0.57%	2.31	**
-6	-0.40%	-1.79	*	-0.49%	-2.24	**	-0.23%	-0.62		-0.12%	-0.28	
-5	-0.08%	-0.61		-0.16%	-0.84		-0.40%	-1.65	*	-0.46%	-1.61	
-4	-0.27%	-1.20		-0.32%	-1.31		-0.06%	-0.55		-0.07%	-0.43	
-3	-0.08%	0.17		-0.10%	0.10		-0.24%	-0.67		-0.31%	-0.67	
-2	-0.11%	-0.74		-0.21%	-0.94		0.66%	2.29	**	0.68%	2.40	**
-1	-0.34%	-1.19		-0.60%	-2.45	**	-0.32%	-0.90		-0.34%	-0.90	
0	**-0.93%**	**-2.16**	**	**-0.97%**	**-2.42**	**	**-0.40%**	**-0.45**		**-0.45%**	**-0.47**	
1	-0.13%	-0.60		-0.16%	-0.65		-0.23%	-1.23		-0.12%	-0.91	
2	-0.06%	-0.42		-0.07%	-0.29		0.00%	0.16		0.06%	0.42	
3	0.10%	0.63		-0.10%	-0.20		-0.24%	-0.72		-0.15%	-0.26	
4	-0.14%	-0.44		-0.18%	-0.47		-0.16%	-0.25		-0.16%	-0.21	
5	0.16%	0.51		0.13%	0.50		-0.28%	-0.70		-0.29%	-0.74	
6	-0.41%	-1.71	*	-0.50%	-1.91	*	0.45%	1.52		0.46%	1.51	
7	0.00%	0.43		0.11%	1.04		-0.13%	-0.32		-0.06%	-0.07	
8	0.52%	2.10	**	0.48%	1.77	*	0.31%	0.90		0.34%	1.09	
9	-0.07%	-0.30		-0.37%	-1.12		-0.64%	-2.48	**	-0.49%	-1.97	**
10	-0.20%	-1.08		-0.19%	-0.96		-0.46%	-1.67	*	-0.32%	-1.12	

Notes: The table presents the test statistic J_t from *(13)* with SWB for the samples of "bad" EA of Official and Current list companies. The average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 to 5 present the results for Official list companies, while columns 6 and 9 present the results for the Current list companies.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 16: **Results of the Standardised Cross-Sectional Test for the "Bad" News Sample in Latvia**

	EWP			CWP		
Day	$\overline{AR}$	J		$\overline{AR}$	J	
-10	-0.46%	-1.06		-0.51%	-1.16	
-9	0.33%	0.98		-0.02%	0.47	
-8	-0.02%	0.01		-0.17%	-0.22	
-7	0.03%	-0.64		0.40%	-0.01	
-6	0.21%	0.38		0.13%	-0.06	
-5	0.34%	1.06		0.07%	-0.43	
-4	-0.62%	-2.12	**	-0.62%	-2.15	**
-3	-0.19%	-0.16		-0.79%	-1.01	
-2	0.07%	0.22		-0.24%	-0.52	
-1	-0.34%	-0.16		-0.07%	0.46	
0	**0.24%**	**0.08**		**-0.32%**	**-0.61**	
1	-1.10%	-2.61	***	-1.95%	-2.64	***
2	-0.75%	-1.14		-0.72%	-0.99	
3	0.05%	-0.02		0.36%	0.78	
4	-0.31%	-0.27		0.09%	0.20	
5	0.81%	1.31		0.16%	0.14	
6	-0.58%	-1.79	*	-0.34%	-1.51	
7	0.71%	0.89		0.71%	0.67	
8	-0.04%	-0.30		-0.37%	-0.80	
9	-0.70%	-1.01		-0.66%	-0.51	
10	-0.32%	-0.46		-0.55%	-0.94	

Notes: The table presents the test statistic J_t from *(13)* for the sample of "bad" news announcements (N=34) with SWB. The average abnormal returns are provided along with the *J* values for each day in the event window. Columns 2 and 3 present the results for the equally weighted portfolio, while Columns 4 and 5 present the results for the capitalisation weighted portfolio.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 17: **Results of the Standardised Cross-Sectional Test for the Full News Sample in Lithuania**

	All news (N=351)				**Official list (N=121)**				**Current list (N=230)**			
	EWP		CWP		EWP		CWP		EWP		CWP	
Day	J		J		J		J		J		J	
-10	1.31		0.90		1.55		1.55		0.81		0.68	
-9	0.37		0.19		0.41		0.41		0.35		0.34	
-8	0.01		-0.32		-0.21		-0.21		0.43		-0.03	
-7	1.36		1.00		-0.31		-0.31		1.74	*	1.60	
-6	0.15		0.13		-0.12		-0.12		-0.23		0.00	
-5	-0.96		-1.45		0.26		0.26		-1.22		-1.60	
-4	-0.54		-0.25		-0.13		-0.13		-0.68		-0.27	
-3	-1.22		-1.51		-1.11		-1.11		-0.97		-1.30	
-2	1.20		1.03		-0.96		-0.96		1.87	*	1.73	*
-1	-1.62		-1.96	**	-0.84		-0.84		-1.36		-1.41	
0	**2.61**	***	**2.54**	**	**2.02**	**	**2.02**	**	**1.99**	**	**1.90**	*
1	0.18		0.26		1.31		1.31		-0.61		-0.48	
2	-1.99	**	-1.46		-2.78	***	-2.78	***	-1.05		-0.49	
3	0.14		0.30		0.43		0.43		0.13		0.58	
4	0.35		0.48		-0.16		-0.16		0.50		0.62	
5	-1.43		-1.14		-1.14		-1.14		-1.01		-0.80	
6	-0.65		-1.10		0.40		0.40		-1.19		-1.31	
7	0.10		0.12		1.27		1.27		-0.79		-0.69	
8	0.13		0.33		0.45		0.45		0.19		0.47	
9	-0.73		-0.97		0.28		0.28		-1.03		-0.92	
10	-1.81	*	-0.97		-0.52		-0.52		-1.94	*	-1.50	

Notes: The table presents the test statistic *J* from *(13)* with SWB. The results for the sample, including all quarterly news announcements are presented in Columns 2 and 3. Columns 3-4 present the results for the sample with the news announcements of the Official list companies, while Columns 5-6 present the results for Current list companies.

*denotes significance at 10% level; **denotes significance at 5% level; ***denotes significance at 1% level.

APPENDIX 3: RESULTS OF THE CUMULATIVE ABNORMAL RETURNS TEST

***Table 18*: CAR Test Results for Lithuania for the Period [1; 20]**

	Good news (N=165)							**Bad news (N=126)**		
				Broker		Individual				
Days in acc.	CAR	Z		CAR	Z	CAR	Z	CAR	Z	
1	0.21%	1.62		-0.12%	-0.43	-0.82%	-4.63	-0.20%	-1.44	
1-2	-0.14%	-0.65		-0.42%	-1.83	-1.12%	-4.80	-0.22%	-1.06	
1-3	-0.19%	-0.71		-0.46%	-1.65	-1.16%	-4.07	-0.35%	-1.11	
1-4	-0.19%	-0.76		-0.46%	-1.55	-1.16%	-3.65	-0.51%	-1.21	
1-5	-0.55%	-1.63		-0.76%	-2.19	-1.46%	-4.07	-0.66%	-1.27	
1-6	-0.78%	-1.96	**	-0.96%	-2.40	-1.66%	-4.12	-0.46%	-0.88	
1-7	-0.84%	-1.65	*	-1.01%	-2.08	-1.71%	-3.67	-0.56%	-0.85	
1-8	-1.09%	-1.98	**	-1.23%	-2.32	-1.93%	-3.81	-0.18%	-0.23	
1-9	-0.93%	-1.56		-1.09%	-1.93	-1.79%	-3.33	-0.65%	-1.00	
1-10	-0.91%	-1.62		-1.08%	-1.95	-1.78%	-3.27	-1.03%	-1.53	
1-11	-1.16%	-1.93	*	-1.28%	-2.18	-1.98%	-3.45	-1.17%	-1.77	*
1-12	-1.13%	-1.71	*	-1.26%	-1.97	-1.96%	-3.19	-1.08%	-1.57	
1-13	-1.35%	-1.89	*	-1.44%	-2.10	-2.14%	-3.27	-0.87%	-1.15	
1-14	-1.44%	-1.90	*	-1.52%	-2.10	-2.22%	-3.22	-1.03%	-1.26	
1-15	-1.85%	-2.41	**	-1.87%	-2.52	-2.57%	-3.60	-0.61%	-0.39	
1-16	-2.16%	-2.84	***	-2.13%	-2.86	-2.83%	-3.91	-0.22%	0.25	
1-17	-2.18%	-2.63	***	-2.15%	-2.67	-2.85%	-3.69	-0.31%	0.03	
1-18	-2.46%	-3.04	***	-0.12%	-3.01	-3.10%	-4.00	-0.27%	0.08	
1-19	-2.53%	-3.06	***	-0.42%	-3.01	-3.15%	-3.98	-0.09%	0.18	
1-20	-2.61%	-3.04	***	-0.46%	-2.99	-3.22%	-3.92	-0.11%	0.12	

Notes: Columns 2,3 and 6,7 present the test statistic Z_{wt} from *(15)* with SWB and EWP. *CAR*, accumulated from the end of day 0 up to day 20 are presented along with the *Z* values. A two-tailed test is considered, which assumes no information and trading costs, and no restrictions on short-selling. The Columns 4 to 7 present the results after accounting for trading costs for the "good" news sample. A one-tailed test is considered, since it is assumed that due to restrictions on short-selling, it is not possible to directly profit from negative news.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

***Table 19:* CAR Test Results for Latvia for the Period [1; 20]**

	Good news (N=49)								**Bad news (N=35)**		
				Broker			Individual				
Days in acc.	CAR	Z		CAR	Z		CAR	Z	CAR	Z	
1	0.09%	-0.01		-0.03%	-0.33		-0.64%	-2.29	-1.10%	-2.83	***
1-2	0.94%	1.73	*	0.70%	1.24		0.01%	-0.32	-1.83%	-2.96	***
1-3	1.45%	2.92	***	1.13%	2.30	**	0.39%	-1.32	-1.77%	-2.36	**
1-4	1.67%	3.00	***	1.32%	2.39	***	0.55%	1.11	-2.05%	-2.13	**
1-5	1.69%	2.75	***	1.33%	2.19	**	0.57%	-1.02	-1.29%	-1.35	
1-6	2.27%	2.92	***	1.83%	2.35	***	1.00%	1.26	-1.86%	-2.02	**
1-7	1.93%	2.34	**	1.54%	1.87	**	0.75%	-0.87	-1.16%	-1.50	
1-8	1.71%	2.10	**	1.35%	1.67	**	0.58%	0.77	-1.21%	-1.55	
1-9	1.76%	2.01	**	1.40%	1.60	*	0.62%	-0.76	-1.85%	-1.71	*
1-10	2.43%	2.90	***	1.97%	2.36	***	1.12%	1.45	*	-2.10%	-1.64	
1-11	2.47%	2.68	***	2.00%	2.18	**	1.15%	-0.69	-2.05%	-1.90	*
1-12	2.00%	2.21	**	1.60%	1.79	**	0.80%	1.00	-2.25%	-2.14	**
1-13	2.52%	2.51	**	2.05%	2.04	**	1.19%	-0.63	-1.21%	-1.08	
1-14	2.35%	2.13	**	1.89%	1.73	**	1.06%	0.99	-1.68%	-1.04	
1-15	2.48%	2.20	**	2.01%	1.79	**	1.16%	-0.59	-1.51%	-1.23	
1-16	3.06%	2.81	***	2.50%	2.31	**	1.59%	1.54	*	-2.35%	-1.72	*
1-17	3.57%	3.09	***	2.93%	2.55	***	1.97%	-0.56	-1.98%	-1.61	
1-18	2.50%	2.18	**	2.03%	1.78	**	1.18%	1.10	-1.38%	-1.30	
1-19	2.06%	1.83	*	1.65%	1.48	*	0.84%	-0.53	-2.54%	-1.73	*
1-20	2.22%	1.90	*	1.79%	1.54	*	0.97%	0.92	-2.14%	-1.50	

Notes: Columns 2,3 and 6,7 present the test statistic Z_{wt} from *(15)* with SWB and EWP. *CAR*, accumulated from the end of day 0 up to day 20 are presented along with the *Z* values. A two-tailed test is considered, which assumes no information and trading costs, and no restrictions on short-selling. The Columns 4 to 7 present the results after accounting for trading costs for the "good" news sample. A one-tailed test is considered, since it is assumed that due to restrictions on short-selling, it is not possible to profit from negative news.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

Table 20: **CAR Test Results for Lithuania for the Period [0; 20]**

Days in acc.	Good news (N=165)								Bad news (N=126)		
				Broker			Individual				
	CAR	Z		CAR	Z		CAR	Z	CAR	Z	
0	1.39%	8.44	***	0.88%	5.38	***	0.18%	1.17	-0.56%	-2.51	**
0-1	1.61%	7.11	***	1.07%	4.77	***	0.37%	1.80 **	-0.76%	-2.79	***
0-2	1.25%	4.34	***	0.77%	2.65	***	0.07%	0.22	-0.78%	-2.31	**
0-3	1.20%	3.60	***	0.72%	2.16	**	0.02%	0.06	-0.91%	-2.22	**
0-4	1.20%	3.09	***	0.72%	1.82	**	0.02%	-0.06	-1.07%	-2.21	**
0-5	0.85%	1.96	**	0.42%	0.93		-0.28%	-0.79	-1.22%	-2.18	**
0-6	0.62%	1.37		0.23%	0.49		-0.47%	-1.10	-1.02%	-1.76	*
0-7	0.56%	1.44		0.17%	0.59		-0.53%	-0.89	-1.11%	-1.68	*
0-8	0.30%	0.94		-0.04%	0.20		-0.74%	-1.20	-0.74%	-1.05	
0-9	0.47%	1.19		0.10%	0.44		-0.60%	-0.89	-1.21%	-1.74	*
0-10	0.48%	1.00		0.11%	0.31		-0.59%	-0.96	-1.59%	-2.22	**
0-11	0.24%	0.62		-0.10%	- 0.02		-0.80%	-1.23	-1.73%	-2.53	**
0-12	0.26%	0.76		-0.08%	0.10		-0.78%	-1.07	-1.64%	-2.40	**
0-13	0.05%	0.49		-0.26%	- 0.11		-0.96%	-1.23	-1.43%	-2.00	**
0-14	-0.04%	0.40		-0.34%	- 0.17		-1.04%	-1.26	-1.59%	-2.18	**
0-15	-0.45%	-0.27		-0.69%	- 0.64		-1.39%	-1.69	-1.17%	-1.21	
0-16	-0.76%	-0.88		-0.95%	- 1.04		-1.65%	-2.06	-0.78%	-0.46	
0-17	-0.79%	-0.72		-0.97%	- 0.90		-1.67%	-1.89	-0.87%	-0.73	
0-18	-1.07%	-1.35		-1.21%	- 1.28		-1.91%	-2.25	-0.83%	-0.66	
0-19	-1.14%	-1.47		-1.27%	- 1.33		-1.97%	-2.27	-0.65%	-0.52	
0-20	-1.22%	-1.55		-1.33%	- 1.35		-2.03%	-2.26	-0.67%	-0.60	

Notes: Columns 2,3 and 6,7 present the test statistic Z_{wt} from *(15)* with SWB and EWP. *CAR*, accumulated from the beginning of day 0 up to day 20, are presented along with the *Z* values. A two-tailed test is considered, which assumes no information and trading costs, and no restrictions on short-selling. Columns 4 to 7 present the results after accounting for trading costs for the "good" news sample. A one-tailed test is considered, since it is assumed that due to restrictions on short-selling, it is not possible to profit from negative news.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

***Table 21*: CAR Test Results for Latvia for the Period [0; 20]**

Days in acc.	Good news(N=49)								Bad news (N=35)		
				Broker			Individual				
	CAR	Z		CAR	Z		CAR	Z	CAR	Z	
0	0.33%	0.95		0.18%	0.48		-0.45%	-1.57	0.20%	-0.19	
0-1	0.41%	0.67		0.25%	0.34		-0.39%	-1.11	-0.89%	-2.14	**
0-2	1.27%	1.96	*	0.98%	1.48		0.25%	0.15	-1.62%	-2.52	**
0-3	1.78%	3.01	***	1.41%	2.39	**	0.64%	1.11	-1.56%	-2.14	**
0-4	2.00%	3.11	***	1.60%	2.50	**	0.80%	1.31	-1.85%	-1.99	**
0-5	2.02%	2.90	***	1.61%	2.33	**	0.81%	1.24	-1.09%	-1.31	
0-6	2.60%	3.07	***	2.11%	2.48	**	1.25%	1.44	-1.65%	-1.94	*
0-7	2.26%	2.53	**	1.82%	2.04	**	0.99%	1.09	-0.95%	-1.47	
0-8	2.04%	2.30	**	1.63%	1.84	*	0.83%	0.96	-1.00%	-1.53	
0-9	2.09%	2.21	**	1.68%	1.77	*	0.87%	0.94	-1.64%	-1.68	*
0-10	2.76%	3.05	***	2.25%	2.49	**	1.37%	1.60	-1.90%	-1.62	
0-11	2.80%	2.84	***	2.28%	2.32	**	1.40%	1.47	-1.85%	-1.87	*
0-12	2.33%	2.39	**	1.88%	1.94	*	1.05%	1.16	-2.04%	-2.11	**
0-13	2.85%	2.67	***	2.32%	2.19	**	1.44%	1.40	-1.01%	-1.09	
0-14	2.67%	2.31	**	2.17%	1.88	*	1.31%	1.14	-1.48%	-1.05	
0-15	2.81%	2.37	**	2.29%	1.94	*	1.40%	1.21	-1.30%	-1.24	
0-16	3.39%	2.96	***	2.78%	2.44	**	1.84%	1.67 *	-2.15%	-1.71	*
0-17	3.89%	3.23	***	3.21%	2.67	***	2.22%	1.88 *	-1.78%	-1.61	
0-18	2.83%	2.34	**	2.31%	1.91	*	1.42%	1.23	-1.18%	-1.31	
0-19	2.39%	1.99	**	1.93%	1.62		1.09%	0.99	-2.34%	-1.73	*
0-20	2.55%	2.06	**	2.07%	1.68	*	1.21%	1.05	-1.93%	-1.51	

Notes: Columns 2,3 and 6,7 present the test statistic Z_{wt} from *(15)* with SWB and EWP. *CAR*, accumulated from the beginning of day 0 up to day 20, are presented along with the *Z* values. A two-tailed test is considered, which assumes no information and trading costs, and no restrictions on short-selling. Columns 4 to 7 present the results after accounting for trading costs for the "good" news sample. A one-tailed test is considered, since it is assumed that due to restrictions on short-selling, it is not possible to profit from negative news.
*denotes significance at 10% level; **denotes significance at 5% level; *** denotes significance at 1% level.

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