The Relationship between Accounting Numbers and Returns in the Baltic Stock Markets*

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Abstract

This paper analyses the relationship between accounting data and market price returns in the stock markets of Lithuania, Latvia and Estonia. Given the different informational environment and accounting practices from those of developed markets, and relatively thinly traded Baltic stocks, the paper aims to evaluate the relevance of accounting numbers for investors in their investment decisions. It investigates both the contemporaneous one-period return-earnings relation and leading period returns in regression model of the main and secondary list securities (totalling 99 companies) over a 5-year period (1995-2000). Leading period returns in regression model are used order to reduce downward bias in the earnings response coefficient when prices lead earnings, meaning that information reflected in the markets expectations and thus in prices is richer than that in the past series of earnings. Transitory earnings, the other common cause of low returns-earnings association, are analysed as well. I look at the effects of transitory earnings by accounting for the asymmetry in relation to losses and also for the non-linearity of the returns-earnings regression.

Keywords: Estonia, Latvia, Lithuania, value relevance, earnings response coefficients, prices leading earnings, asymmetry, non-linearity.

JEL Classification: G14, P20

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Introduction and summary

Since the work of Ball and Brown (1968), the relationship between accounting information and capital markets has become one of the most popular issues in the accounting literature. According to Dumontier and Raffournier (2002) the interest for this subject is legitimate given the generally accepted statement that in capital markets context accounting figures are aimed at providing investors with relevant information for their investment decisions. Accounting numbers are supposed to facilitate the prediction of firm’s future cash flows and help the investors assess future securities’ risk and returns. This is the reason why there have been so many studies carried out in the USA and in Europe with the aim of determining to what extent this objective was achieved.

This paper belongs to studies of the long-term association between stock returns and accounting numbers (association studies), which value the information in financial statements against information in stock prices. The association studies do not presume that investors use only accounting data in their investment decisions. They state that if accounting data are good summary measures of the events incorporated in security prices, then they are value relevant because their use might provide a value of the firm that is close to its market value (Dumontier & Raffournier, 2002). Thus association studies test whether accounting numbers provide a good summary measures of the value relevant events that have been incorporated in stock prices during the reporting period. In other words test whether and how quickly accounting measures capture changes in the information set that is reflected in security returns over a given period (Kothatri, 2001).

The objective of this paper is to assess the relationship between accounting data and market price returns in the stock markets of Lithuania, Latvia and Estonia. The informational environment and accounting practices are quite different in the Baltic countries compared to those of developed markets, and unlike stocks in the developed markets, most stocks in the Baltic states are thinly traded.

Investors demand value relevant information from financial statements, and financial information (for example, earnings per share) displaying a high association with market values (price returns) indicates value relevance. Of particular interest is to evaluate the relevance of accounting numbers for investors in their investment
decision making in the view of the Baltic countries becoming a potential target for European investors. Investors that have diversified their portfolios with stocks traded in the EU markets, may after the introduction of Euro look for new opportunities to diversify their investments.

I look at both contemporaneous one-period return-earnings relation\(^1\) and leading period returns in regression model\(^2\) of the main and secondary list securities (totalling 99 companies) over a 5 year period (1995-2000). Leading period returns in regression model is used in order to reduce downward bias\(^3\) in the earnings response coefficient (ERC) when prices lead earnings. Prices leading earnings means that information reflected in the markets expectations and thus in prices is richer than that in the past series of earnings, because investors focus on all events that affect expected future cash flows, while earnings incorporate only those that have met the conditions for accounting recognition.

I also investigate the other common cause of low returns-earnings association - transitory earnings\(^4\). I look at the effects of transitory earnings by accounting for the non-linearity of the returns-earnings regression and also for the asymmetry in relation to losses.

Non-linearity of the returns–earnings regression allows for declining stock price responses to extreme values of earnings surprises, since they are not expected to persist (transitory).

Asymmetry in relation to losses means that investors react differently to positive and negative earnings. It hypothesises that losses are not value-relevant because they are not expected to perpetuate indefinitely and also because they do not provide information about firms ability to generate future cash flows. Losses are more transitory and therefore the stock price will not necessary drop to zero nor decline

\[ P_t / P_{t-1} = \alpha + \beta X_t / P_{t-1} + \epsilon_t \]

\[ P_t / P_{t-2} = \alpha + \beta X_t / P_{t-2} + \epsilon_t \]

\(3\) When prices lead earnings relevant events that are not captured in contemporaneous earnings, should be captured in subsequent periods. This recognition lag causes both an error-in-variables problem and an omitted variable problem because earnings do not reflect some info captured in current returns, whereas they reflect some info captured in prior returns. Since this lag is negatively correlated with earnings, earnings response coefficients and R-squares of regressions of current returns with contemporaneous earnings are biased towards zero (Dumontier & Raffournier, 2002).

\(4\) The assumption of transitory earnings means that the earnings change is expected to be non-permanent.
proportionally the change in earnings, resulting in lower ERCs than theoretically predicted.

To allow for firm specific characteristics and for intertemporal variation, the earnings response coefficients are estimated with fixed effects, also allowing for first order serial correlation.

I find that the association between returns and earnings differs quite substantially among all three Baltic States, with Lithuania showing the weakest and Estonia showing the highest value relevance. The returns-earnings association in Latvia seem to be very similar to Estonia, but it has a higher standard error and so the results are less convincing. Estonia’s lead is explained by the higher efficiency of the Estonian stock market, resulting from its more liquid stock market as well as a more developed Estonian accounting system, making earnings figures more value relevant.

I find that estimates of earnings response coefficients and $R^2$ values increase with the inclusion of leading-period returns. This suggests that despite thin trading and there only being a small number of participants in the Baltic Stock markets, stock prices lead accounting earnings and the stock market provides useful information about future earnings.

All three Baltic countries have been affected by common external events over the period of investigation, the most significant of which was the Russian financial crisis in 1997-1998, and so many companies in all three countries have been suffering from negative earnings during that particular period. I find that the presence of losses reduces the observed returns-earnings relation in all three Baltic countries – in fact there is nearly no response to negative earnings in all three countries.

The non-linearity effect is only significant in Estonia. This may be because most of the extreme values in Lithuania and Latvia are negative, so any non-linearity effect is absorbed by accounting for the asymmetry.
Literature review

Before looking at the earnings and returns relationship in the Baltic States, I briefly
review the available literature on the earnings and returns relationship.
Economic intuition for the relationship between accounting data and security prices
relies on a standard valuation model in which price is the discounted present value of
expected net cash flows. This valuation model relies on the hypothesis that current
earnings contain information about expected future net cash flows (eg., Watts &
Zimmerman, 1986, Ch.2; Kormendi & Lipe. 1987, Ohlson, 1991). Since the market’s
expectations of future cash flows are unobservable, empirical specifications of the
price-earnings relation often use current earnings as a proxy for the market’s
expectations (Kothari & Zimmerman, 1995). This suggests regressions of accounting
figures on market data.

The general model that defines the relation between accounting information and
market values is:

\[ V = f(A, \nu) \]

where \( V \) is a variable representing some market measure of value (Luberrink, 2000).
\( V \) can be the current price of the firm, or return accrued over a given period. \( A \) can
be any vector of accounting variables, such as earnings per share, and \( \nu \) can be any
vector of information other than information in accounting numbers. The basic
specification of this model is:

\[ P_t = f(X_t) \]

where \( P_t \) is the ex-dividend price at the end of period \( t \), and \( X_t \) is accounting earnings
for period \( t \). There are three main regression specifications that can be used to
estimate this model, which, given two crucial assumptions, produce equal slope
coefficients (earnings response coefficients) of \( 1/r \), where \( r \) is the expected rate of
return (Kothari & Zimmerman, 1995):

\[ P_t = \alpha + \beta X_t + \epsilon_t \quad \text{Price earnings model (a)} \]

\[ \frac{P_t}{P_{t-1}} = \alpha' + \beta \frac{X_t}{P_{t-1}} + \epsilon_t' \quad \text{Return model (b)} \]

\[ \frac{\Delta P_t}{P_{t-1}} = \alpha'' + \beta \frac{\Delta X_t}{P_{t-1}} + \epsilon_t'' \quad \text{Changes model (c)} \]
If price inclusive of dividend is used, then the slope is equal to $1 + 1/r$ (Kothari, 1992). The two critical assumptions are that earnings follow a random walk and that only the information in the current and past time series of earnings is used by the market in setting prices; that is, prices do not lead earnings (Kothari & Zimmerman, 1995). If these assumptions do not hold then the choice of model has an impact on the slope (earnings response coefficient (ERC)) and $R^2$, both of which are the focus of accounting research.

ERC is used as a measure of timeliness of accounting earnings, while $R^2$ measures the degree of association between market value, which reflects the value relevance of that accounting number. Value relevance is defined as the degree of association between accounting information and market value, while timeliness is defined as the extent to which accounting information co-varies with market values. Timeliness can otherwise be described as timely financial information reflecting value relevant events as early as possible. Increased timeliness results in higher association between accounting numbers and market values, which leads to higher value relevance of accounting information (Luberrink, 2000).

Kothari (2001), in his review of empirical research on the relation between capital markets and financial statements, points out four hypotheses explaining the observed low magnitudes of earnings response coefficients:

1) Prices lead earnings;
2) Inefficient capital markets;
3) Transitory earnings; and
4) Noise in earnings and deficient GAAP.

*Prices lead earnings.* Considerable research since Beaver, Lambert & Morse (1980) demonstrated that prices lead earnings, i.e., the information set in stock prices is richer than that in the past time series of accounting earnings (examples include Easton et al. (1992), Warfield & Wild (1992) and Collins et al. (1994)). The market obtains alternative information in year $t$, which is a substitute for some “news” of earnings in year $t+1$. The econometric consequence is that when returns are correlated with contemporaneous earnings changes, only a portion of earnings change is a surprise to a market. Kothari (2001) points out that this contributes to standard errors-in-variable problem, which biases downward the earnings response coefficient and reduces the
explanatory power of the return-earnings regression. Kothari & Zimmerman (1995) suggest that earnings lag returns by up to three years. This may be explained by the conservative nature of accounting or otherwise called, accounting recording lag, which recognises events but only considers them after verification.

Choosing the correct regression specification from the three possible models (prices, returns and changes models) becomes very important when prices lead earnings. Kothari (1992) and Kothari & Sloan (1992) provide analytical support and evidence for a returns model to be used in the context of prices leading earnings, given the random walk assumption. They showed that, compared with change specification, the levels specification (returns model in our case) yields higher explanatory power and a less biased earnings response coefficient when prices lead earnings. Kothari & Sloan (1992) also presented a method that uses leading period returns to control for biased coefficients of return models.

*Inefficient capital markets.* “If a market fails to correctly appreciate the implications of a current earnings surprise in revising its expectations of future earnings, the price change associated with the earnings change will be too small” (Kothari, 2001).

*Transitory earnings.* The assumption of transitory earnings means that the earnings change is expected to be non-permanent, which is a departure from the random walk assumption (Luberrink, 2000). There is extensive literature documenting smaller earnings response coefficients on transitional earnings as proxied for by non-recurring items reported in financial statements (Hayn 1995, Ramakrishnan & Thomas 1998, etc.). The interpretation is that markets do not expect extreme earnings changes (positive and negative) to be permanent, so price adjustments are smaller, implying a nonlinear, S-shaped relation between stock returns and accounting earnings. There is also a substantial literature focused on the transitory nature of losses. Hayn (1995) notes that losses are of great importance when estimating the returns-earnings relation, because they are not expected to continue indefinitely, since shareholders have a liquidation option. She observes that the information content of losses is limited in the US market. By excluding loss observations, the relation between returns and earnings becomes much stronger. This theory is supported in the Finnish data by Martikainen *et al.* (1997) and Kallunki & Martikainen (1997).

Easton *et al.* (2000) notes that differences in earnings response coefficients generally result from the degree in permanence in earnings and/or the accounting recording lag and that the failure to recognise that both these effects impact the earnings coefficient
may lead to misleading inferences. For example, since accounting recording lag is the
cause for prices leading earnings, it can be inferred that a low earnings response
coefficient may reflect either transitory earnings (with high timeliness\(^5\)) and/or a great
effect of prices leading earnings (that is, low timeliness\(^3\)). Or in the words of
Lubberink (2000) low earnings response coefficients are often interpreted as a result
of low quality of financial statements, while low ERC can be the result of investors’
anticipations (prices leading earnings) that are not correctly captured by the
association model.

Isolating these two effects empirically is very difficult. If one assumes that earnings
are transitory, then the returns model (using earnings levels) is a more appropriate
choice since the earnings surprises (expressed as earnings changes) have only a
relatively small impact on expected future earnings (Luberrink, 2000).

*Noise in earnings and deficient GAAP.* Beaver *et. al* (1980) define accounting
earnings as the sum of “true earnings” plus value-irrelevant noise that is uncorrelated
with stock prices or returns in all periods. However there is not consensus on the
definition on value irrelevant noise (Kothari, 2001). The deficient GAAP argument
assumes that the major objective of financial reporting is to be a predictor for future
investor cash flows or stock returns (Kothari, 2001). Its proponents measure returns-
earnings association as a measure of GAAP success in fulfilling such objective.
Kothari (2001) points out that deficient GAAP is simply another form of the prices-
leading-earnings argument. The deficient GAAP argument postulates that financial
statements are slow to incorporate information that is reflected in contemporaneous
market values and the greater the correlation of earnings with returns, the more
desirable are GAAP which produces such earnings numbers.

There have been a number of recent papers published about the returns earnings
relationship in developing stock markets: Vafeas *et al.* (1998) – on Cyprus;
Jermakowicz and Gornik-Tomaszewski (1998) about the Warsaw Stock Exchange;
Kousenidis *et al.* (2000) about Athens Stock exchange; and Jindrichovska (2001)
using Czech data. They present a different case from developed markets because of
their thinly traded shares and different information environment, as well as accounting

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\(^5\) Easton, *et al.* (2000) in their paper use a term “value relevance” instead of “timeliness”. I prefer to
use the term “timeliness” in this situation, because the definition of “value relevance” that I use varies
recording all events in accounting earnings of the same period in which they are captured in returns
(that is, accounting recording lag) decreases value relevance and permits a role for other information in
valuation.
practices. For example, Jindrichovska (2001) finds that estimates of earnings response coefficients increase with inclusion of leading-period returns. This relation holds in the longer run (more than one year) but not in the short run (up to one year). Prices do not lead accounting data in the short run, which may be due to unreliability in the Czech quarterly results.

Stock markets and accounting in the Baltic States

The goal for the analysis in this paper is to carry out a combined study of the Baltic stock markets treating them as one region, as well as to relate the differences of these stock markets to economic development and accounting regulations in Estonia, Latvia and Lithuania.

Baltic stock markets

One of the reasons for the low earnings response coefficients given by Kothari (2001) is inefficient capital markets. Thus it is important to overview the development of the Baltic stock markets.

Of all three Baltic States stock exchanges the National Stock Exchange of Lithuania (NSEL) is the oldest. It started trading in September 1993, while the Riga Stock Exchange (RSE) started in July 1995, and Tallinn Stock Exchange (TSE) in June 1996.

For both the NSEL and the RSE the stock exchange model selected was an order driven system developed in co-operation with the French Bourse de Paris. Although the NSEL is the oldest and was the largest by capitalisation until 1998, it started as a very illiquid market compared to the TSE and the RSE. This can be partly explained by the ineffective trading system that the NSEL used until 1998: a single price fixing per day and a price fluctuation limit of 10%. Now the NSEL uses order-driven, automatic trade matching and two trading models: single fixing and continuous trading. The RSE uses an order-driven system with automatic order matching, which allows continuous trading with variable prices. The TSE, besides using an order-driven public order book model, also operates a quote-driven dealer market, which are both continuous trading models.
There has not been much empirical research done so far about the Baltic stock markets. Some examples can be mentioned, eg. J. P. Kairys et al. (2000) about winners and losers from the introduction of continuous variable price trading in Riga Stock exchange (Latvia) and A. Pajuste & P. Hoegfeldt about risk and return in Central and Eastern Europe. Pajuste & Hoegfeldt’s analysis out of the three Baltic States includes only Estonia. They found that Estonia (1996-2000) was associated with the highest risk (measured as standard deviation of country stock market index returns) compared to the Czech Republic, Hungary, Poland and Slovenia. It is also had the strongest positive stock market index correlation with Russia compared to European countries, which could be because Estonian stock index was composed mainly of banking stocks.

As can be seen from the index levels in Table 1, the Baltic equity markets flourished for much of 1996 and 1997. However, economic tremors in Russia, the financial crisis in Asia and a sudden realisation that Baltic share prices had gone too high, too fast, triggered panic selling in late 1997. As a result of these three factors, during the next two years the stock exchanges suffered badly with low turnovers and flat prices. This period is thus associated with a high inefficiency of the capital market and is likely to cause low magnitudes of earnings response coefficients. Low liquidity of the stock markets means that price change associated with earnings change may be inadequate.

The existence of the Baltic stock markets is heavily dependent on the ability to attract foreign investors. It takes time to change outside investors’ perception that the Baltic countries, being former Soviet republics, are still strongly linked to Russia, when in fact they are now more closely linked to the European Union. The main trade partner of the Baltic States is the EU, accounting for 48% of Lithuanian, 65% of Latvian and 77% of Estonian exports and to 43%, 53% and 62% of imports in 2000\(^6\). Baltic exports to and imports from the Commonwealth of Independent States (CIS) were around 10% and 20%, respectively.

The year 2000 showed an outstanding market performance in all three Baltic markets, perhaps indicating the start of a change in investor perception. This may be from Baltic countries becoming potential targets for European investors. Investors that have diversified their portfolios with stocks traded in the EU markets, after the introduction of Euro may look for new opportunities to diversify their investments.

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Table 1

Comparative economic data for Baltic States stock exchanges 1996-2000

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<tbody>
<tr>
<td><strong>Lithuania</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Exchange rate</td>
<td>1e = 4.9 LTL</td>
<td>1e = 4.4 LTL</td>
<td>1e = 4.7 LTL</td>
<td>1e = 4.0 LTL</td>
<td>1e = 3.7 LTL</td>
</tr>
<tr>
<td>Equity market capitalisation (of listed shares) (mln EUR)</td>
<td>1022.85</td>
<td>1554.24</td>
<td>914.84</td>
<td>1131.4</td>
<td>1706.25</td>
</tr>
<tr>
<td>Equities turnover (mln EUR)</td>
<td>38.55</td>
<td>217.03</td>
<td>189.72</td>
<td>307.04</td>
<td>227.99</td>
</tr>
<tr>
<td>Number of firms, subject to central market regulations</td>
<td>460</td>
<td>607</td>
<td>62</td>
<td>60</td>
<td>54</td>
</tr>
<tr>
<td>LITIN A</td>
<td>1862.68</td>
<td>1930.85</td>
<td>1133.63</td>
<td>1109.17</td>
<td>1105.94</td>
</tr>
</tbody>
</table>

| **Latvia**       |            |            |            |            |            |
| Exchange rate    | 1e = 0.693 LVL | 1e = 0.658 LVL | 1e = 0.669 LVL | 1e = 0.633 LVL | 1e = 0.581 LVL |
| Equity market capitalisation (mln EUR) | 58.35 | 302.14 | 337.88 | 879.69 | 592.87 |
| Equities turnover (mln EUR) | 9.9 | 74.38 | 75.29 | 30.96 | 253.3 |
| Number of firms  | 34 | 68 | 67 | 63 |
| Official and second list | 34 | 31 | 41 | 26 | 22 |
| Free list        | 0 | 20 | 27 | 41 | 41 |
| Dow Jones Riga Stock Exchange index value | 248 | 345.92 | 97.97 | 87.77 | 139.16 |

| **Estonia**      |            |            |            |            |            |
| Exchange rate    | 1e = 15.82 EEK | 1e = 15.65 EEK | 1e = 15.63 EEK | 1e = 15.65 EEK |
| Equity market capitalisation (mln EUR) | 560.9 | 999.49 | 442.6 | 1785 | 1931.86 |
| Equities turnover (mln EUR) | 146.64 | 1394.66 | 851.93 | 279.72 | 325 |
| Number of firms  | 25 | 38 | 36 | 38 | 33 |
| Talse index at end of period | 160.32 | 265.35 | 90.74 | 125.51 | 138.24 |

Source: http://www.baltic-exchanges.com, NSTE, TSE.

However, another obstacle in the way to stock market development is the size of these markets – they are too small to able to achieve any synergies of scale. Claessens et al. (2002) notes that as countries improve their fundamentals, stock exchange activity increases, but so does the share of activity taking place abroad where corporations can achieve lower trading costs and even higher liquidity. The migration of major shares of market capitalisation and value traded may have adverse consequences for the remaining companies liquidity.

Foreign investors often see the three Baltic markets as one because of their small size. Treating these three countries as one region in view of foreign investors would only be reasonable if the main economic indicators, GDP growth and inflation, exhibited similar trends.
As we can see from Figures 1 and 2, all three Baltic States have experienced similar GDP growth and decline phases, with Estonia being the fastest growing country, which also experienced the highest inflation. So, even though there are some differences in economic indicators, it should still possible to treat these countries as one economic zone, with similar trends GDP growth and inflation.

**Baltic States accounting overview**

The accounting system in the Soviet Union could be described as a large corporation consisting of millions of smaller companies and belonging to one owner (Deveikis G., 1997). Financial information for all of the economy was consolidated, but without the main element – profit having eliminated insider operations. In the meantime the main task of accountants was to follow detailed instructions and to report that the assets were being used efficiently. After the collapse of the Soviet Union this huge corporation exploded into millions of economic units.

In order to assess the value relevance of current accounting numbers in the Baltic stock markets I will briefly outline the accounting reform that took place in the Baltic countries after 1990, focusing on the period 1995-2000. I aim to highlight some of the differences between IAS and current Baltic accounting legislation as well as the differences between accounting legislation in the Baltic countries themselves. It should be noted that the accounting regulations for credit institutions in all three

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7 Since the 1st June 1998 the Official, Current and Unlisted shares lists have been introduced. Central market regulations are applied only to equities issued by successfully operating companies.
Baltic countries are different from other companies with legal persons status and the focus of this overview is on accounting regulations for legal persons in general.

**Accounting reform in Lithuania**

According to the National Stock Exchange of Lithuania all companies on the “Official List”, including domestic ones must follow the IAS (International Accounting Standards Board).

Lithuania chose a different route to accounting reform than Estonia and Latvia. Estonia and Latvia tried, as soon as possible, to replace transitional measures by primary legislation – the Accounting Act 1994 in Estonia and the Law on Accounting 1994 with Law on Annual Reports 1994 in Latvia, whereas in Lithuania there was a greater reliance upon accounting change through executive action (Alver Jaan and Lehte, Mackevicius, Paupa and Bailey, 1998).

Lithuania passed a provisional law (still in power) on the Principles of Accounting in 1992, which has since been supplanted by the decrees issued by the Ministry of Finance. The real accounting Reform in Lithuania started in 1994 with the resolution No. 804 “on the Procedure for Drawing up Annual Financial Statements of Legal Persons”. Before this many accountants could not understand the statements in the law of Principles of Accounting 1992 (Juskauskas Gintaras, 1997). The main years of accounting reform were 1993-1994 when most of the accounting decrees were passed, which were based on EU norms (Deveikis 1997).

Some authors say that, looking at Lithuanian enterprises, it could be roughly stated that Lithuanian companies do not have financial accounting and yearly financial statements at all (Bucas & Dicpetris, 1998). They emphasise the term “financial accounting and financial statements”, because companies do carry out accounting, but all this is only done in relation to tax accounting. Therefore, Lithuanian accounting and accountability serve only for tax accounting purposes and satisfy only the interests of tax administrating state institutions.

Tax accounting concentrates on taxable results, which differ from company activities’ results. Such differences can be found in relation to receivables and inventory as well as accumulating expenses. In tax accounting the writing off of such assets or making provisions for them does not reduce taxable profits. Therefore, companies, by following the tax regulations, do not evaluate expenses associated with doubtful
receivables (they do not make provisions for them and do not recognise these provisions as expenses) and inventories (they do not write off old and illiquid stocks and do not recognise them as expenses). The same can be said about the revaluation of fixed assets in Lithuania, where fixed assets revaluation as well as unexpected reduction in the value of fixed assets has no effect on the calculation of profit tax (Maniusyte, 2001). Consequently, companies do not reduce the value of these assets in the balance sheet and thus make accounting numbers less value relevant.

Besides this, in Lithuania bad or doubtful receivables can be kept in the balance sheet for up to three years before it is requested that they are written-off. The IAS require that a provision is established, or a write-off performed, as soon as the recoverability is in doubt (Harvey, 1997). Thus, the fundamental concept of prudence is not applied in as strict a way as it is under the IAS.

**Accounting reform in Latvia**

According to the Riga Stock Exchange all companies on the “Official List”, including domestic ones must follow the IAS (*International Accounting Standards Board*).

The two main laws regulating accounting in Latvia are – the law on “On Accounting” and “Law on annual reporting in Latvia”. Both these laws came into force in January 1993 and are based on the 4th and 7th EU directives. Compared with the Estonian Regulation on Accounting 1990, the Latvian accounting law was much shorter and simpler, consisting of only seventeen sections compared with fifty sections in the Estonian Regulation from 1990. The same can be said about the Lithuanian Law on the Principles of Accounting from 1992 in relation to Estonian regulation (Bailey, Alver, Mackevicius & Paupa, 1995).

Before 2000 there were three Latvian Accounting Standards (on presentation of financial statements, on inventories and on cash flow statements) developed on the lines of international Accounting Standards. These standards are not binding, but reflect best practice (PricewaterhouseCoopers, Baltic Bulletin, 2000).
**Accounting reform in Estonia**

All companies listed on Tallinn Stock Exchange, including domestic ones, are required to adhere to the International Accounting Standards (*International Accounting Standards Board*). Estonian Accounting Standard No. 13 (concerned with earnings per share) also states that the computation of EPS by listed companies should conform with IAS 33. However, “in case the International Accounting Standards are in contradiction with legal acts regulating the accounting in the Republic of Estonia, the issuer is obliged to proceed from term of legal acts regulating the accounting in the Republic of Estonia and comment on the arisen contradiction” (*Tallinn Stock Exchange*). It is, therefore, important to look at the national accounting regulation of Estonia.

Estonian Accounting Law came into effect at the beginning of 1995. At present, Estonian legal accounting regulation consists of the following items:

- Estonian Accounting Law;
- Accounting Standards issued by the Estonian Accounting Standards Board (EASB). The EASB is an autonomous government unit and has the authority to improve accounting principles and practices in Estonia. The Cabinet appoints the EASB chairman and its six members who run for a three-year term. So far, there are 16 Estonian accounting standards.
- Accounting Pronouncements issued by the EASB.

Thus, Estonian accounting regulations are a compilation of the Anglo-American approach and the Continental approach (Haldma & Kallas 2001). The Estonian Anglo-American approach becomes more apparent when comparing the accounting policies and the influence of organisations, involved in the development of accounting procedures, with the other Baltic States. The Estonian Accounting Standards board seems to have more influence in accounting development when compared to the Methodological Council created by the Latvian Law on Accounting. While the Estonian Accounting Standards Board published obligatory instructions on accounting, the Latvian Methodological Council prepared recommendations. With Lithuania, the difference becomes more obvious - Lithuanian law on Accounting reserves the direction of accounting to the government (Bailey, Alver, Mackevicius and Paupa, 1995).
Further differences can be illustrated by comparing accounting policies: in Estonia, records and financial statements are to be prepared in accordance with good accounting practice, or alternatively, in the right and correct manner, whereas in Lithuania, laws and executive acts are to be used.

Estonian accounting regulation is based on the accounting directives of the European Community and the principles, standards and recommendations approved by IASC. However, it is evident that issues in the International Accounting Standards are dealt with in more detail (Alver Jaan and Lehte, Mackevicius, Paupa and Bailey, 1998).

In conclusion, it should be noted that, because of the strong influence of tax accounting, the “true and fair” view may be distorted, with Estonian accounts being the least distorted from all three Baltic States. This may lead to an even weaker relationship between accounting numbers and stock returns. This effect should be reduced by the fact that, in the sample used in this research, many companies are from the “Official list”, meaning that they have to adhere to IAS.

The earnings and returns relationship in the Baltic States

Methodology

In this section a model is presented that is used to assess the returns-earnings relationship in the recently created Baltic stock markets and to investigate the differences between Lithuania, Latvia and Estonia.

A large component of annual earnings in the Baltic States between 1995 and 2000 is likely to have been transitory since these countries went through substantial economic transformation, especially during the earlier periods of 1990s, and were also affected by the Russian crisis. At the same time prices are likely to lead earnings in emerging stock markets, because such markets are often associated with insider trading. Also historical cost accounting with emphasis on conservatism and objectivity, revenue realisation and expense matching principles, that are fundamental to earnings determination process, in general results in prices leading earnings (Kothari & Zimmerman, 1995). Under such conditions a returns model which uses earnings levels (equation a) is considered to be more appropriate than a changes model (equation b), as mentioned above.
The estimation method used here is a time series-cross-section analysis with fixed effects. Fixed effects are used to consider the possible influence of firm-specific characteristics and intercepts are treated as fixed for each individual firm. The earnings response coefficient (ERC) is treated as cross-sectional and is constant over time.

The literature also recognises that the ERC may vary across firms because of firm-specific factors such as earnings persistence, growth prospects, risk and earnings predictability (different information environments). Teets & Wasley (1996), in their comparison of pooled versus firm-specific models, show that pooling observations across firms and over time produces an ERC that is a weighted average of firm-specific ERCS, where the weights are proportional to the variances of the individual firms’ unexpected earnings. They document a negative relation between the firm-specific ERC and unexpected earnings variances, which results in a pooled ERC being downward biased relative to the simple average of firms-specific ERCS.

However, Freeman et al. (2002) noted that when a researcher wishes to generalise conclusions to firms or time periods outside a sample (i.e., when accuracy of out-of-sample projections are important), pooled regressions provide a better specification of the returns-earnings relation than firm-specific regressions (ERC coefficients varying across firms). They propose minimizing out-of-sample prediction errors as an alternative criterion for evaluating returns-earnings models and find that ranking based on out-of-sample prediction errors are quite different from ranking based on $R^2$. They also recommend that future research about value relevance should rely on comparing ERCS using a cross-sectional or pooled nonlinear model.

The Baltic stock markets’ data only cover a 5-year period and so provide very few time-series observations for each firm – from 2 to 4, making firm-specific ERC estimation unachievable, and according to Freeman at al. (2002), not even recommended, given that I will use an non-linear model. I will allow the coefficients to vary only across the countries.

This study examines the degree of association between price relatives (one plus-buy-and-hold return), including dividends, and the earnings to price ratio (accounting earnings yield).

The following models are used to look at the association between returns and earnings, first in all three Baltic countries together as one region, and after that,
allowing for the differences in the association between returns and earnings across Lithuania, Latvia and Estonia over the period 1996-2000.

\[
R_{it} = \alpha + \beta E_{it} + \nu_i + \epsilon_{it} \tag{1}
\]

\[
R_{it} = \alpha + \beta^{\text{Lith}} D_{it}^{\text{Lith}} E_{it} + \beta^{\text{Lat}} D_{it}^{\text{Lat}} E_{it} + \beta^{\text{Est}} D_{it}^{\text{Est}} E_{it} + \nu_i + \epsilon_{it} \tag{2}
\]

where:

\[R_{it} = P_{it} / P_{i,t-1}\] This is a price relative to which I will refer as returns throughout the paper.

\[E_{it} = X_{it} / P_{i,t-1}\]

\[X_{it} = \text{Accounting earnings per share of company } i \text{ for the period from the end of } t-1 \text{ to the end of } t.\]

\[D_{it}^{\text{Lith}} = \begin{cases} 1 & \text{for Lithuanian observations} \\ 0 & \text{otherwise} \end{cases}\]

\[D_{it}^{\text{Lat}} = \begin{cases} 1 & \text{for Latvian observations} \\ 0 & \text{otherwise} \end{cases}\]

\[D_{it}^{\text{Est}} = \begin{cases} 1 & \text{for all Estonian observations} \\ 0 & \text{otherwise} \end{cases}\]

\[P_{it} / P_{i,t-1} = \text{One plus buy-and-hold return, inclusive of dividends}^8, \text{ for the period from the end of } t-1 \text{ to the end of } t, \text{ for company } i.\]

\[\epsilon_{it} = \text{A random error term, assumed to be distributed } \epsilon_{it} \sim N(0, \sigma)\]

An equivalent formulation of model (2) is

\[
R_{it} = a_i + \beta^{\text{Lith}} D_{it}^{\text{Lith}} E_{it} + \beta^{\text{Lat}} D_{it}^{\text{Lat}} E_{it} + \beta^{\text{Est}} D_{it}^{\text{Est}} E_{it} + \nu_i + \epsilon_{it}
\]

where \(a_i = \alpha + \nu_i\), are intercepts treated as fixed separately for each firm, so then

\[\nu_i = \text{Fixed error component, it is not assumed to have a distribution but is treated as fixed and estimable.}\]

\[\alpha = \text{Constant part of intercept or mean intercept when the following constraint}\]

---

\(^8\) The inclusion of dividends in the returns’ calculation does not have any significant impact on the returns-earnings relation. This might be because only between 30% to 40% of all yearly observations in the sample included dividend payments, in other cases companies were not paying dividends.
is imposed. To identify $\alpha$ from $\nu_i$ Stata xtreg, fe command proceeds under constraint that average $\nu_i = 0$ (as $\sum_{i=1}^{N} \nu_i = 0$), the average mean intercept is then equal to $\frac{1}{N} \sum_{i=1}^{N} a_i = \frac{1}{N} \sum_{i=1}^{N} (\alpha + \nu_i) = \alpha$ (Stata, www.stata.com). $\alpha$ can be interpreted as the average fixed effect.

For the calculation of the annual returns, the beginning of period price usually refers to the first day of the third month of the year. Thus annual return is extended from 8 months prior to the fiscal year-end to 2 months after the fiscal year-end. This is because listed companies are required to provide their unaudited annual reports by the 1st of April. Accordingly that implies that on the 1st of April stock market prices should be already affected by the new earnings figures or in other words market prices should already have incorporated new information from new earnings figures.

Since empirically to isolate the effects transitory earnings and prices leading earnings is very difficult (Easton at al. 2000), I use the “correct” regression specification (that is, earnings levels) for each of these effects and look at them separately, not controlling for the other effect.

**Accounting for prices leading earnings**

I first test if prices lead earnings, assuming a random walk, that is no transitory earnings. Supported by empirical evidence by Kothari & Sloan (1992), price changes are expected to have predictive power in relation to future earnings changes.

The effect of prices leading earnings on return model is that it biases ERC downward. The intuition behind this bias is as follows: when prices lead earnings, only a portion earnings change is a surprise to the market and the rest is anticipated in the earlier period. Thus earnings change contains both anticipated and surprise components. Due to earnings anticipation, the weight of anticipated information component in the returns earnings regression increases at the expense of weight of the surprise component. The surprise component is the only relevant component for explaining returns, because stock price adjustments to some factors reflected in current annual earnings may have occurred in the previous year. Due to earnings anticipation the magnitude of surprise component diminishes and informationally irrelevant portion
of earnings change contributes to standard errors-in-variables problem (see Greene, 1997, Chapter 9) resulting in a lower ERC.

Following the methodology suggested by Kothari & Sloan (1992) to account for prices leading earnings, the degree of association between price relatives and earning yield is tested.

To reduce the bias that arises because information in prices about future earnings is ignored, Kothari & Sloan regress current and past returns on current period earnings or, in other words, include return over a leading period in $R_{it}$. The price-earnings relation is estimated using earnings measured over one-year intervals, while the return, expressed as a price relative, measurement interval includes a leading time period:

$$
\frac{P_{it}}{P_{it-t}} = \alpha + \beta \frac{X_{it}}{P_{it-t}} + \epsilon_{it}
$$

(3)

When $\tau = 1$, this equation, after having accounted for different countries, results in the same model as model 2. For $\tau = 2$, the leading period returns are included in $\frac{P_{it}}{P_{it-t}}$, to exploit the information in prices with respect to future earnings. I regress overlapping two-year returns on the second year’s annual earnings divided by price at the beginning of the return holding period. When $\tau = 2$, it is more likely that information reflected in $X_{it}$ will be incorporated in the return over the period $t - 2$ to $t$. Thus earnings response coefficient ($\beta$) is expected to approach its theoretical value $(1 + 1/r_t)$.

Previous research shows that prices lead earnings by more than one period or that earnings lag prices by more than one period. This effect would be allowed for by setting $\tau = 3$. Unfortunately, with $\tau = 3$, the measurement window increases accordingly, dramatically reducing the number of observations for Estonia and Latvia, and it is unreasonable to expect that at the end of 1995 or 1996 the stock markets could have forecasted the effects of the Russian crisis in 1997 and 1998. Consequently such a value of $\tau$ is not included.

Model specification (2) in detailed form is:

$$
P_{it} / P_{it-1} = \alpha + \beta_{\text{Lith}} D_{it}^{\text{Lith}} (X_{it} / P_{it-1}) + \beta_{\text{Lat}} D_{it}^{\text{Lat}} (X_{it} / P_{it-1}) + \beta_{\text{Est}} D_{it}^{\text{Est}} (X_{it} / P_{it-1}) + \epsilon_{it}
$$

(2)
and is extended to:

\[ P_t / P_{t-\tau} = \alpha + \beta^{\text{Lith}} D_{it}^{\text{Lith}} (X_{it} / P_{it-\tau}) + \beta^{\text{Lat}} D_{it}^{\text{Lat}} (X_{it} / P_{it-\tau}) + \beta^{\text{Est}} D_{it}^{\text{Est}} (X_{it} / P_{it-\tau}) + v_i + \epsilon_{it} \]  

(4)

**Figure 2. Earnings and returns measurement intervals when leading period returns are included.**

Two-year buy-and-hold returns, inclusive of dividends, regressed on annual earnings deflated by price at the beginning of return measurement interval. Return measurement interval consists of the contemporaneous and one leading year. Return observations are overlapping. (Source Kothari & Sloan 1992)

When I include leading-period returns \((\tau = 2)\), I obtain overlapping return observations (see Figure 2), and the regression errors become serially correlated (Kothari & Sloan, 1992). That is when \( \tau = 1 \), \( \epsilon_{it} \) is independently and identically distributed \((\epsilon_{it} \sim iid)\), but when \( \tau = 2 \), then \( \epsilon_{it} = u_{it} + \rho \epsilon_{it-1} \) and \( u_{it} \sim iid \).

In order to account for first order serial correlation (AR(1)) in my data I use the Stata `xtregar, fe` function, which estimates fixed effects linear models with an AR(1) disturbance, instead of `xtreg, fe`, which assumes no autocorrelation. Thus I obtain an estimate of \( \rho \), which is an indication of an AR(1) process. \( \rho \) varies between 0 and 1 and when larger than 0, indicates first order autocorrelation.
Accounting for transitory earnings

One way to deal with transitory earnings is to introduce a non-linear function and to account for the asymmetry in the stock price response to positive and negative earnings (Lipe et al., 1998).

A non-linear function should allow for declining stock price responses to extreme values of earnings surprises, since they are not expected to persist, and therefore are more heavily discounted (Freeman & Tse, 1992, Das & Lev, 1994).

Apart from the degree of earnings persistence there have been other different underlying factors identified which are responsible for the non-linear returns earnings relationship. Therefore, it is important to ensure that a non-linear function is used when appropriate. Das & Lev (1994) point out that returns-earnings non-linearity may be attributed to relevant non-earnings or other previously disclosed information used by investors that are missing in the simple returns-earnings relation. Beneish & Harvey (1998) point out that unexpected earnings are generated by the sum of measurement error and a true earnings innovation, so the apparent non-linearity could be the result of a non-linearity in the measurement errors. They caution researchers to investigate alternative models only in the context of situations where measurement error is less likely to drive earnings surprises. Non-linear models are more appropriate where unanticipated structural changes are driving large earnings surprises. The Baltic states have undergone a huge transition period and also experienced a shockwave from the Russian financial crisis, which is a case of unanticipated structural changes. This provides more support for using a non-linear model.

Most of the literature about the non-linearity of returns earnings regression use earnings changes or proxy unexpected returns using financial analysts’ forecasts (Beneish & Harvey, 1998, Freeman & Tse, 1992). Das & Lev (1994), besides earnings changes, also use earnings levels and find some non-linearity in earnings levels. According to them the reason for the less pronounced non-linearity when using earnings levels is because of the relatively smaller role played by transitory items in the level of earnings than in the earnings change. In this paper I use earnings levels for the reasons explained earlier, namely: 1) Kothari’s (1992) and Kothari & Sloan’s (1992) evidence for a returns model to be used in the context of prices leading earnings, given the random walk assumption; or 2) when assuming the transitory earnings, earnings levels are a more appropriate choice since earnings surprises
expressed as earnings changes have only a relatively small impact of future earnings (Luberrink, 2000).

Asymmetry in relation to losses means that investors react differently to positive and negative earnings. Some authors claim that, since investors can always liquidate the firm rather than suffer from indefinite loss, they treat negative earning as transitory and therefore stock price will not necessary drop to zero nor decline proportionally to the change in earnings (Hayn, 1995).

Lipe et al. (1998) points out that accounting for non-linearity and asymmetry could mitigate the bias, which arises using constant coefficients across firms (instead of firm specific coefficients). This is because a firm with a history of relatively more extreme earnings would have a relatively lower ERC than a firm with less extreme earnings news. Similarly, firms that experience relatively more losses, characterised by low persistence of earnings, will have lower ERC and higher variance of unexpected earnings.

Beneish & Harvey (1998) use a piecewise linear model to account for the asymmetry. It adds a slope dummy variable $L_{it}$ to the linear model that takes on the value of one if the earnings surprise is negative and 0 otherwise:

$$ R_{it} = \alpha + \beta_1 E_{it} + \beta_2 L_{it} E_{it} + \epsilon_{it} $$

The same principle is used by Kallunki & Martikainen (1997), Easton et al. (2000) and many other authors.

In order to test for non-linearity I use a modified quadratic equation. A quadratic model allows the stock price response to vary as a function of the magnitude of earnings surprise (earnings in my case) (Freeman & Tse, 1992), which results in an “S”-type non-linear relation, which dampens the impact of large absolute earnings surprises:

$$ R_{it} = \alpha + \beta_1 E_{it} + \beta_2 |E_{it}| E_{it} + \epsilon_{it} $$

The use of absolute values ($|E_{it}|$) allows for different signs (but the same coefficient) on the quadratic term depending on whether the surprise is positive or negative. Such a model treats positive and negative surprises symmetrically (Beneish & Harvey, 1998).

In order to see the effect of non-linearity and asymmetry together I combine the previous two equations into one:
\[ R_{it} = \alpha + \beta_1 E_{it} + \beta_2 L_{it} E_{it} + \beta_3 |E_{it}| E_{it} + \nu_i + \epsilon_{it} \]  

(8)

where

\[ L_{it} = 1 \text{ if } E_{it} < 0, \text{ and } L_{it} = 0 \text{ if } E_{it} \geq 0; \]

Equation (8) applies to the entire Baltic region (pooled equation), while equation (9) allows estimation for all three countries simultaneously and separately.

\[ R_{it} = \alpha + \beta_1^{Lith} D_{it}^{Lith} E_{it} + \beta_2^{Lith} D_{it}^{Lith} L_{it} E_{it} + \beta_3^{Lith} D_{it}^{Lith} |E_{it}| E_{it} + \]  

\[ \beta_1^{Lat} D_{it}^{Lat} E_{it} + \beta_2^{Lat} D_{it}^{Lat} L_{it} E_{it} + \beta_3^{Lat} D_{it}^{Lat} |E_{it}| E_{it} + \]  

\[ \beta_1^{Est} D_{it}^{Est} E_{it} + \beta_2^{Est} D_{it}^{Est} L_{it} E_{it} + \beta_3^{Est} D_{it}^{Est} |E_{it}| E_{it} + \nu_i + \epsilon_{it} \]  

(9)

where

\[ L_{it} = 1 \text{ if } E_{it} < 0, \text{ and } L_{it} = 0 \text{ if } E_{it} \geq 0. \]

\[ D_{it}^{Lith} = 1 \text{ for Lithuanian observations and 0 otherwise.} \]

\[ D_{it}^{Lat} = 1 \text{ for Latvian observations and 0 otherwise.} \]

\[ D_{it}^{Est} = 1 \text{ for all Estonian observations and 0 otherwise.} \]

**Sample and descriptive statistics**

The initial sample consists of main and secondary lists securities together with a few companies from the free list, which totals 99 securities – 18 from Estonia, 23 from Latvia and 58 from Lithuania. Stocks traded on the National Stock Exchange of Lithuania make up over 50% of the Baltic sample. This is because the National Stock Exchange of Lithuania has a significantly longer trading history than Tallinn Stock Exchange (Estonia) or the Riga Stock Exchange (Latvia) and thus has more listed shares providing more data.

Lithuanian stock market and accounting data were purchased from the National Stock Exchange of Lithuania. Estonian stock market data were obtained from the Tallinn
Stock Exchange website. I found Estonian earnings figures in the Bloomberg database and the websites of Estonian listed companies. The Riga Stock Exchange kindly provided me with missing price data for earlier years, while later years’ price data and all of earnings data were available on its website. All data have been adjusted for stock splits or stock dividends.

The analysis is carried out for the 5 year period end of 1995 to the end of 2000, providing 4 full years of data – with a total of 473 annual observations of prices and earnings per share. The observations of 5 Lithuanian companies and 3 Latvian companies have been removed as outliers because these observations were causing extreme returns and earnings values in the sample. For example, the exclusion of these companies reduced the extreme values of contemporaneous returns in the sample from 14.76 to 5.84, and for earnings from –12.24 to –3.99 and from 4.96 to 1.5. After outliers have been removed and price relatives \( P_n / P_{n-1} \) obtained, there remain 356 observations of price relatives and earnings to price ratios (see Table 2).

Four years is rather a short period of time for a comprehensive study, but the cost of expanding to earlier years is a significant reduction in data. The National Stock Exchange of Lithuania started trading in September 1993, the Riga Stock Exchange in July 1995 and the Tallinn Stock Exchange even later, in June 1996.

<table>
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<td>15</td>
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Table 3  Descriptive statistics for price relatives and earnings

Baltic countries pooled

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<td>$R_{it}^\tau (\tau = 1)$</td>
<td>1.085</td>
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<td>0.061</td>
<td>5.844</td>
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<td>$R_{it}^\tau (\tau = 2)$</td>
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<td>0.752</td>
<td>0.045</td>
<td>5.370</td>
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<td>$E_{it}^\tau (\tau = 1)$</td>
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<td>$E_{it}^\tau (\tau = 2)$</td>
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<td>0.327</td>
<td>0.054</td>
<td>-1.820</td>
<td>1.348</td>
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By country

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<th>Min.</th>
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Regression results

Prices leading earnings

Tables 4, 5, 6 and 7 present the results of association between price relatives, including dividends, and the earnings to price ratio.

Tables 4 and 5 show the results of regressions (1) and (3), when Baltic states are treated as one region, while tables 6 and 7 show the results when ERC are allowed to vary across countries, but share one error term. The results from all these four
regressions show that estimates of earnings response coefficients and \( R^2 \) adjusted values increase with the inclusion of leading-period returns. This suggests that despite thin trading and there only being a small number of participants in the Baltic Stock markets, stock prices lead accounting earnings and information set reflected in prices contains information about future earnings changes.

Allowing for different response coefficients across countries increases the adjusted \( R^2 \). The earnings response coefficients \( \beta^{Lith}, \beta^{Lat}, \beta^{Est} \), which are all significant at the 5% level, show that the weakest contemporaneous and lagged association between returns and earnings is in Lithuania. Estonia and Latvia exhibit very similar returns-earnings association. For equation (2) I can reject the hypothesis that \( \beta^{Lith} \) equals to \( \beta^{Lat} \) or \( \beta^{Est} \) at 1% level.

The inclusion of the leading period returns increases earnings response coefficients in all three countries, but for Lithuania and Latvia these coefficients become less significant compared to the contemporaneous regressions (t-values lagged: 2.05 and 3.48, t-values contemporaneous-3.47 and 3.70). This is because standard errors for Lithuania and Latvia double in lagged regressions, so I should be cautious in interpreting the increase in ERC, especially in the case of Latvia. The Estonian data seems to benefit most out of all three countries from the inclusion of lags, with a big increase in t values and ERC. This proves that prices leading earnings is a very important factor in earnings returns relationship in Estonia. Out of all three Baltic countries, Estonia alone was in the past associated with some scandals of insider trading, including government officials. The other reason is a higher conservatism of accounting standards in Estonia.

The inclusion of dividends in the returns’ calculation does not have any significant impact on the returns-earnings relation. This might be because only between 30% to 40% of all yearly observations in the sample included dividend payments, in other cases companies were not paying dividends. The returns I am using include dividend payments.
Table 4 Regression results, $\tau = 1$ (no lag), $\rho = 0$ (no serial correlation)

\[ R_{it} = \alpha + \beta E_{it} + \nu_i + \epsilon_{it} \]

| Dependent variable $R_{it}$ | Coefficient ($\beta$) | St. Error | t | P>|t| | R sq | R sq adjusted |
|----------------------------|----------------------|-----------|---|------|------|----------------|
| Independent variable $E_{it}$ | 0.557 | 0.114 | 4.89 | 0.000 | 0.0881 | 0.0881 |
| Intercept $\alpha$ | 1.067 | 0.042 | 25.54 | 0.000 | No of observations 361 |

Table 5 Regression results, $\tau = 2$ (lag), $\rho > 0$ (serial correlation allowed)

\[ R_{it} = \alpha + \beta E_{it} + \nu_i + \epsilon_{it} \]

| Dependent variable $R_{it}$ | Coefficient ($\beta$) | St. Error | t | P>|t| | $\rho$ | R sq | R sq adjusted |
|----------------------------|----------------------|-----------|---|------|------|------|----------------|
| Independent variable $E_{it}$ | 1.296 | 0.263 | 4.92 | 0.000 | 0.2128 | 0.2807 | 0.2807 |
| Intercept $\alpha$ | 0.988 | 0.061 | 0.061 | 0.000 | No of observations 168 |

Table 6 Regression results, $\tau = 1$ (no lag), $\rho = 0$ (no serial correlation)

\[ R_{it} = \alpha + \beta^{Lith} D_{it}^{Lith} E_{it} + \beta^{Lat} D_{it}^{Lat} E_{it} + \beta^{Est} D_{it}^{Est} E_{it} + \nu_i + \epsilon_{it} \]

| Dependent variable $R_{it}$ | Coefficients ($\beta^{Lith}$, $\beta^{Lat}$, $\beta^{Est}$) | St. Error | t | P>|t| | R sq | R sq adjusted |
|----------------------------|----------------------------------------------------------|-----------|---|------|------|----------------|
| Independent variable $D_{it}^{Lith} E_{it}$ | 0.411 | 0.118 | 3.47 | 0.001 | 0.1386 | 0.1338 |
| $D_{it}^{Lat} E_{it}$ | 1.697 | 0.458 | 3.70 | 0.000 | No of companies 97 |
| $D_{it}^{Est} E_{it}$ | 1.715 | 0.482 | 3.56 | 0.000 | No of companies 361 |
| Intercept $\alpha$ | 1.035 | 0.042 | 24.58 | 0.000 |

Table 7 Regression results, $\tau = 2$ (lag), $\rho > 0$ (serial correlation allowed)

\[ R_{it} = \alpha + \beta^{Lith} D_{it}^{Lith} E_{it} + \beta^{Lat} D_{it}^{Lat} E_{it} + \beta^{Est} D_{it}^{Est} E_{it} + \nu_i + \epsilon_{it} \]

| Dependent variable $R_{it}$ | Coefficients ($\beta^{Lith}$, $\beta^{Lat}$, $\beta^{Est}$) | St. Error | t | P>|t| | $\rho$ | R sq | R sq adjusted |
|----------------------------|----------------------------------------------------------|-----------|---|------|------|------|----------------|
| Independent variable $D_{it}^{Lith} E_{it}$ | 0.486 | 0.237 | 2.05 | 0.043 | 0.2556 | 0.4227 | 0.4157 |
| $D_{it}^{Lat} E_{it}$ | 3.383 | 0.972 | 3.48 | 0.001 | No of observations 168 |
| $D_{it}^{Est} E_{it}$ | 4.502 | 0.502 | 8.96 | 0.000 | No of companies 81 |
| Intercept $\alpha$ | 0.791 | 0.051 | 15.61 | 0.000 |

$\alpha$ is the constant part of the intercept or can be interpreted as the average fixed effect.
Transitory earnings

Table 8 shows the results for the entire Baltic region pooled and table 9 allows the coefficients for positive and negative earnings, and for absolute values ($|E_{it}|$) to vary across countries. Both these tables show that the slope coefficients for profits ($\beta_1^L$, $\beta_1^{Lat}$, $\beta_1^{Est}$) are significant and positive.

**Table 8 Regression results, $\rho = 0$ (no serial correlation)**

$$R_{it} = \alpha + \beta_1 E_{it} + \beta_2 L_{it} E_{it} + \beta_3 |E_{it}| + \epsilon_{it}$$

| Dependent variable $R_{it}$ | Coefficients | St. Error | t  | P>|t| | R sq 0.2259 | R sq adjusted 0.2216 |
|-----------------------------|--------------|-----------|----|-------|----------------|----------------------|
| Independent variable |             |           |    |       | No of observations 361 | No of companies 97 |
| $E_{it}$ | ($\beta_1$) | 2.690 | 0.258 | 10.44 | 0.000 |
| $L_{it} E_{it}$ | ($\beta_2$) | -2.936 | 0.402 | -7.31 | 0.001 |
| $|E_{it}| E_{it}$ | ($\beta_3$) | 0.054 | 0.090 | 0.60 | 0.551 |
| Intercept $\alpha$ | | 0.683 | 0.058 | 11.75 | 0.000 |

**Table 9 Regression results, $\rho = 0$ (no serial correlation)**

$$R_{it} = \alpha + \beta_1^{Lat} D_{it}^{Lat} E_{it} + \beta_2^{Lat} D_{it}^{Lat} L_{it} E_{it} + \beta_3^{Lat} D_{it}^{Lat} |E_{it}| E_{it} + \beta_1^{Est} D_{it}^{Est} E_{it} + \beta_2^{Est} D_{it}^{Est} L_{it} E_{it} + \beta_3^{Est} D_{it}^{Est} |E_{it}| E_{it} + \beta_1^{Lith} D_{it}^{Lith} E_{it} + \beta_2^{Lith} D_{it}^{Lith} L_{it} E_{it} + \beta_3^{Lith} D_{it}^{Lith} |E_{it}| E_{it} + \beta_1^{Est} D_{it}^{Est} E_{it} + \beta_2^{Est} D_{it}^{Est} L_{it} E_{it} + \beta_3^{Est} D_{it}^{Est} |E_{it}| E_{it} + \epsilon_{it}$$

| Dependent variable $R_{it}$ | Coefficients | St. Error | t | P>|t| | R sq 0.2322 | R sq adjusted 0.2148 |
|-----------------------------|--------------|-----------|---|-------|----------------|----------------------|
| Independent variable |             |           |   |       | No of observations 361 | No of companies 97 |
| $D_{it}^{Lith} E_{it}$ | ($\beta_1^{Lith}$) | 2.190 | 0.290 | 7.57 | 0.000 |
| $D_{it}^{Est} E_{it}$ | ($\beta_2^{Est}$) | 5.021 | 1.012 | 4.96 | 0.000 |
| $D_{it}^{Lith} L_{it} E_{it}$ | ($\beta_2^{Lith}$) | 7.252 | 1.480 | 4.90 | 0.000 |
| $D_{it}^{Est} L_{it} E_{it}$ | ($\beta_2^{Est}$) | -2.379 | 0.449 | -5.29 | 0.000 |
| $D_{it}^{Lith} |E_{it}| E_{it}$ | ($\beta_2^{Lith}$) | -6.169 | 1.205 | -5.12 | 0.000 |
| $D_{it}^{Lat} E_{it}$ | ($\beta_1^{Lat}$) | -8.306 | 1.774 | -4.68 | 0.000 |
| $D_{it}^{Lith} |E_{it}| E_{it}$ | ($\beta_5^{Lith}$) | .50 | 0.100 | 0.50 | 0.619 |
| $D_{it}^{Lat} |E_{it}| E_{it}$ | ($\beta_1^{Lat}$) | 1.170 | 1.680 | 0.70 | 0.487 |
| $D_{it}^{Est} |E_{it}| E_{it}$ | ($\beta_3^{Est}$) | -3.976 | 1.469 | -2.71 | 0.007 |
| Intercept $\alpha$ | | 0.564 | 0.063 | 9.01 | 0.000 |

In table 9 coefficients ($\beta_2^{Lith}$, $\beta_2^{Lat}$, $\beta_2^{Est}$) taking into account the effect of losses are significantly negative in all three countries. This suggest that the presence of losses
reduces the observed returns-earnings relation, in fact it is a near zero response to negative earnings in all three countries. The results support the asymmetry hypothesis that there exists differences in the informational content of losses and profits, and that losses adversely affect earnings response models by biasing earnings response coefficients downward. This supports the results of Hayn (1995) that negative earnings are more transitory than non-negative earnings and therefore lead to smaller ERCs than theoretically predicted. The absolute value of coefficient, accounting for the impact of negative earnings, is the largest for Estonia ($\beta^{\text{Est}}_2 = -8.306$), for Latvia – in the middle ($\beta^{\text{Lat}}_2 = -6.169$) and for Lithuania - the smallest ($\beta^{\text{Lith}}_2 = -2.379$).

Coefficients indicating non-linearity, $\beta_3, \beta^{\text{Lith}}_3, \beta^{\text{Lat}}_3, \beta^{\text{Est}}_4$, are statistically insignificant at 5% level, except for Estonia. This might be because of most of the extreme values in Lithuania and Latvia are negative, while Estonia has more extreme positive earnings values (see Table 3, $E_\mu$ for Estonia when $\tau = 1$). The non-linearity effect in Lithuania and Latvia might be absorbed by accounting for the asymmetry in relation to profits and losses.

**Conclusion and further research**

I find that the association between returns and earnings differs quite substantially among all three Baltic States, with Lithuania showing the weakest and Estonia showing the highest value relevance. The returns-earnings association in Latvia seems to be very is similar to Estonia, but it has higher standard errors, so the results are less convincing. Estonia’s lead is explained by the higher efficiency of the Estonian stock market, resulting from its more liquid stock market as well as a more developed Estonian accounting system, making earnings figures more value relevant.

I find that estimates of the earnings response coefficients and the adjusted $R^2$ values increase with the inclusion of leading-period returns. This suggests that stock prices lead accounting earnings in the Baltic States and that information reflected in prices contains information about future earnings changes.

The presence of losses reduces the observed returns-earnings relation in all three Baltic countries, in fact it is a near zero response to negative earnings in all three countries. The non-linearity effect is significant only in Estonia. This might be because most of the extreme earnings values during the investigated period in Lithuania and Latvia were negative, while Estonia experienced extreme negative as
well as positive earnings values. Alternatively, it might mean that the returns-earnings relation only in Estonia exhibits non-linearity.

Ideally I would like to obtain differences in estimates of the earnings coefficient due to the effects of prices leading earnings, given that the effects of the transitory earnings are being controlled for, and visa versa.

Since I can not do it empirically, in my further research about the Baltic Stock markets I could replicate Easton et al. 2000, who do the next best thing - they identify variables that might indicate a greater degree of non-permanence or prices leading earnings\(^{10}\). For non-permanence they use one-time items (special items, discontinued operations, extraordinary items) and negative earnings, for prices leading earnings - investment in intangibles. Accounting standards rarely record the value of intangibles, while the stock market uses the information of this value and its implications immediately. Eventually the effect of intangibles flow into earnings, but this change in earnings is already partly anticipated by the market, which leads to a lower estimate of ERC. Easton et al. 2000 do not account for non-linearity in relation to the extreme values of earnings.

\(^{10}\) Easton et al. 2000 instead of prices leading earnings use a term of lags in accounting recording, which I take as equivalent because accounting recording lag is the cause for prices leading earnings.
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