Implications of Capital Structure and Credit Constraints for Company Performance: A Comparative Study of Local and Multinational Companies in the Baltics

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Declaration:
Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology has not been submitted for any academic degree.

/Mari Avarmaa/

Kapitali struktuuri ja krediidipiirangute mõju ettevõtte majandustulemustele Baltimaade kohalike ja rahvusvaheliste ettevõtete näitel

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INTRODUCTION

Companies' sustainable performance is a cornerstone of sound economic development. It is therefore important to study the various aspects of corporate performance under different economic conditions and identify the influence of factors that shape companies´ operational and financial decisions.

Ever since the seminal paper of Modigliani and Miller (1958) showing that, upon certain conditions, financing choices do not have an impact on company value, researchers have brought out a number of factors such as informational asymmetries (Ross 1977, Myers 1984, Myers and Majluf 1984), agency conflicts (Jensen and Meckling 1976, Myers 1977), bankruptcy costs (Kraus and Litzenberger 1973) and taxes (Modigliani and Miller 1963, Miller 1977) that make financing choices relevant. The impact of financing on various aspects of corporate operations therefore deserves attention in finance research.

Multinational companies (MNCs) play a significant role in the economic development of many emerging markets, including the Baltic countries. The foreign direct investment stock as a percentage of GDP stood at 86% in Estonia, 45% in Latvia, and 37% in Lithuania in 2010 (Eurostat). Financing decisions of MNCs may be affected by forces different from those that shape the capital structure of local companies. Since some authors (e.g. Desai et al. 2004, Aggarwal and Kyaw 2008) have suggested that better financing conditions could serve as a competitive advantage for MNCs compared to their local counterparts, it is important to investigate the existence, sources and implications of any such advantages in the context of emerging economies, such as the three Baltic countries. Furthermore, capital structure has been found to be an important determinant of company viability, including in studies that cover the Baltic countries (Männasoo 2008, Hazak and Männasoo 2010). It is therefore particularly interesting to study such implications of financing under different phases of the economic cycle.

The present thesis investigates the drivers of financing choices for local companies and MNCs operating in the Baltic countries, and the implications of these choices on their development and performance. Such a cross-country study on three catching-up markets with a similar historical and economic background serves as a good context for investigating the issues of company financing and performance in transition economies.

The main goals of the thesis are as follows:
- To understand the driving forces of capital structure formation of companies operating in the Baltic countries;
- To identify the key differences between the financing patterns of local companies and MNCs based on the example of companies operating in Estonia, Latvia and Lithuania, and to search for the main drivers of these differences;

- To identify the impact of financing on corporate productivity and growth in the comparative perspective of local and multinational companies, based on a sample of companies in the Baltic countries;
- To build a conceptual framework for describing the impact of credit constraints on companies' investment behaviour under economic fluctuations;
- To identify any related differences between local and multinational companies in their responses to economic fluctuations.

In this thesis, a company is classified as multinational if more than 50% of the company is directly owned by a foreign company, and otherwise as a non-multinational (i.e. local) company.

The thesis contributes to the finance literature by providing empirical evidence on the determinants of companies' capital structure in the Baltic countries. To the best knowledge of the author, the thesis includes the first studies highlighting the differences between MNCs and local companies in the impacts of various capital structure determinants and in the impact of financing on company productivity and growth. In addition, the thesis presents a conceptual framework for describing the investment behaviour of companies experiencing various degrees of credit constraints during the different stages of the economic cycle, and provides empirical evidence in favour of the theoretical predictions.

The thesis is based on four academic papers. The first paper (Paper 1) co-authored with Aaro Hazak and Kadri Männasoo is titled "Capital structure formation in multinational and local companies in the Baltic States". The paper deals with empirical examination of the determinants of capital structure in local companies and MNCs operating in the Baltic countries. The paper has been published in the Baltic Journal of Economics (Avarmaa et al. 2011a), a journal issued by the Stockholm School of Economics in Riga and the Baltic International Centre for Economic Policy Studies (BICEPS). The journal is indexed in Thomson Reuters ISI Web of Science (ETIS 1.1) and other databases. A preliminary version of the paper has been presented at the 2nd International Conference "Economies of Central and Eastern Europe: Convergence, Opportunities and Challenges" in Tallinn, Estonia (13-15 June 2010). The roles of the three authors of the paper were divided as follows. The author of the thesis generated the idea for the paper, prepared the literature review, compiled the empirical dataset on financial variables and company ownership, and was involved in the execution of the regression analysis under the guidance of the supervisors. Aaro Hazak provided ideas for the setup of the paper and the regression model. Kadri Männasoo was leading the selection and implementation of the econometric approach. All of the authors were jointly involved in the formulation, interpretation and presentation of the results and conclusions of the paper.

The second paper (Paper 2) is titled "Does Leverage Affect Company Growth in the Baltic Countries?" (Avarmaa 2011). The paper presents an empirical analysis of the impact of company financing on the growth of local

companies and MNCs operating in the Baltic countries. It has been published in "Information and Finance", peer-reviewed conference proceedings of the International Economics and Development Research Centre (Singapore), indexed in EBSCO and other databases (ETIS 3.1). A preliminary version of the paper has been presented at the 3rd International Conference "Economies of Central and Eastern Europe: Convergence, Opportunities and Challenges" in Tallinn, Estonia (12-14 June 2011) and the final version at the 2011 International Conference on Information and Finance in Kuala Lumpur, Malaysia (4-6 November 2011).

The third paper (Paper 3) co-authored with Aaro Hazak and Kadri Männasoo is titled "Does leverage affect labour productivity? A comparative study of local and multinational companies of the Baltic countries" (Avarmaa et al. 2013, forthcoming). The paper investigates the impact of company financing on labour productivity of local companies and MNCs operating in the Baltic countries. The paper has been accepted for publication in the Journal of Business Economics and Management, a journal published by Taylor & Francis. The journal is indexed in Thomson Reuters ISI Web of Science (ETIS 1.1; 2010 Impact Factor 3.9) and other databases. Preliminary versions of the paper have been presented at the 3rd International Conference "Economies of Central and Eastern Europe: Convergence, Opportunities and Challenges" in Tallinn, Estonia (12-14 June 2011) and the 8th International Conference on Applied Financial Economics in Samos, Greece (30 June - 2 July 2011) and included in the peer-reviewed conference proceedings of the latter (Avarmaa et al. 2011b). The contributions of the three authors of the paper were as follows. The author of the thesis prepared the literature review, compiled the empirical dataset on financial variables and company ownership, and performed the empirical analysis. Aaro Hazak provided ideas for the setup of the paper. Kadri Männasoo was leading the selection of the econometric approach and consulted on methodological issues. All of the authors contributed to the formulation, interpretation and presentation of the results and conclusions of the paper.

The fourth paper (Paper 4) is titled "Credit constraints, corporate investments and economic fluctuations: Implications for local versus multinational companies" (Avarmaa 2012, forthcoming). The paper develops a conceptual framework regarding the investment behaviour of companies with varying degrees of credit constraints at the different stages of economic cycle, and tests the predictions empirically on a sample of companies operating in the Baltic countries. It has been accepted for publication in International Research Journal of Finance and Economics, a peer-reviewed journal indexed in EconLit, EBSCO, Elsevier and other databases (ETIS 1.2). The paper was presented at the 4th international conference "Economic Challenges in Enlarged Europe" in Tallinn, Estonia (17-19 June 2012).

Preliminary versions of the papers have been presented at the doctoral seminars of the Department of Economics at Tallinn University of Technology.

The rest of the thesis is organised as follows. Section 1 gives an overview of related literature. Section 2 presents data and methodology and Section 3 presents models and results of the papers that serve as the basis for the thesis. Section 4 presents the conclusions of the thesis.

1. RELATED LITERATURE

1.1 Capital structure determinants

Modern literature on company financing decisions starts with the capital structure irrelevance proposition by Modigliani and Miller (1958), followed by their later paper outlining the debt tax shield concept (Modigliani and Miller 1963). Although these theories are not able to capture the real life behaviour of companies, they have been a starting point for many later works that explain the various imperfections that make decisions regarding capital structure relevant.

The traditional trade-off theory, which focuses on the benefits and costs of issuing debt, suggests that an optimal debt ratio is reached when the marginal benefits of debt (tax shield) offset the increase in the present value of the costs of debt (i.e. mainly bankruptcy costs) (Kraus and Litzenberger 1973). The agency theory of capital structure (Jensen and Meckling 1976, Myers 1977, Jensen 1986) focuses on the influence of conflicts of interest between managers, owners and debt-holders on financing decisions. Pecking order theory introduced by Myers (1984) and Myers and Majluf (1984) is based on the informational imperfections that have an impact on the choice between debt and equity as well as between internal and external sources of funding. Signalling theory of capital structure developed by Ross (1977) also deals with the impact of asymmetric information on financing decisions.

The majority of empirical studies on capital structure seek to understand the impact of various determinants of financing decisions or aim to test the applicability of certain theories of capital structure. Empirical research on factors that influence leverage covers three main areas – company specific, business environmental, and ownership factors. For a detailed overview of the empirical research of various factors determining capital structure, see Prasad et al. (2001). In summary, previous studies on capital structure find that company level characteristics which are most often considered to determine capital structure are tangibility, size, profitability, growth, company risk, non-debt tax shields, and industry.

A few empirical studies deal with determinants of capital structure in the Baltic countries. In their analysis of the target capital structure of large firms in transition countries, including Estonia, Latvia and Lithuania, Haas and Peeters (2004) find profitability and age to be the most robust determinants of capital structure. They report a significant negative relationship between profitability and leverage, and a significant and positive relationship between company age and leverage. In his analysis of capital structure formation in five Central and Eastern European (CEE) countries, including Estonia, Nivorozhkin (2005) finds a negative relationship between profitability and leverage, as well as between age and leverage, and a positive relationship between earnings variability and tangibility and leverage. Jõeveer (2006) analyses determinants of capital structure in nine CEE countries, including the Baltics. She concludes that company specific factors mostly

influence the leverage of listed and large unlisted companies, while country specific factors are the most prominent determinants of leverage variation for small companies. Shamshur (2010) investigates determinants of capital structure of financially constrained and unconstrained companies operating in seven Eastern European countries (including the three Baltic countries) and finds that tangibility appears to be a significant determinant of leverage for financially constrained companies while macroeconomic factors impact the level of leverage of unconstrained firms, suggesting that the latter firms adjust their capital structure in response to changes in macroeconomic conditions. There are also two papers dealing with capital structure choices in Estonia (Sander 2004, Seppa 2008). Both papers conclude that capital structure decisions in Estonia tend to follow the the pecking order theory and find no support for the traditional trade-off theory.

1.2 MNC specific financial issues

The modern theory of foreign direct investment is based on the conviction that MNCs have emerged due to market imperfections (Hymer 1976). In order to compete with local companies, foreign enterprises would need to have some advantages that compensate for the disadvantage of operating in a (relatively unfamiliar) foreign environment. In addition, some market imperfections must limit local companies' access to the advantages available to foreign enterprises (Blomström 2002). To summarise his overview of theoretical argumentation for investing abroad, Blomström concludes that in order to compete successfully in a foreign market, a company must possess some ownership-specific assets in knowledge, technology, organisation or managerial and marketing skills. These features are likely to have an impact on the financing choices of MNCs compared to local companies.

Corporate finance theories are likely to have different implications for MNCs and local companies. For example, monitoring costs of debt brought out in the agency theory (Jensen and Meckling 1976) may be higher due to the complexity of international operations and geographical distances. Leverage is therefore expected to be lower for MNCs compared to companies having only domestic operations, and this relationship has found empirical support (Lee and Kwok 1988, Burgman 1996, Chen et al. 1997, Doukas and Panzalis 2003).

Desai et al. (2004) draw attention to the opportunity of multinationals to use internal capital markets to overcome any shortcomings associated with external credit market conditions. Subsidiaries of MNCs might substitute group debt for external debt in countries where creditor rights are weak, and choose intra-group debt where locally provided debt is scarce or expensive, while local firms must rely primarily on local sources of debt. The same has been suggested by Aggarwal and Kyaw (2008) who find that this type of financial flexibility is likely to be an important source of competitive advantage for MNCs.

MNCs are believed to have lower business risks compared to non-multinationals due to a broader diversification of their operations. As riskier companies have higher probability of default, international diversification may enhance their debt carrying capacity (Lee and Kwok 1988, Doukas and Panzalis 2003). However, empirical results regarding the lower level of business risks of MNCs remain inconclusive (see Lee et al. 2006 for literature review). Doukas and Panzalis (2003) offer an alternative view regarding the choice of the level of leverage by MNCs – due to lower informational asymmetries and agency costs, internal equity is easier to obtain for MNCs than external equity, and therefore their lower leverage should reflect the strengths of internal capital markets.

One of the imperfections characterising the operating environment of MNCs is taxation. In their theoretical models of capital structure choice of multinational companies, Chowdhry and Nanda (1994) and Chowdhry and Coval (1998) focused on the influence of host country and home country taxes on the use of debt by MNCs. Chowdhry and Nanda (1994) show that for any given level of total debt financing, higher corporate tax rates in the host country are associated with a larger proportion of external debt compared to intra-group debt. Chowdhry and Coval (1998) demonstrate that MNCs' debt-to-assets ratio is positively related to the tax rate of the host country and negatively to the tax rate of the parent country. In their empirical analysis of capital structure of MNCs in Europe, Huizinga et al. (2008) view taxation as one of the central factors determining the capital structure choice of MNCs along with company specific variables such as size, tangibility and profitability. They find both host country tax rates and tax differences between host country and home country to have a positive influence on the leverage of MNCs.

Singh and Hodder (2000) bring out the ability of multinational firms to shift income and tax deductions across subsidiaries in different tax jurisdictions. Such financial flexibility is not available for single country firms and it represents a distinctive characteristic and potential advantage of multinationality. They find that financial flexibility is a key determinant of optimal capital structure for a multinational firm. Unfortunately, as Singh and Hodder (2000) admit, the implications of financial flexibility are difficult to test, since this would require detailed data on costs for transferring income and tax shields across subsidiaries.

1.3 Impact of capital structure on company investments, productivity and growth

The corporate finance theories mentioned in Section 1.1 offer some predictions on the influence of leverage on company investments, productivity and growth. As the agency theory of capital structure explains that debt functions as a monitoring device over managers (Jensen and Meckling 1976), higher debt levels might help to avoid overinvestment and result in higher productivity and growth. On the other hand, the debt overhang concept by

Myers (1977) demonstrates that high leverage can cause companies to underinvest since the benefits of new capital investments accrue largely to debt holders instead of equity holders. Ultimately, this would lead to weaker company performance and limit growth. At the same time, the overinvestment problem outlined by Jensen (1986) implies that managers may wish to expand the scale of companies even if it means investing into poorly performing projects, whereas debt might limit the free resources available for such investments. This would result in a negative relationship between leverage and investment growth for companies that have weak growth opportunities. The pecking order theory by Myers and Majluf (1984) demonstrates that due to asymmetric information, companies prefer internal financing sources to external ones, and debt to external equity – these tendencies might put limits on companies' investment decisions as well as to the ability to grow. The signalling theory of capital structure suggests that because companies which perform better use the issuance of debt as a signal about their quality (Ross 1977), higher debt might be associated with higher productivity.

Concerning empirical research, several works show that leverage has a negative impact on productivity. Nucci et al. (2005), based on a sample of Italian companies, find a negative relationship between leverage and productivity. They show that there is a negative relationship between a company's leverage and its propensity to innovate, and that innovativeness leads to higher productivity. Ghosh (2009) draws a similar conclusion on a sample of Indian high-tech companies. Based on their quantile regression analysis on a sample of Portuguese companies, Nunes et al. (2007) also show that the relationship between leverage and labour productivity is negative, except for the most productive companies, in which case higher leverage tends to increase productivity. In contrast to the papers above, Kale et al. (2007), relying on a sample of US companies, find a positive concave relationship between leverage and labour productivity, which is in line with the monitoring concept of the agency theory. Out of the limited research on the relationship between leverage and productivity in CEE, Coricelli et al. (2010) have focused on the impact of leverage on total factor productivity growth in twelve CEE countries (including Latvia) and found the relationship to be non-linear – at low levels of leverage the impact is positive and starting from a certain breakpoint it turns negative. Foreign ownership was found to have a positive impact on productivity growth.

Empirical works dealing with the impact of leverage on sales growth have focused either on SMEs or young companies. Most of the studies have identified a positive impact of leverage on sales growth (e.g. Heshmati 2001, Honjo and Harada 2006, Hermelo and Vassolo 2007 and Huynh and Petrunia 2010). The positive impact of leverage has been explained by the difficulties with access to credit of these types of companies in relation to informational asymmetries. The only paper concentrating on company growth in the CEE

region (Mateev and Anastasov 2010) found the relationship between leverage and sales growth of SMEs to be insignificant.

The impact of leverage on investments has generally been found to be negative whereas the negative relationship is stronger for the firms with lower growth opportunities (Lang et al. 1996, Aivazian et al. 2005, Ahn et al. 2006, Umutlu 2010). The results are explained by the agency theory (Jensen 1986) whereby the tendency of companies (especially the ones with weak growth opportunities) to overinvest is constrained by leverage. There are also some studies carried out on data from emerging markets that have found the impact of leverage on investments to be insignificant (Saquido 2004, Bokpin and Onumah 2009).

1.4 Impact of credit constraints on company investments, productivity and growth

The existence of financial frictions implies that the investment spending of some companies may be constrained. Financial constraints can be defined as financial obstacles that hinder companies in accessing external funds to finance their investments (Ismail et al. 2010). In other words, financing constraints refer to the inability of companies to finance the desired level of investment that they would have undertaken in a perfect capital market. In perfect capital markets companies would be indifferent between what sources (internal or external) they use to finance their investments (Hashi and Toçi 2010).

Credit constraints can be considered as one specific form of financing constraints denoting a situation where access to debt is limited. The concept of credit constraints stems from the seminal paper by Stiglitz and Weiss (1981) who developed a model of credit rationing, and demonstrated how adverse selection leads to the restraining of loan issuance by banks. Overall, there are two forms of credit constraints mentioned in finance literature – quantity constraints (see e.g. Giambona and Schweinbacher 2008, Liu and Wang 2010) and cost constraints (refer to e.g. Fazzari et al. 1988, Kaplan and Zingales 1997, Lin and Paravisini 2012). Almeda and Campello (2007) have explained that in the case of quantity constraints, companies cannot raise additional external funds irrespective of how high borrowing costs they would be ready to bear, while in the case of cost constraints, attracting external funds beyond a certain limit entails some deadweight costs in addition to the fair costs of raising funds.

One of the main reasons of credit constraints to occur is asymmetric information (Bebczuk 2003). Another factor considered to be causing credit constraints is relatively low development of financial markets and institutions (Almeida et al. 2011). It has also been argued that overall cautiousness in the banking system can be a source of credit constraints during recessions (Drehmann et al. 2011). From among the demand side factors, current or expected financial distress of the borrower could be among the reasons for experiencing credit

constraints (Almeida et al. 2011). Empirical evidence (Canton et al. 2010, Brown et al. 2012, Beck et al. 2006) shows that young, small and locally owned companies tend to be more credit constrained.

There is a host of literature dealing with the essence and implications of financing constraints. A major strand in the literature (e.g. Fazzari et al. 1988, Kaplan and Zingales 1997, Whited and Wu 2006, Hadlock and Pierce 2010 etc) has investigated methodologies for identifying and measuring the severity of financing constraints. Various models have been developed to outline the interaction between macroeconomic fluctuations and financing constraints (e.g. Kiyotaki and Moore 1997, Baccetta and Caminal 2000, Levy and Hennessy 2007, Liu et al. 2010, Liu and Wang 2010) and some empirical investigations of the same relationship have been carried out (e.g. Korajczyk and Levy 2003).

A few models have been constructed on the impact of financing constraints on investment behaviour. Some of the models (Almeida and Campello 2007, Giambona and Schwienbacher 2008, among others) concentrate on investment in tangible assets as means of mitigating financing constraints. A recent work by Almeida et al. (2011) focuses on the impact of future financing constraints on the choice between investments with different level of liquidity, risk and tangibility.

While the majority of the studies deal with financing constraints in general, there are some papers focusing on the interaction of credit constraints and investments. Eisfeldt and Rampini (2007) show that credit constrained companies are more likely to invest in second hand assets. Aghion et al. (2010) show in their model on volatility and growth that tighter credit constraints increase the likelihood that the share of long-term investment raises with a positive productivity shock. Perez (2010) demonstrates that the anticipation of credit constraints results in an increase in the share of short-term projects that produces a temporary increase in output at the expense of lower long-run investment and future output, and leads to the dampening of productivity shocks in the short term and propagation of these in the long term.

The only work dealing with the determinants of investment decisions in the Baltic countries is the one by Tuusis et al. (2010) on Estonian companies where the impact of three main categories of factors (risk factors, liquidity constraints and business confidence) is investigated using the survey methodology. The authors of the latter paper conclude that financing constraints play a considerable role in the investment decisions of Estonian companies.

A few empirical works have touched upon relationships between financing constraints and productivity. Gatti and Love (2006), relying on a Bulgarian sample, find that access to credit is positively associated with productivity. Moreno Badia and Slootmaekers (2008) have investigated the relationship between productivity and financial constraints in Estonia. They conclude that financial constraints do not have an impact on productivity in most sectors, with the exception of R&D, where financial constraints have a large negative impact on productivity.

2. DATA AND METHODOLOGY

For the empirical analysis performed in the thesis, data from the Amadeus database compiled by Bureau van Dijk are used. The database provides financial statements and information regarding the ownership structure of private and publicly owned European companies. In the empirical works included in the thesis, companies have been divided into two subsets – multinational and non-multinational companies. This enables to observe differences in capital structure formation and implications of the differences in financing choices on company investments, growth, and productivity. Data for credit constraints were obtained from the Business Environment and Enterprise Performance Survey (BEEPS) gathered jointly by EBRD and the World Bank. Data on GDP growth and deflators were obtained from Eurostat.

Empirical analysis is performed on companies operating in Estonia, Latvia and Lithuania during the period of 2000-2008 (Papers 2-4 cover the period of 2001-2008). Companies in the public utilities and financial sector (US SIC codes 4000-4999 and 6000-6999) are excluded from the analysis due to their fundamentally different financial structure as in many other studies (Lee and Kwok 1988, Rajan and Zingales 1995, Chkir and Cosset 2001). Branches of foreign companies, cooperative companies and partnerships are also excluded from the analysis since their legal form makes capital structure decisions different from regular limited liability companies. For every company, data are included in the sample for those years for which financial information was available at sufficient level of detail and accuracy. The empirical studies performed in the four papers are based on samples consisting of 18,000 to 87,000 company-year observations. These differences in sample sizes relate to the research focus that determined the formation of the final sample. The elimination of outliers reduced the initial number of observations by 2-6%.

Regression analysis has been the main method in the literature for analysis of the determinants of capital structure (Rajan and Zingales 1995, Booth et al. 2001, Deesomsak 2004, Delcour 2007, Frank and Goyal 2009), productivity (Nucci et al. 2005, Nunes et al. 2007, Kale et al. 2007, Ghosh 2009, Coricelli et al. 2010), growth (Heshmati 2001, Bechetti and Trovato 2002, Honjo and Harada 2006, Mateev and Anastasov 2010) or investments (Lang et al. 1996, Aivazian et al. 2005, Ahn et al. 2006, Umutlu 2010). While most of the empirical works use regression analysis, there are also a few surveys based on international samples examining capital structure choices – Bancel and Mittoo (2004) and Brounen et al. (2006). In some cases, the survey approach has also been used for observing the impact of financial factors on productivity, investments or growth (Hermelo and Vassolo 2007, Tuusis et al. 2010). We prefer using panel data regression whereby we are able to cover a time period of almost ten years and include data on more than 15,000 companies.

The specification of the regression model was guided by the nature of the data and the goals of the thesis. We use an unbalanced panel with companies'

dimension (N) much larger than time-dimension (t). A fixed effects model has been used in all studies since it helps to control for unobserved heterogeneity between firms that is constant over time and correlated with independent variables. A random effects model would have ignored such firm-level heterogeneity. Moreover, the assumption of zero correlation between latent heterogeneity and included observed characteristics that is necessary under the random effects model would have been particularly restrictive. This is confirmed by the Hausman test, which strongly suggests that in all the studies, a fixed effects model should be preferred over the random effects model. Robust standard errors have been employed in all our regression models to control for potential bias in the presence of heteroskedasticity and for the within-cluster serial correlation. Year-sector dummies have been included to control for the time and sector level effects.

An unbiased fixed effects estimator requires a strict exogeneity of the explanatory variables. We have therefore used the Davidson-MacKinnon test that controls for exogeneity of a panel regression estimated via instrumental variables. The null hypothesis states that estimates are consistent and the exogeneity assumption of explanatory variables is met. Applying the Davidson-MacKinnon test on our equations showed that the null hypothesis was not rejected and hence the alternative hypothesis that endogenous regressors' effects on the estimates are meaningful was not supported. For pre-cautionary reason, some of the models (model 3 and 5 presented in the next section) also employed pre-determined variables. The robustness of the models has been tested on a number of subsamples in the majority of the studies.

In order to observe differences between local companies and MNCs operating in the same host country, interactions between independent variables and MNC dummy have been used in regression models 2-5 presented in the next section. A similar approach has been applied by Akhtar (2005), Mittoo and Zhang (2008), Akhtar and Oliver (2009) for comparisons of capital structure determinants of domestic companies and MNCs from the same home country.

3. MODELS AND RESULTS

3.1 Determinants of capital structure in local companies and MNCs

Paper 1 investigates the impact of major capital structure determinants of local and multinational companies operating in the Baltic countries. The regression model is built on the classical model of Rajan and Zingales (1995) and is complemented with additional independent variables derived from the findings of previous research (Booth et al. 2001, Haas and Peeters 2004, Nivorozhkin 2005 among others).

The regression is first estimated for the whole sample (Model 1), seeking to identify key capital structure determinants in the Baltic countries over the period from 2000 to 2008. Leverage of an i-th company at time t is modelled as follows:

$$LEV_{it} = \beta_1 AGE_{it} + \beta_2 AGE^2_{it} + \beta_3 TANG_{it} + \beta_4 PROF_{it} + \beta_5 SIZE_{it} + \beta_6 CRED_{it} + \beta_7 TAX_{it} + \beta_8 HHI_{it} + \alpha_i + u_{it}, \tag{1}$$

where α_i denotes firm-level fixed effects. The variables are described in Table 1.

In order to identify the differences between multinational and local companies in the impact that the various determinants have on their leverage, interaction terms between independent variables and the dummy variable for MNCs are employed in Model 2.

$$LEV_{it} = \beta_1 AGE_{it} + \beta_2 AGE^2_{it} + \beta_3 TANG_{it} + \beta_4 PROF_{it} + \beta_5 SIZE_{it} + \beta_6 CRED_{it} + \beta_7 TAX_{it} + \beta_8 HHI_{it} + \beta_9 AGE \times MNC_{it} + \beta_{10} AGE^2 \times MNC_{it} + \beta_{11} TANG \times MNC_{it} + \beta_{12} PROF \times MNC_{it} + \beta_{13} SIZE \times MNC_{it} + \beta_{14} CRED \times MNC_{it} + \beta_{15} TAX \times MNC_{it} + + \beta_{16} HHI \times MNC_{it} + \alpha_i + u_{it} \tag{2}$$

Two alternative measures of leverage (*LEV*) are used as dependent variables in the regressions. First, we have used an adjusted measure of leverage (*LEV A*), calculated similarly to several studies on capital structure (Rajan and Zingales 1995, Jog and Tang 2001, Huizinga et al. 2008). This measure takes into account that some assets on the balance sheet are offset by specific non-debt liabilities. Second, to consider the specifics of long-term financing compared to short term financing, we have employed long-term leverage (*LEV B*) as an alternative to adjusted leverage. While long-term investments are generally financed from long-term financial resources, long-term debt could be more difficult to obtain compared to short-term debt. We have used the same denominator for long-term leverage as for adjusted leverage due to the advantages of that measurement mentioned above. Due to limitations on data availability, calculations of all the

leverage ratios used throughout the thesis are based on book values instead of market values. The advantages and disadvantages of using book and market leverage are summarised by Frank and Goyal (2009).

Table 1. Variables used in regression models

Variable	Abbre-viation	Measurement
Adjusted Leverage	LEV A	(Short-term debt + Long-term liabilities) / (Total assets − Current liabilities + Short-term debt)
Long-term Leverage	LEV B	Long-term debt / (Total assets − Current liabilities + Short-term debt)
Multinatio-nality	MNC	Dummy variable, 1 if more than 50% owned by a foreign company, otherwise 0
Labour Productivity	ln(Y/L)	Ln (Real Sales / Number of employees)
Company Sales Growth	GROWTH	[Real Sales(t) / Real Sales (t-1)] − 1
Company Investment Growth	INV	[Real tangible fixed assets(t) − Real tangible fixed assets (t-1)] / Real tangible fixed assets (t-1)
GDP Growth	GDP	Real GDP growth, data from Eurostat
Size	SIZE	Logarithm of Real total sales (Models 1 and 2)
Size	SIZE	Logarithm of Real total assets (Models 3, 4 and 5)
Tangibility	TANG	Tangible fixed assets / Total assets
Profitability	PROF	EBIT / Sales
Effective Tax Rate	TAX	Tax expenses / Profit before tax
Credit Constraints	CRED	Obstacles for getting credit from BEEPS, normalised [0,1]
Herfindahl Index	HHI	Squared sum of market shares of Sales in all firms in the industry based on 2-digit US SIC codes
Skill-intensive Industry	SKILL	1 if belonging to skill-intensive industry, otherwise 0

Our panel regression analysis shows that some of the traditional capital structure determinants influence leverage also in the Baltic countries. There is an overall negative and significant relationship between company age and leverage. As companies become older, leverage starts to decrease, in line with the pecking

order theory, suggesting that own funds which have been generated in previous years are preferred to external financing. Profitability appears to have a negative and significant relationship with leverage, a finding in accordance with previous research as well as with the pecking order theory.

The regression results indicate that bigger companies tend to borrow relatively more – a tendency which expectedly relates to reputational effects (higher transparency improves credit-worthiness) as well as relatively lower bankruptcy costs. The relationship between tangibility and leverage appears to be positive and significant, which is also in line with the findings of previous studies.

Based on the outcome of the regression model, the influence of effective tax rate on leverage is not statistically significant. However, it cannot be ruled out that the capital structure formation of certain companies is significantly impacted by taxation, whereas the multifaceted nature of international and local taxation principles with respect to different groups and companies may not have made it possible for us to bring out these potential relationships in our regression models.

Descriptive statistics reveal that there are significant differences in the leverage of multinational and non-multinational companies in the Baltic countries. Compared to local companies, MNCs averagely appear to be less leveraged (three percentage points lower adjusted leverage)[1], which seems to be primarily related to the higher investment level (thus requiring relatively more external funds) and lack of alternatives to external financing for the latter. The lower tangibility of MNCs might be related to their tendency to perform certain functions for their parent or other group companies (e.g. acting as sales representatives or wholesale or retail traders) without the need for major investment.

The regression results show differences between local and multinational companies in the sensitivity of their leverage to some capital structure determinants. Namely, the impact of company size on leverage appears to be larger for MNCs. This might be related to the lower business risks of multinational companies or differences in monitoring costs between the two types of companies. Also, the negative impact of company age is stronger in the case of multinational companies, indicating that local company owners might be less risk averse, preferring to withdraw profits earned to invest elsewhere or use retained earnings to attract additional debt for further expansion of the company, while multinationals appear to retain profits and potentially repay loans from these funds.

The difference between MNCs and local companies in the impact of credit constraints on leverage is most remarkable. While the impact of credit

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[1] There is a typing error in Section 5 on page 140 of Paper 1 published in the Baltic Journal of Economics stating that MNCs are more leveraged than local companies. In the rest of the published paper the fact that MNCs are on average less leveraged compared to local companies is presented correctly.

constraints on leverage of multinational companies is slightly negative, as one would assume, the similar impact for local companies is positive. While credit constraints seem to have hindered borrowing by local companies up to 2005, the overall economic and credit boom appears to have led local companies to follow the boom and undertake a growing number of investment projects in the following years. Part of these investments appear to have been successful in attracting external finance, while the increasing level of perceived credit constraints indicates that many of these projects were difficult to fund. This relationship also shows that compared to local companies, MNCs have been in an advantageous position in accessing external financing, as illustrated by their lower perceived credit constraints as well as by their ability to increase average leverage at the beginning of the 2000s when actual credit constraints were strongest. On the other hand, the above finding might show that the overall approach by MNCs to taking risks and borrowing is more conservative compared to local companies.

The results highlighting the differences in capital structure of local companies and MNCs as well as the different behaviour of those two types of companies during the cycle provided motivation for the investigation presented in the next two subsections.

3.2 Impact of company financing on productivity and growth

The thesis investigates the impact of financing on various aspects of corporate performance with the focus on differences between local companies and MNCs. Since both corporate productivity and growth are among the main drivers for economic growth, Paper 2 and Paper 3 investigate the impact of leverage on labour productivity and company sales growth respectively.

For investigating the impact of financing on sales growth, we build a fixed effects regression model in similar veins to the panel data regression model of Mateev and Anastsov (2010). Since access to finance is believed to be the most binding obstacle to company growth (Dinh et al. 2010), we have added a measure of credit constraints as one of the independent variables. Similarly to the empirical model described in the previous section and in order to allow for differences in the impact of growth, we have included interaction terms between independent variables and the dummy variable for MNCs.

The growth of an i-th company at time t has been modelled as follows:

$$
\begin{aligned}
GROWTH_{it} ={}& \beta_1 GDP_{it} + \beta_2 AGE_{it} + \beta_3 AGE^2_{it} + \beta_4 LEV_{i(t-1)} + \beta_5 LEV^2_{i(t-1)} + \\
& \beta_6 CRED_{it} + \beta_7 SIZE_{i(t-1)} + \beta_8 HHI_{i(t-1)} + \beta_9 AGE \times MNC_{it} + \beta_{10} AGE^2 \times MNC_{it} + \\
& \beta_{11} LEV \times MNC_{i(t-1)} + \beta_{12} LEV^2 \times MNC_{i(t-1)} + \beta_{13} CRED \times MNC_{it} + \\
& \beta_{14} SIZE \times MNC_{i(t-1)} + \beta_{15} HHI \times MNC_{i(t-1)} + \alpha_i + u_{it},
\end{aligned} \tag{3}
$$

where α_i denotes company level fixed effects. The variables included in the regression models are described in Table 1 (p. 20).

In addition to the whole sample, the impact of leverage on company growth has been investigated by three groups of leverage: low ($0 < LEV \leq 21.2\%$), medium ($21.2\% < LEV \leq 51.5\%$), and high ($LEV < 51.5\%$). As another alternative, regressions covering different phases of the economic cycle have been estimated. As discussed in the last section, the Baltic countries experienced an economic and credit boom during 2006-2007, and local companies increased their leverage substantially during that period. Thus, the impact of leverage on growth is expected to be different for the subsample.

Similarly to the empirical model described above, panel data regression analysis to study the determinants of labour productivity is used in Paper 3. Drawing on the work of Dimelis and Louri (2002), we use an augmented version of Cobb-Douglas production function for our empirical model. The model is complemented with additional control variables derived from the findings of previous research. Similarly to the previous model, credit constraints are included to take into consideration the perceived access to credits. In order to allow for the differences in the impact of leverage and credit constraints on productivity between multinational and local companies, interaction terms between those variables and a dummy variable for multinational companies are used. We model labour productivity of an i-th company at time t as follows:

$$Log\ Y/L_{it} = \beta_1 GDP_{it} + \beta_2 LEV_{it} + \beta_3 LEV^2_{it} + \beta_4 LEV \times MNC_{it} +$$
$$\beta_5 LEV^2 \times MNC_{it} + \beta_6 CRED_{it} + \beta_7 CRED \times MNC_{it} + \beta_8 AGE_{it} + \beta_9 AGE^2_{it} + \qquad (4)$$
$$\beta_{10} SIZE_{it} + \beta_{11} TANG_{it} + \beta_{12} HHI_{it} + \beta_{13} LEV \times SKILL_{it} + \alpha_i + u_{it},$$

where α_i denotes company level fixed effects.

Regression results for Paper 2 show that MNCs operating in the Baltic countries differ from local companies in their impact of financing on growth. Leverage appears to have a positive impact on sales growth only for local companies and not to influence the growth of MNCs. Credit constraints appear to have a stronger negative impact on the sales growth of local companies compared to MNCs. This indicates that the ability to obtain debt financing is vital for the development of local companies. This could be related to a relatively low capital market development in the Baltic countries, as well as to informational asymmetries that make local companies dependant on bank lending rather than private or public equity capital. MNCs seem to be able to finance their growth without excess lending, potentially due to the support of their corporate group and better access to capital markets. An alternative explanation to the different impact for MNCs stems from the agency theory - leverage might function as a disciplining device more effectively for local companies than MNCs.

The results by groups of leverage indicate that the increase of leverage tends to bring additional growth for the local companies only at low levels of leverage

while high leverage does not enable to achieve additional growth. This outcome is similar to the results of Paper 3 on the impact of leverage on labour productivity discussed below.

The regression results for the boom period show that the positive impact of leverage on growth of local companies is strongly evident during the time when the availability of credit was rapidly improving. The growth of MNCs does not seem to depend on lending to the same extent as in local companies as MNCs had been more flexible in financing their growth already before the boom. The descriptive statistics show that the credit constraints have been lower for MNCs during the whole period covered in this thesis. The strong negative impact of credit constraints of the local companies during the boom period is related to the trends discussed in the previous section - while the levels of leverage were increasing in the economy and availability of lending improved the financing needs of the companies increased even more rapidly and companies perceived increased obstacles for getting credit.

Paper 3 provides evidence that the relationship between leverage and labour productivity in the Baltic countries is non-linear. Namely, at low levels of adjusted leverage, increase in debt tends to bring along an increase in labour productivity, while at high levels of leverage an increase in debt financing appears to be associated with a decrease in labour productivity. This outcome is similar to Kale et al. (2007) who find a non-linear relationship between leverage and labour productivity based on a sample of US companies. Kale et al. (2007) argue that debt functions as a disciplinary mechanism up to a certain breakpoint starting from where the threat of financial distress or underinvestment due to the debt overhang problem begins to outweigh the incentives from the bonding mechanism. The positive coefficient of leverage might also show that the lack of debt financing sets limits to companies' ability to increase sales and thereby hinders the achievement of productivity improvements through economies of scale in labour utilisation.

The results of Paper 3 indicate that like in case of company growth, the relationship between financing and labour productivity is considerably different for MNCs compared to local companies. The interaction term between leverage and the MNC dummy is negative and significant while the coefficient for the interaction term between squared leverage and MNC dummy is positive and significant for adjusted leverage and insignificant for long-term leverage. This implies that labour productivity of MNCs, in contrast to local companies, appears to be more linear and tends to decrease as a reaction to increased leverage. The relationship is illustrated in Figure 1.

The breakpoint leverage, starting from where the impact of adjusted leverage for local companies becomes negative, is 32%, while the average level of adjusted leverage for local companies is 33% and the median value 27%. Thus, for more than half of the observations, additional leverage might bring along improvements in labour productivity. On the other hand, for MNCs, additional leverage does not seem to have any positive impact on labour productivity.
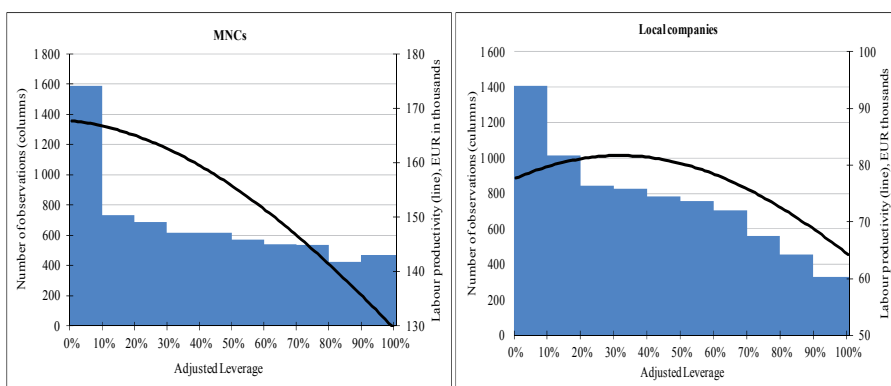
Figure 1. Impact of leverage on labour productivity of MNCs and local companies

This outcome might indicate that unlike local companies, the productivity of MNCs operating in the Baltic countries is not considerably limited by the availability of debt financing. A possible explanation for the different impact of leverage on the labour productivity of MNCs might be that in their case the disciplinary role of debt is weaker compared to local companies. Belonging to a corporate group, MNCs might be potentially able to utilise intra-group financial resources and are therefore less dependent on external debt providers. As the size of the operations of the subsidiaries of multinational groups in the Baltic countries tends to be relatively small compared to the size of the entire group, providing financing for such operations is not likely to be significantly constrained. In some cases, maintaining presence in the Baltic market might be of higher priority for corporate groups than improving short-run results. Additionally, the part of financing that comes in the form of intra-group lending might not function as a monitoring device.

The impact of perceived credit constraints on labour productivity is found to have a complex nature. Namely, the perceived obstacles in obtaining credit appear to have a positive influence on the productivity of local companies and only a minor impact on the productivity of multinational companies. This implies that the perceived (and materialised) obstacles in accessing credit are likely to force local companies to find ways to increase efficiency by using less workforce to generate a unit of sales. On the other hand, similar obstacles do not seem to put such a pressure on multinational companies as they generally tend to have a broader choice of financing sources in addition to third party credit, and can therefore more easily attract financing to support growth. Beck et al. (2002) have demonstrated that perceived financing constraints are generally higher for those companies which have a high demand for external financing either due to the growth opportunities or lack of internal resources. High perceived credit constraints may therefore indicate that companies are active at the credit market and see opportunities for expansion.

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Interestingly, both perceived credit constraints and leverage appear to have a positive relation to labour productivity in local companies. While experienced obstacles in getting credit are related to productivity improvements, the ability to increase leverage also has a positive influence on productivity up to a certain point in local companies. A possible explanation to this somewhat puzzling result might be that limited financial resources, which constrain growth, motivate companies to look for ways of achieving the existing activity level with fewer resources. The results of Paper 2 discussed previously show that credit constraints have a negative impact on sales growth in local companies operating in the Baltic countries, while the negative influence on sales growth of MNCs is relatively low. The positive impact of credit constraints on labour productivity is therefore likely to indicate that productivity improvements are gained through increased efficiency rather than sales growth. However, in the circumstances where local companies are able to increase leverage despite the faced obstacles for getting credit, the increase of leverage enables to achieve further productivity improvements (i.e. higher sales per employee) through economies of scale.

Paper 2 and Paper 3 show that many local companies operating in the Baltic countries would benefit from increased leverage by increasing sales growth and thereby also improving their productivity.

3.3 Impact of company financing on investments

The results of the previous articles indicating that local companies are likely to be more exposed to cyclical movements in economy provided the motivation for building a conceptual framework describing the differences in investment behaviour of local companies and MNCs in various states in economy in Paper 4. Empirical analysis is used subsequently to seek evidence for the predictions.

We develop a two-moment company-level investment model, reflecting the investment behaviour of two companies exposed to different levels of credit constraints. We assume that credit constraints occur in the form of cost constraints, i.e. the model does not apply to quantity constraints, a situation where a company is not able to raise funds at whatever cost of financing.

Similarly to Zábojník (2009) and Almeida et al. (2011), among others, we assume that if financing constraints exist, the increase in external financing would entail deadweight costs. As Almeida et al. (2011) explain, the deadweight costs might arise from different sources, such as informational asymmetries or poor investor protection. Also, companies that face credit constraints due to the poor development of financial markets or other reasons may be considered financially constrained and carry deadweight costs.

We assume that a company would incur a deadweight costs of $C(D,\theta)$ if it raises debt in the amount of D ($D \geq 0$). The parameter θ ($0 \leq \theta \leq 1$) is the measure of frictions (credit constraints). The higher θ is, the higher the

deadweight costs of raising a given amount of D are. This means that $C > 0$ if $D > 0 \land \theta > 0$; $C = 0$ if $D = 0 \lor \theta = 0$.

While several other studies divide companies into constrained and unconstrained in terms of access to credit, we allow for various degrees of credit constraints between the two companies. We note that such an assumption covers also the situation where one of the companies is not exposed to credit constraints, i.e. if $\theta = 0$.

We assume that company A experiences lower credit constraints than company B, i.e. $\theta_A < \theta_B$. This is assumed to be the only difference between the two companies in the model, i.e. for simplicity we regard credit constraints as exogenous and we focus on the reactions to credit constraints in this model.

Assumed there is an investment project with a cost of I ($I \geq 0$) that both companies consider to undertake, i.e. if undertaken by both, $I_A = I_B$, and if it is not economically justified to make the investment right away, the company would consider it again at any later moment of time. We assume that the investment is a lump sum payment. For the sake of simplicity, we consider only one investment and leave aside any other projects that might become available for the companies.

Net present value of the investment related cash flows is assumed to equal $NPV = aV - I - C$. V (to exclude obviously unattractive investments, assume $V \geq 0$) represents the net present value of all cash flows related to the project (incorporating any costs of borrowing), excluding (a) the initial investment I, (b) deadweight costs C, and (c) any changes in expectations about V due to cyclical changes (cf. a). The coefficient a depends on the state of the economy: $a = 1$ in the case of a stable state, $a > 1$ in the case of an upturn (i.e. a growth compared to the steady state) and $a < 1$ in the case of a downturn (i.e. a contraction compared to the steady state).

The investment project is assumed to be undertaken if $NPV > 0$, i.e. if the expected net present value of cash inflows exceeds the initial investment net of any deadweight costs.

Assuming that there are no internal resources available, both of the companies would need to raise external financing for the project. Similarly to Giambona and Schweinbacher (2008), we assume that the companies prefer debt financing to additional equity financing due to the relatively higher issuance costs of equity in relation to informational asymmetries. Therefore, $D = I + C$.

We consider two moments of time $t = 0$ and $t = 1$, and a period between these two moments.

Model 1: Upturn

First, for Model 1, we assume that there has been a positive shock (upturn) in the economy in the period between moments 0 and 1.

Credit constraints are believed to vary along with the phase of the business cycle and to be countercyclical (Eisfeldt and Rampini 2006). An increase in asset prices during an upturn (boom) is considered to ease the constraints and

thus help to expand production and investment, while drops in equity value during a downturn (recession) reduce the availability of credit (Liu and Wang 2010). We therefore assume that credit constraints are relieved during economic upturns and get tighter during a downturn. In period 1, due to an upturn, θ would drop unless there are no constraints already in the initial moment, i.e. if $\theta_0 > 0$ then $\theta_{A0} > \theta_{A1}$ and $\theta_{B0} > \theta_{B1}$.

Proposition 1: *Companies' different exposure to credit constraints leads to companies having different breakeven levels of projects with otherwise similar returns.*
Proof:
$\theta_A < \theta_B \rightarrow C_A < C_B \rightarrow aV_t - C_A - I_t > aV_t - C_B - I_t \rightarrow NPV_A > NPV_B$

This means that if at moment 0 the investment related expected present value of net cash inflows, net of any deadweight costs, exceeds the initial investment, i.e. $aV_0 - C_A > I_0$, company A would be able to make the above investment. However, starting from a certain point where $aV_0 - C_B = I_0$ or less, B could not make the investment in period 0, since the net cash inflows from the project, net of deadweight costs, would not be high enough to cover the investment due to the credit constraints. Evidently, the higher the credit constraints, the more discriminating the effect.

Proposition 2: *A company that experiences credit constraints needs to postpone certain investments from the current period to an upturn (i.e. a "boomier") period.*
Proof:
If $\theta_0 = \theta_1 = 0 \rightarrow C_0 = C_1 = 0$
If $\theta_0 > \theta_1 \rightarrow C_0 > C_1 \rightarrow aV_0 - C_0 < aV_1 - C_1 \rightarrow NPV_0 < NPV_1$

We can easily see that in case $\theta_0 = 0$, any difference between NPV_0 and NPV_1 is not driven by credit constraints (but may be caused by the effects that cyclical changes have on expectations regarding future cash flows, i.e. coefficient a; please refer to Proposition 3). However, if $\theta_0 > \theta_1$, the relaxation of credit constraints would have a positive impact on NPV and might thus lead to the postponement of certain investments to a period of upturn in order to achieve sufficient returns. It is important to note that the higher the credit constraints, the stronger the effect described in Proposition 2.

Model 2: Downturn
For Model 2, we assume that between moments 0 and 1 there is an unexpected downturn in the economy. For the avoidance of doubt, the state of the economy at moment 0 could be whatever, i.e. a moment after a boom or a stable period or even a downturn. What matters, is that there is an unexpected worsening in the state of the economy in the period between moments 0 and 1. We also assume that both company A and company B are able to make investment I at moment 0, or in other words $NPV_{A0} > 0$ and $NPV_{B0} > 0$.

As there is a downturn, coefficient a drops for both companies, and NPV goes down for both since $a_1 < a_0$.

Proposition 3: *A company experiencing credit constraints is more exposed to generating losses during a downturn.*

Proof:

If $\theta = 0 \rightarrow C = 0 \rightarrow NPV_0 = a_0V - I$; $NPV_1 = a_1V - I$

If $\theta > 0 \rightarrow C > 0 \rightarrow NPV_0 = a_0V - I - C$; $NPV_1 = a_1V - I - C$

Since $a_1 < a_0 \rightarrow a_1V - I - C < a_0V - I - C$; $a_1V - I < a_0V - I$

$a_1V - I - C < a_1V - I$

If both A and B experience some degree of credit constraints, the consequences of declining a are less severe for company A since $\theta_A < \theta_B$ and the deadweight costs are not as high. If the difference between θ_A and θ_B is sufficiently high, there exists a point at which the project becomes value destroying for company B while company A is still able to cover the initial cost of the project. In this case, in the light of the subsequent economic downturn, company B has overinvested at moment 0.

Propostion 4: *The higher the credit constraints, the stronger the effect described in Proposition 3.*

Proof:

If $(1 - a_1/a_0)V > NPV_0$ then $NPV_1 < 0$.

If $\theta_A < \theta_B \rightarrow C_A < C_B$, and for $V_{A0} = V_{B0}$, $NPV_{A0} > NPV_{B0}$.

Since $NPV_{A0} > NPV_{B0}$, it requires a less dramatic drop in coefficient a for company B to face the situation where $NPV_1 < 0$.

The framework presented above can be applied to various real-life situations where different types of companies experience varying degrees of credit constraints. As noted in Section 1.4, small, young and local companies have been found to be confronted with higher credit constraints.

The implications of the conceptual framework are now discussed on the example of local companies. Paper 1 included in the thesis shows that the average level of credit constraints perceived by locally-owned companies in the Baltic countries during 2000-2008 was 18% higher compared to subsidiaries of MNCs. Based on survey data of the World Business Environment Survey from 1999 covering 80 countries, Beck et al. (2006) have demonstrated that financing constraints (obstacles for any kind of external financing) are lower for foreign-owned companies compared to local ones. The above evidence pertains to perceived constraints as opposed to objective constraints. As mentioned in the previous section, Beck et al. (2002) have argued that perceived financing constraints are generally higher for those companies that have a high demand for external financing either due to the growth opportunities or lack of internal financial resources. High perceived credit constraints may therefore indicate that companies are active in the credit market and see opportunities for expansion.

Propositions 1 and 2 demonstrate that due to their higher credit constraints, local companies operating in the Baltic countries might be forced to shift investments to the boom period while MNCs might be more flexible in choosing the timing of investments. Ultimately, such a procyclical investment behaviour of local companies might lead to the propagation of economic fluctuations on a broader scale.

It has been brought out in previous literature that companies tend to invest in riskier projects during a boom and are less prone to undertake risky projects during downturns (Bonfirm 2009, Veirman and Levin 2011, Nanda and Rhodes-Kropf 2011). This tendency can be well interpreted in the context of our model. As company B is forced to postpone its investments to the "boomier" period, it is likely that it would prefer a riskier investment than the one that it would have made during the less "boomy" period. This implies that local companies might be taking more risks than the less credit constrained MNCs, and thus be more vulnerable to the adverse events in the economy.

Propositions 3 and 4 show that since the more credit constrained local companies tend to concentrate their investments to the upturn period, there might be an inclination to overinvest because the investment decisions could be influenced by the positive economic state and might turn out to be unprofitable under deteriorating economic conditions. This could cause a waste of scarce (capital) resources in the economy.

Using regression analysis, we investigate whether the different investment behavior of local companies and MNCs operating in the Baltic countries over the economic cycle drawn out above finds empirical support. We build a fixed effects regression model where the dependent variable is investment growth. We seek to observe how the GDP growth combined with credit constraints impacts investment growth of local companies and MNCs. We model investment growth of an i-th company at time t as follows:

$$
\begin{aligned}
INV_{it} = &\ \beta_1 GDP\_UP_{it} + \beta_2 GDP\_DOWN_{it} + \beta_3 GDP\_UP \times CRED_{it} + \\
&\ \beta_4 GDP\_DOWN \times CRED_{it} + \beta_5 GDP\_UP \times CRED \times MNC_{it} + \\
&\ \beta_6 GDP\_DOWN \times CRED \times MNC_{it} + \beta_7 LEV_{i(t-1)} + \beta_8 LEV^2_{\ i(t-1)} + \\
&\ \beta_9 LEV \times MNC_{i(t-1)} + \beta_{10} LEV^2 \times MNC_{i(t-1)} + \beta_{11} CRED_{it} + \beta_{12} CRED \times MNC_{it} + \\
&\ \beta_{13} AGE_{it} + \beta_{14} AGE^2_{\ it} + \beta_{15} AGE \times MNC_{it} + \beta_{16} AGE^2 \times MNC_{it} + \beta_{17} SIZE_{i(t-1)} + \\
&\ \beta_{18} SIZE \times MNC_{i(t-1)} + \beta_{19} PROF_{i(t-1)} + \beta_{20} PROF \times MNC_{i(t-1)} + \beta_{21} TANG_{i(t-1)} + \\
&\ \beta_{22} TANG \times MNC_{i(t-1)} + \beta_{23} HHI_{i(t-1)} + \beta_{24} HHI \times MNC_{i(t-1)} + \alpha_i + u_{it}
\end{aligned} \tag{5}
$$

Where α_i denotes company-level fixed effects.

Our aim is to observe the simultaneous impact of economic cycles and credit constraints on investment growth of local companies and MNCs operating in the Baltic countries. For that purpose, we have included interactions between GDP growth (*GDP_UP*) or GDP decline (*GDP_DOWN*) and credit constraints (*CRED*) in the regression model. The GDP growth equals the real GDP growth rate if real GDP growth is positive and zero otherwise, while the GDP decline

equals the real GDP growth if the growth rate is negative and zero otherwise. Similarly to the previous empirical models, interaction terms between all independent variables and the dummy variable for MNCs are included in the regression.

The regression analysis on the determinants of investment growth provides empirical support for the predictions presented above. The level of perceived credit constraints seems to impact companies' investment behaviour in different phases of the economic cycle. Economic growth combined with credit constraints has had a significant positive impact on the investment growth of both MNCs and local companies operating in the Baltic countries. Compared to the companies experiencing lower credit constraints, those perceiving higher credit constraints appear to invest more during periods of economic growth. We also found that the investment behaviour of local companies and MNCs reacts differently to the (simultaneous) impact of economic cycles and credit constraints. The difference between local companies and MNCs appears mainly during recessions, when MNCs seem to invest relatively more compared to local companies. Thus, MNCs appear to be less susceptible to economic fluctuations from this perspective.

Our results also imply that MNCs are better able to spread their investments over the economic cycle and therefore perhaps avoid the risks involved in concentrating their investments in the boom period. As noted previously, companies tend to invest in riskier projects during boom periods and are less prone to undertake risky projects during downturns. Thus, local companies might be inclined to invest into projects that eventually turn out to be value-destroying.

CONCLUSIONS

The thesis provides evidence on the differences in financing patterns between local companies and MNCs operating in the Baltic countries. The main results of the thesis are summarised on Figure 2 below. Overall, the results indicate that the consequences of financing choices seem to be of higher importance to local companies compared to MNCs.
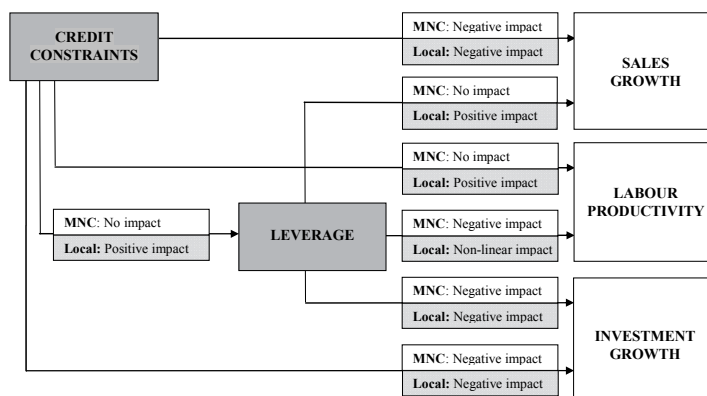
Figure 2. Main results of the thesis modelling the relationships between credit constraints, capital structure and performance. Impacts indicated at 5% of significance.

The differences in the impact of credit constraints on leverage between these two types of companies identified in the empirical analysis imply that compared to local companies operating in the Baltic countries, MNCs have had more flexibility in attracting external financing as well as in using internal financing. Local companies are thus more vulnerable to adverse cyclical effects.

The empirical analysis presented in the thesis provides insight into the impact of financing choices on corporate operations. The results on the impact of leverage on productivity indicate that additional leverage might bring along some improvements in labour productivity for many local companies. The thesis provides similar evidence on the impact of leverage on company growth. The results of the analysis show that the increase of leverage tends to bring along additional growth for local companies at low levels of leverage while high leverage does not enable the achievement of additional growth. MNCs seem to be able to improve productivity and finance their growth without excess lending, potentially due to the support of their corporate group and better access to capital markets. Due to positive impact of leverage, it would be necessary to encourage local companies to use borrowing at reasonable levels.

The empirical results of the thesis indicate that despite the potential advantages of leverage, it is essential for companies to pay attention to the measures for avoiding excess borrowing as this appears to hinder productivity. Companies' unawareness of the critical level at which additional leverage starts to generate non-productive or non-sustainable growth may also be a key in understanding why some companies perform in a pro-cyclical way, propagating economic booms and bubbles.

The results of the thesis also imply that since MNCs are able to spread their investments over the economic cycle, they are in a better position to mitigate risks related to excessive investments during economic booms. Local companies, on the other hand, might be more susceptible to overinvestment and suffer from the resulting losses under adverse economic events. Due to the potential harm of credit constraints on the real sector, it would be necessary to find measures for alleviating these impacts. We suggest that supporting easier access for local companies (as well as of any other types of otherwise sustainable companies experiencing high credit constraints) to the sources of credit, especially during economic downturns, would help to reduce the vulnerability of the whole economy to fluctuations, and warrant a more efficient use of resources.

There are certain limitations that should be considered when interpreting the results of the thesis. Internal capital markets are regarded as an important factor of capital structure of multinational companies. Therefore, an alternative measure of leverage, indicating the proportion of intra-group debt, would have contributed to the empirical analysis carried out in the thesis. Unfortunately, information regarding intra-group debt is not available for the data set used. Another issue is related to transfer pricing. Singh and Hodder (2000) bring out that the ability of multinational companies to shift income and tax deductions across subsidiaries is likely to serve as a competitive advantage. Unfortunately, detailed data on the transferring of costs and income are difficult to obtain and the current thesis has not addressed this issue. One also needs to keep in mind that the results of the thesis are applicable to the Baltic States (and potentially some other transition countries) and might not hold for mature developed economies.

The results of the thesis provide a number of ideas for future research. The empirical analysis performed in the thesis found no significant relationship between leverage and the effective tax rate for companies operating in the Baltic countries. Therefore, the impact of taxation on capital structure would need to be investigated in a more complex manner – more suitable proxies and modelling frameworks would need to be designed.

The differences between the financial behaviour of local companies and MNCs should be studied further in terms of several aspects. We have pointed out that the level of tangibility is significantly lower for MNCs compared to local companies operating in the Baltic countries, but the reasons for this difference are a potential subject for future studies. We have also noted that MNCs tend to be less profitable than local companies in the early years of their

development – a phenomenon that may be explained by the ability of MNCs to use group support in the start up phase, whereas local companies may be more constrained in their ability to enter the market. Our regression analysis showed that negative impact of company age is stronger for MNCs than for local companies. Further studies should test whether this is caused by the higher tendency to retain profits. The possible difference of monitoring needs of multinational companies compared to local companies is also an area that needs to be studied further as this might have implications on the capital structure choice.

Since the thesis provides evidence on the smoother behaviour of MNCs over the economic cycles in the Baltic countries, it is worth studying the impact of foreign direct investments on the economic fluctuations in the future. Although the empirical analysis performed in the thesis covers a rather long period of time, we believe that prolonging the analysis into future periods might provide additional insight regarding the nature of companies' reactions to economic fluctuations.

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APPENDIX 1

Capital structure formation in multinational and local companies in the Baltic States

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Capital structure formation in multinational and local companies in the Baltic States

Mari Avarmaa, Aaro Hazak, Kadri Männasoo[1]

Abstract

This paper investigates whether there are systematic differences in the capital structure formation of local companies and subsidiaries of multinational companies (MNCs) operating in the Baltic States over the period from 2000 to 2008. The analysis is based on panel data estimation on a sample covering 87,000 company-year observations. We find local companies to be more leveraged than MNCs, mainly explained by use of intra group equity financing, lower investment intensity and higher profit retention of the latter. However, MNCs appear to have had better access to external finance, resulting in their competitive advantage over local companies, especially in periods characterised by significant credit constraints. In contrast, local companies appear to have started to increase their leverage under relaxed credit constraints during the years of economic boom, demonstrating local companies' greater vulnerability to adverse cyclical effects.

JEL classification: G32, F23
Keywords: capital structure, multinational companies, local companies, Baltic States

1. Introduction

Multinational corporations (MNCs) play a considerable role in the economic development of many emerging markets, including the Baltic States. Financing decisions of the subsidiaries of MNCs may be affected by forces different from those that shape the capital structure of local companies. Among the underlying reasons may be group level financial considerations, corporate governance issues, cross-country differences in taxation, regulations and overall economic climate as well as differences in access to finance. In this paper we seek to identify the key differences between the capital structures of local companies and MNC subsidiaries operating in Estonia, Latvia and Lithuania, and search for the main drivers of these differences. Since some authors (Desai et al. 2004, Aggarwal and Kyaw 2008) have suggested that capital structure effects could serve as a competitive advantage for MNCs compared to their local counterparts, it is important to investigate the existence and sources of any such advantages in the context of emerging economies such as the three Baltic States. Furthermore, the structure of capital has been found to be an important determinant of company viability, in-

cluding in studies that cover the Baltic States (Männasoo 2008, Hazak and Männasoo 2010), which makes it interesting to study how the above leverage effects behave under different phases of the economic cycle.

A large body of empirical works (Lee and Kwok 1988, Burgman 1996, Chen et al. 1997, Singh and Nejadmalayeri 2004, Mittoo and Zhang 2008, among others) have explored the reasons for the differences between the capital structure of multinational corporations (meaning companies with international operations) and local companies (meaning companies with only domestic operations) which are registered in the same country (home country). We aim to compare capital structure differences between local companies and the subsidiaries of multinational companies that operate in the same country (host country). The only paper with a similar host country focus seems to be the one by Jog and Tang (2001), which compares the capital structures of local corporations in Canada to those of subsidiaries of US corporations with the purpose of determining the effects of differences in taxation between the two countries.

We use a fixed effects regression model to investigate the capital structure effects of the key company specific variables that have been brought out in previous literature as potential determinants of capital structures of companies. Our study is unique as it is based on a large sample covering 87,000 company-year observations from Estonia, Latvia and Lithuania over the period from 2000 to 2008, thus covering different phases of the economic cycle. We have divided the sample into two subsets – multinational and non-multinational companies. If more than 50% of a company is directly owned by a foreign company, it is classified as a multinational company and otherwise as a non-multinational (i.e. local) company. The terms "local company" and "non-multinational company" are used interchangeably in this paper. Our model enables observation of differences in the determinants of leverage of local and multinational companies in a dynamic perspective.

The paper is set up as follows. Section 2 gives an overview of related literature. In section 3 the data and methodology for the study is presented and in Section 4 the results are discussed. Section 5 concludes.

2. Literature overview

Modern literature on company financing decisions starts with the capital structure irrelevance proposition by Modigliani and Miller (1958), followed by their later paper outlining the debt tax shield concept (Modigliani and Miller 1963). Although these theories are not able to capture the real life behaviour of companies, they have been a starting point for many later works that explain the various imperfections that make decisions regarding capital structure relevant. The traditional trade-off theory, which focuses on the benefits and costs of issuing debt, suggests that an optimal debt ratio is reached when the marginal benefits of debt (tax shield) offset the increase in the present value of the costs of debt (i.e. mainly bankruptcy costs) (Kraus and Litzenberger, 1973). The agency theory of capital structure by Jensen and Meckling (1976) focuses on the influence of conflicts of interest between managers, owners and debt-holders on financing decisions. Pecking order theory introduced by Myers (1984) and Myers and Majluf (1984) is based on the informational imperfections that have an impact on the choice between debt and equity as well as between internal and external sources of

funding. Signalling theory of capital structure developed by Ross (1977) also deals with the impact of asymmetric information on financing decisions.

The majority of empirical studies on capital structure seek to understand the impact of various determinants of financing decisions or aim to test the applicability of certain theories of capital structure. Empirical research on factors influencing the level of leverage covers overall three main areas – company specific, business environmental, and ownership factors. For a detailed review of the empirical research of various factors determining capital structure, see Prasad et al. (2001). Reviewing previous studies on capital structures, they find that company level characteristics that are most often considered to determine capital structure are tangibility, size, profitability, growth, company risk, non-debt tax shields, and industry.

A few empirical studies deal with determinants of capital structure in the Baltic States. In their analysis of the target capital structure of large firms in transition countries, including Estonia, Latvia and Lithuania, Haas and Peeters (2004) find profitability and age to be the most robust determinants of capital structures. They find a significant negative relationship between profitability and leverage, and a significant and positive relationship between age and leverage. In his analysis of capital structure formation in five CEE countries, including Estonia, Nivorozhkin (2005) finds a negative relationship between profitability and leverage, as well as between age and leverage, and a positive relationship between earnings variability and tangibility and leverage. Jõeveer (2006) analyses determinants of capital structure in nine CEE countries including Estonia, Latvia and Lithuania. She concludes that company specific factors mostly influence the leverage of listed and large unlisted companies, while country specific factors are the most prominent determinants of leverage variation for small companies.

The modern theory of foreign direct investment is based on the conviction that MNCs have emerged due to market imperfections (Hymer 1976). In order to compete with local firms, foreign enterprises would need to have some advantages that compensate them for the disadvantage of operating in a foreign environment. In addition, some market imperfections must limit local firms' access to advantages available to foreign enterprises (Blomström 2002). Blomström summarised the theory on arguments for investing abroad and concluded that in order to compete successfully in a foreign market a firm must possess some ownership-specific assets in knowledge, technology, organisation or managerial and marketing skills. We believe that these features are likely to have an impact on the financing choices of MNCs compared to local companies.

The agency theory may have different implications for MNCs and local companies. For example, monitoring costs of debt (brought out by Jensen and Meckling 1976) may be higher due to the complexity of international operations and geographical distances. Leverage is therefore expected to be lower for MNCs compared to companies having only domestic operations, and this relationship has found empirical support (Lee and Kwok 1988, Burgman 1996, Chen et al. 1997, Doukas and Panzalis 2003).

Desai et al. (2004) draw attention to the opportunity of multinationals to use internal capital markets to overcome any shortcomings associated with external credit market conditions.

Subsidiaries of MNCs might substitute parent debt for external debt in countries where credi-tor rights are weak, and choose intra-group debt where locally provided debt is scarce or expensive, while local firms must rely primarily on local sources of debt. The same has been described by Aggarwal and Kyaw (2008) who find that this type of financial flexibility is likely to be an important source of competitive advantage for MNCs. Doukas and Panzalis (2003) express a contrasting view predicting that due to lower informational asymmetries and agency costs internal equity is easier to obtain compared to external equity and therefore MNCs' lower leverage should reflect the strengths of internal capital markets.

MNCs are thought to have lower business risks compared to non-multinationals due to broad-er diversification of their operations. As riskier companies have a higher probability of de-fault, international diversification may enhance their debt carrying capacity (Lee and Kwok 1988, Doukas and Panzalis 2003). However, the empirical results regarding the lower level of business risks of MNCs remain inconclusive (see Lee et al. 2006 for literature review).

One of the imperfections characterising the operating environment of MNCs is taxation. In their theoretical models of capital structure choice of multinational companies, Chowdhry and Nanda (1994) and Chowdhry and Coval (1998) focused on the influence of host country and home country taxes on the use of debt by MNCs. Chowdhry and Nanda (1994) show that for any given level of total debt financing, higher corporate tax rates in the host country are associated with a larger proportion of external debt compared to intra-group debt. Chowdhry and Coval (1998) demonstrate that MNCs' debt-assets ratio is positively related to the tax rate of the host country and negatively related to the tax rate of the parent country. In their empirical analysis of capital structure of MNCs in Europe, Huizinga et al. (2008) view taxa-tion as one of the central factors determining the capital structure choice of MNCs along with company specific variables such as size, tangibility and profitability. They find both host country tax rates and tax differences between host country and home country to have a posi-tive influence on the leverage of MNCs.

Singh and Hodder (2000) bring out the ability of multinational firms to shift income and tax deductions across subsidiaries in different tax jurisdictions. Such financial flexibility is not available for single country firms and it represents a distinctive characteristic and potential advantage of multinationality. With higher leverage, the role of financial flexibility changes from being an alternative to being a complement to leverage. Namely, it complements lever-age by reducing the risks of default and lost tax shields. Singh and Hodder (2000) find that financial flexibility is a key determinant of optimal capital structure for a multinational firm. MNCs derive a synergistic effect from financial flexibility, which can enhance their value beyond that for a single country firm from a low tax jurisdiction. Unfortunately, as Singh and Hodder (2000) admit, the implications of financial flexibility are difficult to test, since this would require detailed data on costs for transferring income and tax shields across subsidiaries.

Various country specific factors are brought out in the literature as relevant to MNC capital structure decisions. Among these are protection of creditor rights, efficacy of legal institutions, capital market development, and political risk (Burgman 1996, Desai et al. 2004, Kesternich and Schneitzer 2007, Aggarwal and Kyaw 2008). Although these factors are not the main interest of the current research, where capital structures of local companies and MNCs operating in the same environment are com-pared, they may help to explain the impact of some company-specific variables.

3. Model and data

3.1 The model

We aim to investigate whether systematic differences exist in the capital structure formation of local and multinational companies operating in the Baltic States. We use a fixed effects regression model to study the determinants of leverage. The model is built on the classical model of Rajan and Zingales (1995) and is complemented with additional independent variables derived from the findings of previous research.

We first run the regression for the whole sample (Model 1), seeking to identify key capital structure determinants in the Baltic States over the period from 2000 to 2008. We model the leverage of an *i*-th company at time *t* as follows:

$$\text{LEVERAGE}_{it} = \beta_1 \text{AGE}_{it} + \beta_2 \text{AGE}^2_{it} + \beta_3 \text{TANG}_{it} + \beta_4 \text{PROF}_{it} + \beta_5 \text{SIZE}_{it} + \beta_6 \text{CRED}_{it} + \beta_7 \text{TAX}_{it} + \beta_8 \text{HHI}_{it} + \alpha_i + u_{it} \tag{1}$$

where α_i denotes firm-level fixed effects. The variables are described in Table 1 and explained in the text below.

Table 1: Description of Variables

Variable	Abbreviation	Measurement	Expected sign
Adjusted Leverage	LEVERAGE A	(Short-term debt+Long-term liabilities)/(Total assets-Current liabilities+Short-term debt)	
Long-term Leverage	LEVERAGE B	Long-term debt/(Total assets-Current liabilities+Short-term debt)	
Multinationality	MNC	dummy variable, 1 if more than 50% owned by a foreign company, otherwise 0	
Age	AGE	Number of years from incorporation	-
Size	SIZE	Logarithm of Total sales in real terms	+
Tangibility	TANG	Tangible fixed assets/Total assets	+
Profitability	PROF	EBIT/Sales	-
Effective Tax-rate	TAX	Tax expenses/Profit before tax	+
Credit Constraints	CRED	Obstacles for getting credit from BEEPS, normalized [0,1]	-
Herfindahl-Hirschman index	HHI	Squared sum of market shares of Sales in all firms in the industry based on 2-digit US SIC codes	+

A fixed effects model has been used since it helps to control for unobserved heterogeneity between firms that is constant over time and correlated with independent variables. A random effects model would have ignored such firm-level heterogeneity, leading to an inconsistent estimation. Moreover, the assumption of zero correlation between latent heterogeneity and included observed characteristics that is necessary under the random effects model would have been particularly restrictive. This is confirmed by the Hausman test, which strongly suggests that a fixed effects model should be preferred over the random effects model. Robust standard errors have been employed, which control for bias in the presence of heteroskedas-

ticity and for the within-cluster serial correlation. An unbiased fixed effects estimator requires a strict exogeneity on the explanatory variables. The Davidson-MacKinnon test controls for exogeneity of a panel regression estimated via instrumental variables. The null hypothesis states that estimates are consistent and the exogeneity assumption of explanatory variables is met. Applying the Davidson-MacKinnon test on our equations showed that the null hypothesis was not rejected and hence the alternative hypothesis that endogenous regressors' effects on the estimates are meaningful was not supported.

In order to identify the differences between multinational and local companies in the impact that the various determinants have on their leverage, in Model 2 (including the entire sample) and Model 3 (only companies with leverage above zero included), we have employed interaction terms between independent variables and the dummy variable for multinational companies.

$$\text{LEVERAGE}_{it} = \beta_1 \text{AGE}_{it} + \beta_2 \text{AGE}^2_{it} + \beta_3 \text{TANG}_{it} + \beta_4 \text{PROF}_{it} + \beta_5 \text{SIZE}_{it} + \beta_6 \text{CRED}_{it} + \beta_7 \text{TAX}_{it} + \beta_8 \text{HHI}_{it} + \beta_9 \text{AGE} \times \text{MNC}_{it} + \beta_{10} \text{AGE}^2 \times \text{MNC}_{it} + \beta_{11} \text{TANG} \times \text{MNC}_{it} + \beta_{12} \text{PROF} \times \text{MNC}_{it} + \beta_{13} \text{SIZE} \times \text{MNC}_{it} + \beta_{14} \text{CRED} \times \text{MNC}_{it} + \beta_{15} \text{TAX} \times \text{MNC}_{it} + + \beta_{16} \text{HHI} \times \text{MNC}_{it} + \alpha_i + u_{it} \qquad (2)$$

Two alternative measures of leverage (*LEVERAGE*) are used as dependent variables in our study. First, we have used an adjusted measure of leverage (*LEVERAGE A*), calculated similarly to several studies on capital structure (Rajan and Zingales 1995, Jog and Tang 2001, Huizinga et al. 2008). This measure takes into account that some assets on balance sheet are offset by specific non-debt liabilities. Second, to consider the specifics of long-term financing compared to short term financing, we have employed long-term leverage (*LEVERAGE B*) as an alternative to adjusted leverage. While long-term investments are generally financed from long-term financial resources, long-term debt could be more difficult to obtain compared to short-term debt. We have used the same denominator for long-term leverage as for adjusted leverage due to the above mentioned advantages of that measurement.

As discussed in Section 2, internal capital markets are regarded as an important factor of capital structure of multinational companies. Therefore, an alternative measure of leverage, indicating the proportion of intra-group debt, would have contributed to the analysis. Unfortunately, information regarding intra-group debt is not available for the data set used.

It has to be noted that due to limitations on data availability all the leverage ratios are calculated based on book values instead of market values. However, as Titman and Wessels (1988) argue, the implications of using book values should not be critical since the difference between book and market values is not likely to be correlated with any of the determinants of capital structure suggested by theory.

Company age is one of the most common determinants used in capital structure research. Contrasting views exist on the influence of company age on capital structure. Pecking order theory explains that the longer a company survives in the business, the more internally generated profits it has accumulated, and therefore the need for debt decreases over time. Several empirical studies confirm the negative relationship between company age and leverage (Petersen and Rajan 1994, Pfaffermayr et al. 2008). On the other hand, Akhtar and Olivier (2009) and Haas and Peeters (2004) believe that the growing age of a firm might refer to

lower informational asymmetries. As firms grow older, more information regarding their performance becomes available. In turn, lower information asymmetries imply higher leverage. The empirical results of Akhtar and Olivier (2009) on the capital structure of Japanese corporations indicate a significant positive correlation between leverage and age. Haas and Peeters (2004) show the same results for large companies in CEE transition economies. Based on the outcome of descriptive statistics (Figure 1), we have included the squared term of age in addition to the linear term (*AGE*).

Tangible assets can serve as debt collateral, diminishing the risk of lenders who suffer from the agency costs of debt, such as risk shifting. Furthermore, the more tangible assets a company has, the higher amount could be expected to be recovered under potential bankruptcy or liquidation. Therefore, the greater the proportion of tangible assets in total assets, the more willing lenders should be to supply loans, leading to higher leverage (Rajan and Zingales 1995). Empirical evidence supports the idea that firms rich in tangible fixed assets use more debt (Rajan and Zingales 1995, Deesomsak et al. 2004, Gaud et al. 2007, Jong et al. 2008). Based on theoretical argumentation and previous empirical evidence, we expect tangibility (*TANG*) to have a positive impact on leverage. The impact of tangibility is expected to be stronger for non-multinational companies, since being part of a larger group should reduce the role of tangible assets as collateral in the lending process for MNCs. Tangibility has been measured by tangible fixed assets divided by total fixed assets, similarly to Akhtar and Oliver (2009).

Profitability is another common variable used as a determinant of leverage. Conflicting theoretical predictions exist on the effects of profitability on leverage. Pecking order theory predicts a negative relationship since firms prefer internal funds to external ones. Several previous studies have found that profitable firms tend to use less debt than less profitable ones (Barton and Gordon 1988, Rajan and Zingales 1995, Booth et al. 2001, Nivorozhkin 2005), mainly explained by own funds being utilised first hand to cover financing needs. On the other hand, signalling theory predicts profitability and leverage to be positively related – adding debt to the capital structure can serve as a signal of credibility, as the more profitable a firm is the more debt it might be able to afford. In the present paper, a negative relationship is expected as in most previous empirical research, and this relationship is expected to be more evident in the case of non-multinational companies, since they might have fewer alternative sources for financing their growth. Profitability has been measured in previous studies either by EBIT (Titman and Wessels 1988), EBITDA (Huizinga et al. 2008), return on assets (Chen et al. 1997) or cash flow (Rajan and Zingales 1995).

In the present study profitability (*PROF*) is measured by EBIT, i.e. operating profit to sales. Data on cash flows or EBITDA was not available for our data set and operating profit is preferred to net profit since it is a pre-leverage profitability indicator, excluding financing costs and tax expenses. In order to avoid correlation with other variables that reflect the size of assets, sales rather than assets have been used in the denominator.

Empirical evidence shows that larger firms tend to borrow more than smaller ones (Rajan and Zingales 1995; Booth et al. 2001, Frank and Goyal 2009). This positive relationship between size and leverage is assumed to occur due to the likelihood that larger firms have better access to debt capital than smaller firms, and because potential bankruptcy costs are relatively lower

for larger firms. In their paper on capital structure of transition economies, Haas and Peeters (2004) explain that in the context of the relatively underdeveloped stock and bond markets in CEE countries, capital structures are influenced by informational asymmetries – large and transparent companies are able to get bank credit more easily, while smaller companies have to rely more on internal financing. Nivorozhkin (2005) offers an additional explanation that banks in transition economies prefer to deal with larger clients due to the fixed costs of monitoring and collecting information. Similarly to previous research, the size variable is expected to have a positive influence on leverage in our study. The effect is expected to be stronger in the case of non-multinationals, since MNCs can be expected to achieve transparency more easily, benefiting from the reputation of the parent company and the group. In previous research, size has been proxied by the logarithm of sales (Rajan and Zingales 1995, Huizinga et al. 2008) or the logarithm of total assets (Chkir and Cosset 2001, Haas and Peeters 2004, Nivorozkin 2005). In the present study, the logarithm of sales in real terms has been used as the size variable (SIZE) in order to avoid correlation with other variables that reflect the size of assets.

Several authors have paid attention to the role of credit conditions in formation of capital structure. Factors such as creditor rights (Aggarwal and Kyaw 2008, Huizinga et al. 2008, Desai et al. 2004), credit availability (Aggarwal and Kyaw 2008), depth of the capital market (Desai et al. 2004), and legal efficiency (Aggarwal and Kyaw 2008) have been used in previous studies to characterise the overall business and financial environment where companies operate. In transition countries these factors are likely to play an important role in the formation of capital structure. We have used the perceived level of credit constraints (CRED) obtained from the Business Environment and Enterprise Performance Survey (BEEPS; conducted by EBRD and the World Bank) to characterise access by companies to credit resources. We expect the impact of this variable on leverage to be negative. Compared to local companies, we expect the impact to be lower for MNCs as their ability to raise funds is higher due to their higher reputation and availability of intra-group financing.

Traditional capital structure theory suggests that a positive relationship should exist between corporate tax rates and leverage since debt creates an opportunity to use tax shields. Several empirical studies on capital structure (e.g. MacKie-Mason 1990, Graham 1996) have found evidence of a positive relationship between leverage and marginal tax rate, supporting the trade-off theory. However, Jong et al. (2008) have reached contrasting results – in their study on capital structure determinants in 42 countries around the world, a negative or no relationship was found for most countries. The authors offer the explanation that debt/equity ratios are the cumulative result of individual financial decisions made in different years, and tax shields have a negligible effect on the marginal tax rate for most firms. A similar result is also derived by Booth et al. (2001) who studied capital structure choices of firms in 10 developing countries. They explain the inverse relationship between leverage and taxes with the possibility that the tax variable works as a proxy for profitability rather than for tax-shield effects – when firms are profitable they have to pay taxes, but when not profitable they do not get a tax refund.

In previous literature, taxation has been considered an important determinant of MNC capital structure. Desai et al. (2004) found that the host country tax rate has a positive and significant influence on MNC leverage as 10 percentage points higher local tax rates are associated with

2.8 percentage points higher debt/asset ratios of US owned affiliates. Huizinga et al. (2008) found a positive and significant relationship between the effective tax rate and the financial leverage of European MNCs. In their study on capital structure formation in some developing countries, Booth et al. (2001) calculated the average tax rate for each country, using company level data on earnings before taxes and earnings after taxes. Desai et al. (2004) calculated host country tax rates of MNCs as the ratio of foreign income tax paid to foreign pre-tax income for each affiliate, and then used the medians of these rates to arrive at country level observations for each country and year. We prefer company specific tax rates similarly to Jong et al. (2008) in order to allow for variation between companies. Effective tax rates (TAX) are calculated as tax cost divided by pre tax profit.

Some recent works (eg Jermias 2008) have pointed out that intensity of competition is likely to have an impact on the level of corporate debt. Competition is considered to be an alternative disciplining mechanism and therefore high competition may lead to a lower level of leverage. High competition is associated with higher risks and according to the agency theory firms operating in a risky environment should prefer lower leverage. In order to control for the intensity of competition we have included the Herfindahl-Hirschman index (HHI) measuring industry concentration as one of the independent variables. Based on the previous literature, we expect the relationship between HHI and leverage to be positive.

3.2 Data

We have extracted data on companies operating in Estonia, Latvia and Lithuania from the Amadeus database compiled by Bureau van Dijk. The database provides financial statements and information regarding the ownership structure of private and publicly owned European companies. Companies in the public utilities and financial sector (US SIC codes 4000-4999 and 6000-6999) are excluded from the analysis due to their fundamentally different financial structure as in many other studies (Lee and Kwok 1988, Rajan and Zingales 1995, Chkir and Cosset 2001). Branches of foreign companies, cooperative companies and partnerships are also excluded from the sample since their legal form makes capital structure decisions different from regular limited liability companies. For every company, data are included in the sample for those years for which financial information was available in sufficient level of detail and all components of assets and liabilities were non-negative. The sample consists of 87,000 company-year observations whereof 13% relate to multinational companies. The total number of companies included in the sample is 15,900.

Similarly to Huizinga et al. (2008), unconsolidated financial data are used. In order to avoid the unjustified influence of outliers on the regression results, for companies established before 1991 we have counted their age starting from year 1991 when the Baltic States regained their independence and the regulatory frameworks for operating a company were fundamentally changed.

As mentioned previously, the data for credit constraints are obtained from the BEEPS survey conducted by EBRD and the World Bank. The indicator has been composed by using BEEPS 2002, 2005 and 2009 data on access to finance. The original data provides firms' estimates regarding their ability to access finance in their country of residence on a 4-scale scale from

"No obstacle" to "Very Severe Obstacle". The variable has been normalised, taking values between 0 and 1. The missing observations for the years 2003-2004 and 2006-2007 have been derived using the cubic spline interpolation technique. Cubic spline interpolation is a fast, efficient and stable method of function interpolation dividing interpolation interval into small subintervals. Each of these subintervals is interpolated by using the third-degree polynomial. The main advantages of spline interpolation are its stability and calculation simplicity. Spline interpolation incurs a smaller error than linear interpolation and the interpolant is smoother. The observations for 2000 and 2001 have been linearly extrapolated. The advantage of the indicator is that it allows for variance across industries and over time.

Descriptive statistics reveal that MNCs and local companies differ significantly in terms of all major company characteristics (see Appendix 1). On average, MNCs use less financial leverage than the non-multinational companies operating in the Baltic States – the mean value of adjusted leverage of non-multinationals is 32% and that of multinationals 29%. It becomes evident that MNCs are overall considerably bigger than local companies in terms of both sales and assets but carry relatively less tangible assets. The average level of profitability is higher in local companies. The perceived level of credit constraints of MNCs is considerably lower than that of local companies operating in the Baltic States. This supports the statement of Aggarwal and Kyaw (2008) that MNCs have an advantage over local companies in raising financing.

Figure 1: Mean Values of Adjusted Leverage by Age
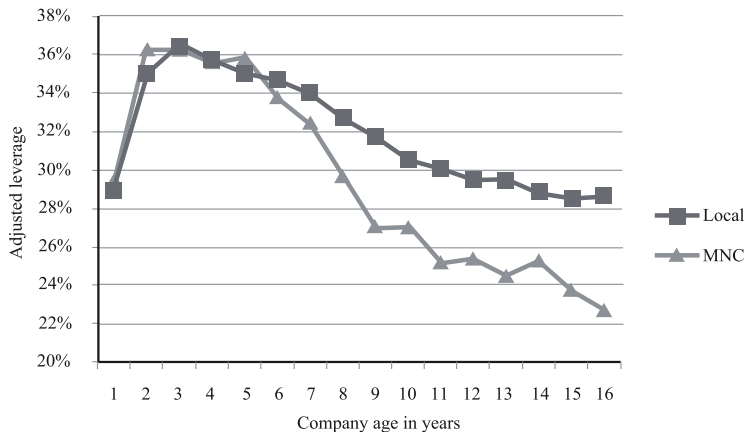
Looking into the dynamics of leverage over company lifetime (Figure 1), it appears that, in general, both MNCs and local companies increase their leverage within the first 2-3 years of operation. This tendency may be explained by informational asymmetries regarding the ability of start-ups to meet financial obligations, supporting findings by Akhtar and Olivier (2009) and Haas and Peeters (2004). However, as companies become older, leverage starts to decrease. This observation may be explained, similarly to Petersen and Rajan (1994) and Pfaffermayr et al. (2008), by the pecking order theory, suggesting that own funds that have been generated in previous years are preferred to external financing. Taking such a dynamic look seems to explain the contradictions in previous studies with respect to the relationship between age and leverage, at least in the Baltic context.

Figure 2: Average Profitability and Tangibility by Company Age
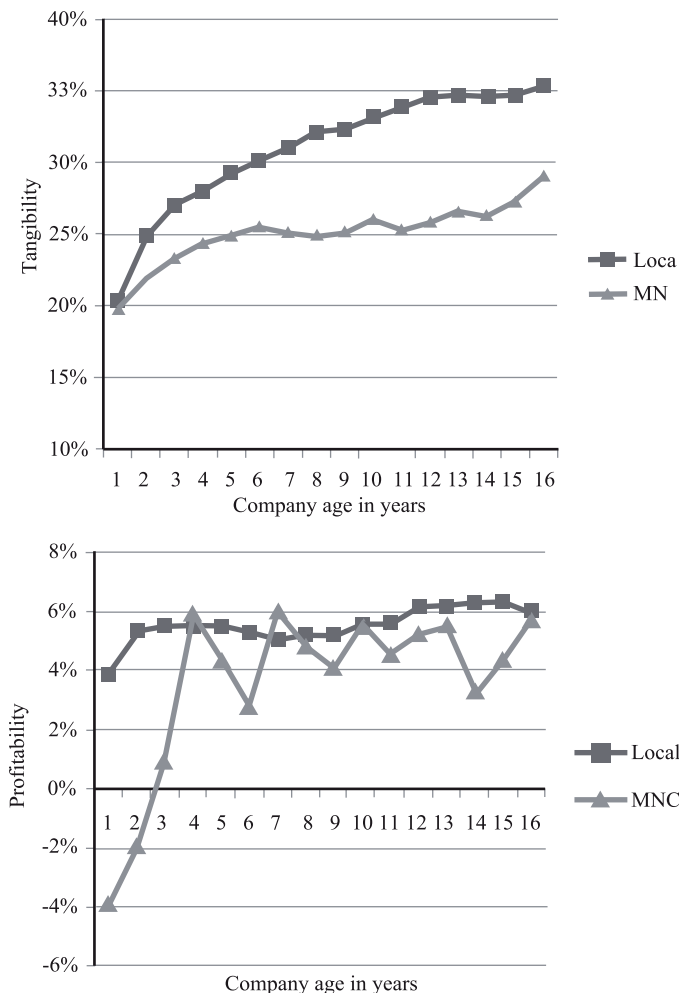
Interestingly, from the sixth year of operation, average leverage of MNCs starts to decrease much more rapidly than that of local companies. This cannot be explained by the dynamics of profitability (which would be a logical explanation in view of the pecking order theory) as MNCs appear to be less profitable than non-MNCs (Figure 2). However, the answer seems to lie in the significantly lower tangibility of MNCs. Local companies appear to be making more investments requiring relatively larger external funds in addition to equity. The lower tangibility of MNCs might be related to their tendency to perform certain functions for their parent or other group companies (e.g. acting as sales representatives or wholesale or retail traders) without a need for major investment. Understanding the reasons for the lower tangibility of MNCs is an area where more research is warranted. It is also interesting to note that MNCs tend to be less profitable than local companies in the early years of their development, a phenomenon that may be explained by the ability of MNCs to use group support in the start up phase, whereas local companies may be more constrained in their ability to enter the market. Further studies in this complex area would be needed.

4. Results

Table 2 below indicates the results of the fixed effects regression. Model 1 shows the outcome for the whole sample of Baltic companies. All of the independent variables incorporated in the model except for effective tax rate appear to be statistically significant determinants of leverage.

The outcome of our regression model shows overall a negative and significant relationship between company age and leverage. An increase in company age by one year would bring a reduction of leverage by 1.4%. This indicates that pecking order behaviour is dominant in Baltic companies. Compared to previous studies in the CEE context, our results confirm the findings of Nivorozhkin (2005). Although Haas and Peeters (2004) found an overall positive relationship between age and leverage, this may be explained by the fact that their study was performed on data from years 1993 to 2001 when informational and reputational aspects might have played a more central role in the credit process, outweighing the pecking order related effects.

Company size appears to have an overall positive and significant correlation with leverage. This finding is in line with previous research by Nivorozhkin (2005) and Jõeveer (2006). The positive influence of size on leverage indicates that bigger companies are able to borrow relatively more, a tendency which expectedly relates to reputational effects as well as relatively lower bankruptcy costs as discussed in the previous section. Our regression model coefficients for size indicate that a 1% increase in sales corresponds to an average 0.025% increase in the adjusted leverage. This outcome is very similar to the results for Canadian companies of Mittoo and Zhang (2008), who also had a coefficient of 0.02 for company size measured by the logarithm of sales.

As expected, the relationship between tangibility and leverage appears to be positive and significant, in line with the well established findings of previous studies (Rajan and Zingales 1995, Deesomsak et al. 2004, Gaud et al. 2007, Jong et al. 2008). A 10% increase in the share of fixed assets in total assets corresponds to an average increase of 4.1 percentage points in adjusted leverage.

Profitability appears to have an expected negative and significant correlation with leverage for the whole sample of Baltic companies. An increase of profitability by 10 percentage points corresponds to a decrease of adjusted leverage by 0.5 percentage points. The negative impact is in line with previous research on capital structure formation in CEE countries (Haas and Peeters 2004, Nivorozhkin 2005, Jõeveer 2006) as well as with pecking order theory, stipulating that companies prefer internally generated sources of financing to external ones. Based on the outcome of our regression model, the influence of effective tax rate on leverage is not statistically significant. Corporate income taxes paid do not seem to be among the major driving forces of capital structure decisions either for multinational or for non-multinational companies in the Baltic States. For Estonia, the explanation for the results may lie in the nature of the corporate income tax system whereby income tax is paid only when profit is distributed and debt does not function explicitly as a tax shield (Hazak 2009). For Latvia and Lithuania, other and more efficient tools than interest expense as a tax shield might be available for tax management. However, it cannot be ruled out that the capital structure formation

Table 2: Regression Results

	No interaction terms (Model 1)		With interaction terms (Model 2)		Subsample with LEV>0 (Model 3)	
	Adjusted leverage (1A)	Long-term leverage (1B)	Adjusted leverage (2A)	Long-term leverage (2B)	Adjusted leverage (3A)	Long-term leverage (3B)
AGE	-0.0146**	-0.0052**	-0.0130**	-0.0052**	-0.026***	-0.0237***
	(0.006)	(0.002)	(0.006)	(0.002)	(0.007)	(0.002)
AGE²	0.0004***	0.0002***	0.0003***	0.0002***	0.0008***	0.0010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.025***	0.014***	0.022***	0.014***	-0.007**	-0.016***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
TANG	0.410***	0.332***	0.410***	0.339***	0.347***	0.351***
	(0.009)	(0.008)	(0.009)	(0.008)	(0.010)	(0.011)
PROF	-0.046***	-0.017***	-0.044***	-0.012***	-0.048***	-0.019**
	(0.006)	(0.004)	(0.006)	(0.004)	(0.010)	(0.009)
TAX	-0.002	-0.005	0.000	-0.006	0.006	-0.004
	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
CRED	0.201***	0.020	0.243***	0.024	0.271***	0.105***
	(0.022)	(0.017)	(0.023)	(0.017)	(0.026)	(0.037)
HHI	-0.076***	-0.032	-0.089***	-0.041*	-0.092***	-0.014
	(0.025)	(0.021)	(0.027)	(0.022)	(0.029)	(0.037)
AGE×MNC			-0.0210***	-0.0024	-0.0200***	-0.0014
			(0.005)	(0.003)	(0.006)	(0.006)
AGE²×MNC			0.0006**	0.000	0.0005*	-0.001
			(0.000)	(0.000)	(0.000)	(0.000)
SIZE×MNC			0.024***	0.004	0.037***	0.016***
			(0.005)	(0.003)	(0.006)	(0.005)
TANG×MNC			-0.021	-0.076***	-0.039	-0.057
			(0.031)	(0.026)	(0.035)	(0.040)
PROF×MNC			-0.015	-0.024**	-0.020	-0.013
			(0.013)	(0.010)	(0.019)	(0.016)
TAX×MNC			-0.023	-0.001	-0.053**	-0.022
			(0.020)	(0.016)	(0.022)	(0.024)
CRED×MNC			-0.210***	-0.030	-0.345***	-0.300***
			(0.060)	(0.041)	(0.078)	(0.080)
HHI×MNC			0.117	0.080	0.092	0.163*
			(0.073)	(0.055)	(0.080)	(0.093)
Constant	0.037	-0.058**	0.041	-0.054*	0.378***	0.326***
	(0.078)	(0.029)	(0.076)	(0.029)	(0.088)	(0.033)
No of observations	86,778	86,778	86,778	86,778	68,830	49,394
R²	0.71	0.64	0.71	0.64	0.72	0.70
Company fixed effects	yes	yes	yes	yes	yes	yes
Sector-year interactions	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes

Note: Estimations are based on panel data regression with firm-level fixed effects and year dummies included. Robust standard errors calculated for controlling heteroskedasticity and the within-cluster serial correlation. *, ** and *** indicate significance at 10%, 5%, and 1% levels respectively.

of certain companies is significantly impacted by taxation, whereas the multifaceted nature of international and local taxation principles with respect to different groups and companies may not have enabled us to bring out these potential relationships in our regression models. Surprisingly, credit constraints exhibit a positive impact on leverage for the whole sample. The phenomenon is discussed below together with the results for Model 2 as the explanation seems to lie in the different behaviour of local and multinational companies.

Contrary to our expectations, the coefficient for the Herfindahl-Hirschman index is negative, indicating that high industry concentration results in lower leverage. A possible explanation for the relationship could be that lower competition enables accumulation of higher profits and thus use of internal funds instead of external financing.

Model 2 enables us to observe the differences between the capital structure determinants of multinational and local companies. The leverage impact of company age, size and credit constraints appears to be significantly different for MNCs and local companies. As can also be observed from Figure 1, there is a stronger negative impact of age for multinational companies, confirming that older multinationals prefer to be less leveraged than local companies of the same age. A possible reason for the difference could be that local company owners are less risk averse (as illustrated by the higher profitability and thus potentially higher risks of local firms), preferring to withdraw profits earned to invest elsewhere or use retained earnings to attract additional debt for further expansion of the company, while multinationals appear to retain profits and potentially repay loans from these funds. This assumption would be an interesting subject for testing in future research.

The impact of company size on leverage appears to be larger for multinational companies, contrary to our predictions. This could be related to the lower business risks of multinational companies. Another possible explanation for the difference relates to agency theory – the need for monitoring management increases with the size of the company and debt serves as a monitoring device. Monitoring need is likely to be higher for multinational companies due to more complex group structures as well as cultural differences and geographical distances. The existence of higher monitoring needs of multinational companies would need to be studied further in the future.

The difference between MNCs and local companies in the impact of credit constraints on leverage is most striking. While the impact of credit constraints on leverage of multinational corporations is slightly negative, as one would expect, the similar impact for local companies is positive. The unexpected direction of the impact in the latter case can be explained by credit market development in the Baltic States. As illustrated in Figure 3, local companies perceived higher credit constraints compared to MNCs throughout the observed period, but especially during the years of rapid economic growth and the credit boom in 2003-2007. While credit constraints seem to have hindered lending by local companies up to 2005, the overall economic and credit boom appears to have led local companies to follow the boom and undertake risky projects in the following years. Part of these projects and investments appear to have been successful in attracting external finance (as illustrated by increased average leverage), while the increasing level of perceived credit constraints indicates that many of these potentially ambitious projects were difficult to fund. This relationship also shows that compared to local companies, MNCs have been in an advantageous situation in access-

Figure 3: Credit Constraints and Adjusted Leverage by Years
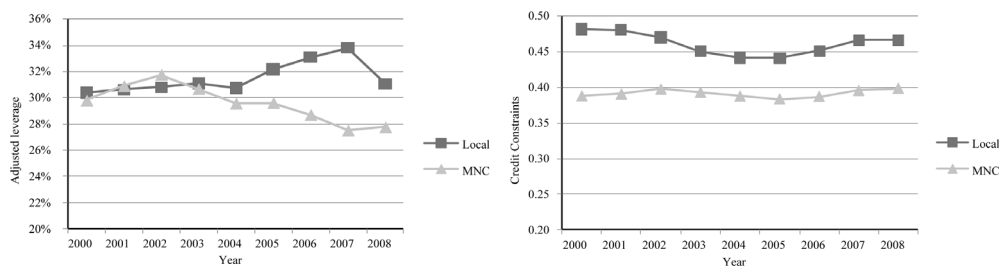
ing external financing, as illustrated by their lower perceived credit constraints as well as by their ability to increase average leverage at the beginning of the 2000s when actual credit constraints were strongest (Figure 4). On the other hand, the above finding might show that the overall approach by MNCs to taking risks and borrowing is more conservative compared to local companies.

In the case of long-term leverage, the difference between MNCs and local companies in capital structure determinants is mainly evident for tangibility. The stronger effect on local companies might be related to the overall lower and slower growing tangibility of MNCs (Figure 2) as well as to the ability of MNCs to raise debt (including intra-group debt) and prove their creditworthiness by other means than having solid collateral in the form of tangible assets. The differences in the dynamics of profitability between MNCs and local companies (Figure 2) do not seem to lead to any significant effects on adjusted leverage but the negative influence is stronger in the case of long-term leverage. This could be related to the tendency that instead of raising loans for long-term investments, MNCs prefer to use accumulated profits. We also run Model 3 for the subsample of companies with leverage above zero (See Table 2). Observing this subsample is especially relevant in the case of long-term leverage since over 40% of observations do not involve any long-term loans. In the case of adjusted leverage, factors that have a different impact on the leverage of multinational and local companies remain the same as for the full sample. However, in the case of long-term leverage, the subsample with leverage above zero has a different outcome for the impact of company size. The impact of company size on leverage for local companies becomes negative – the bigger the local company the less long-term leverage it tends to have. This might be related to the smaller size of local companies – as long-term debt is generally used for financing large investment projects, the amount of related long-term loans is usually relatively large in comparison to company size, leading to a significant increase in long-term leverage.

5. Conclusions

We investigate the impact of major capital structure determinants of local and multinational companies (MNCs) operating in the Baltic States. The outcome of our panel regression model shows an overall negative and significant relationship between company age and leverage. As companies get older, leverage starts to decrease, in line with pecking order theory, suggesting that own funds which have been generated in previous years are preferred to external financing.

Figure 4: Private Sector Credit as Percentage of GDP
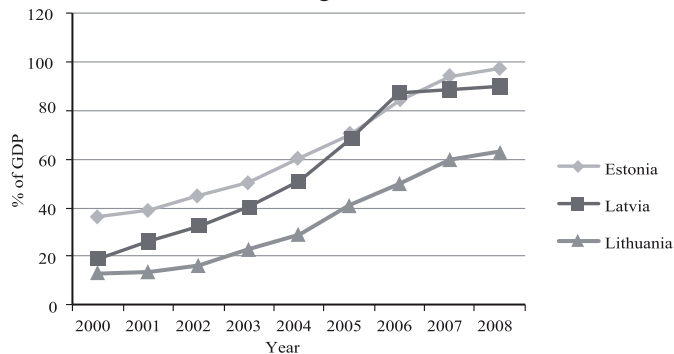
Source: World Bank

Profitability appears to have a negative and significant correlation with leverage, a finding in accordance with previous research as well as with pecking order theory. Local companies appear to have significantly higher profit margins, which may be associated with potentially higher risks of local businesses.

We find that bigger companies (are able to) borrow relatively more, a tendency which expectedly relates to reputational effects as well as relatively lower bankruptcy costs. The relationship between tangibility and leverage appears to be positive and significant, also in line with the findings of previous studies.

We find significant differences in the leverage of multinational and non-multinational companies in the Baltic States. On average, MNCs appear to be more leveraged than local companies (three percentage points higher adjusted leverage), which seems to be primarily related to the higher investment level (thus requiring relatively more external funds) and lack of alternatives to external financing for the latter. The lower tangibility of MNCs might be related to their tendency to perform certain functions for their parent or other group companies (e.g. acting as sales representatives or wholesale or retail traders) without a need for major investment.

Our regression results show differences between local and multinational companies in the sensitivity of their leverage to some capital structure determinants. Namely, the impact of company size on leverage appears to be larger for MNCs. A possible explanation lies in agency theory – the need for monitoring of management increases with the size of the company and debt serves as a monitoring device, whereas monitoring need is likely to be overall higher for multinational companies. Also, the negative impact of company age is stronger in the case of multinational companies, indicating that local company owners might be less risk averse, preferring to withdraw profits earned to invest elsewhere or use retained earnings to attract additional debt for further expansion of the company, while multinationals appear to retain profits and potentially repay loans from these funds.

We find an interesting difference between MNCs and local companies in the impact of credit constraints on leverage. While the impact of credit constraints on leverage of multinational corporations is, as expected, slightly negative, the similar impact for local companies is posi-

tive. While credit constraints seem to have hindered lending by local companies up to 2005, the overall economic and credit boom appears to have led local companies to follow the boom and undertake risky projects in the following years. Part of these projects and investments appear to have been successful in attracting external finance, while the increasing level of perceived credit constraints indicates that many of these ambitious projects were difficult to fund. This relationship also shows that compared to local companies, MNCs have been in an advantageous situation in accessing external financing, as illustrated by their lower perceived credit constraints as well as by their ability to increase average leverage at the beginning of the 2000s when actual credit constraints were strongest. On the other hand, the above finding might show that the overall approach by MNCs to taking risks and borrowing is more conservative compared to local companies.

As mentioned earlier in the paper, due to limitations on the availability of relevant data, we could not differentiate intra-group and third party debt in our study. Should such information be available in the future, this would represent an interesting area for research.

We have pointed out that the level of tangibility is significantly lower for MNCs compared to local companies operating in the Baltic States. The reasons for this difference are another area where more research is warranted. We have also noted that MNCs tend to be less profitable than local companies in the early years of their development, a phenomenon that may be explained by the ability of MNCs to use group support in the start up phase, whereas local companies may be more constrained in their ability to enter the market. Further studies in this complex area would be needed.

Our regression results showed that negative impact of company age is stronger for MNCs than local companies. Whether this is caused by the higher tendency to retain profits, should be tested in further studies. The possible difference of monitoring needs of multinational companies compared to local companies is also an area that needs to be studied further in the future as this might have implications on the capital structure choice.

In general, our results indicate that MNCs operating in the Baltic States have had more flexibility in attracting external finance as well as in using internal (group) financing compared to their local counterparts. Whether this enables them to achieve higher productivity and financial success remains a subject for future research.

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Appendix 1. Descriptive Statistics (monetary amounts in thousands of EUR)

		Mean	Median	Sd	Min	Max	Wilcoxon rank-sum test (z)
Adjusted leverage	Local	0.32	0.26	0.29	0.00	1.00	
	MNC	0.29	0.17	0.32	0.00	1.00	13.14***
Long-term leverage	Local	0.15	0.03	0.21	0.00	1.00	
	MNC	0.12	0.00	0.21	0.00	1.00	22.53***
Total assets	Local	1,664	524	9,765	0	1,203,525	
	MNC	4,998	1,487	11,867	0	257,620	-67.45***
Total equity	Local	756	188	6,711	0	1,047,568	
	MNC	2,170	470	6,352	0	119,689	-51.30***
Long-term debt	Local	231	8	1,596	0	180,321	
	MNC	635	0	3,259	0	83,143	10.43***
Short-term debt	Local	167	12	1,015	0	154,985	
	MNC	445	4	1,837	0	75,434	4.17***
Sales	Local	2,814	997	13,814	0	2,037,042	
	MNC	9,063	2,698	24,988	0	578,506	-67.80***
Net profit	Local	145	36	1,594	-28,000	354,656	
	MNC	360	84	1,554	-13,161	36,561	-29.94***
Age	Local	8.5	8.7	4.3	0.0	17.0	
	MNC	8.3	8.3	4.1	0.1	17.0	5.61***
Tangibility	Local	0.32	0.27	0.25	0.00	1.00	
	MNC	0.26	0.16	0.25	0.00	1.00	29.13***
Profitability	Local	0.06	0.05	0.28	-9.92	1.00	
	MNC	0.04	0.04	0.33	-9.89	1.00	7.71***
Effective tax-rate	Local	0.09	0.00	0.15	-0.99	1.00	
	MNC	0.07	0.00	0.15	-0.99	1.00	13.21***
Credit constraints	Local	0.46	0.45	0.06	0.27	0.65	
	MNC	0.39	0.39	0.09	0.21	0.71	72.52***
Herfindahl-Hirschman index	Local	0.05	0.02	0.07	0.01	1.00	
	MNC	0.05	0.02	0.08	0.01	1.00	7.37***

Note: Monetary values are expressed in real terms, using industry-level price-index deflators obtained from Eurostat.

Appendix 2. Pairwise Correlations between Variables

	Adjusted leverage	Long-term leverage	Age	Sales	Tangi-bility	Profita-bility	Eff. tax-rate	HHI
Long-term leverage	0.68***							
Age	-0.07***	-0.02***						
Sales	0.03***	0.01**	0.05***					
Tangibility	0.30***	0.36***	0.11***	-0.03***				
Profitability	-0.07***	-0.03***	0.01**	0.0001	-0.005			
Effective tax-rate	0.03***	0.02***	0.04***	0.03***	-0.04***	0.04***		
HHI	0.02***	0.04***	0.04***	0.10***	0.14***	-0.01***	0.03***	
Credit con-straints	0.02***	0.01***	0.00	-0.03***	0.07***	0.00	0.00	0.04***

Appendix 3. Number of Observations by Year

		2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Local	Adjusted Leverage	0.30	0.31	0.31	0.31	0.31	0.32	0.33	0.34	0.31	0.32
	No of observations	5,052	5,788	7,194	8,579	9,474	10,569	11,424	10,520	6,937	75,537
	% of observations	7%	8%	10%	11%	13%	14%	15%	14%	9%	100%
MNC	Adjusted Leverage	0.30	0.31	0.32	0.31	0.30	0.30	0.29	0.28	0.28	0.29
	No of observations	770	864	1,056	1,221	1,375	1,480	1,599	1,528	1,348	11,241
	% of observations	7%	8%	9%	11%	12%	13%	14%	14%	12%	100%
Total	Adjusted Leverage	0.30	0.31	0.31	0.31	0.31	0.32	0.33	0.33	0.31	0.31
	No of observations	5,822	6,652	8,250	9,800	10,849	12,049	13,023	12,048	8,285	86,778
	% of observations	7%	8%	10%	11%	13%	14%	15%	14%	10%	100%

Appendix 4. Number of Observations by Industry

		A	B	C	D	F	G	I	Total
Local	Adjusted leverage	0.36	0.29	0.25	0.34	0.34	0.35	0.26	0.32
	Number of observations	2,818	233	14,103	19,494	20,973	10,261	7,655	75,537
	% of observations	4%	0%	19%	26%	28%	14%	10%	100%
MNC	Adjusted leverage	0.46	0.37	0.21	0.36	0.27	0.31	0.22	0.29
	Number of observations	126	87	533	3,465	4,570	803	1,657	11,241
	% of observations	1%	1%	5%	31%	41%	7%	15%	100%
Total	Adjusted leverage	0.37	0.31	0.25	0.34	0.33	0.35	0.26	0.31
	Number of observations	2,944	320	14,636	22,959	25,543	11,064	9,312	86,778
	% of observations	3%	0%	17%	26%	29%	13%	11%	100%

A. Agriculture, forestry, and fishing
B. Mining
C. Construction
D. Manufacturing
F. Wholesale trade
G. Retail trade
I. Services

APPENDIX 2

Does leverage affect company growth in the Baltic countries?

MARI AVARMAA

Does Leverage Affect Company Growth in the Baltic Countries?

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Abstract. This paper investigates the impact of leverage and credit constraints on sales growth of companies operating in the Baltic countries. A fixed effects regression model on company level data, covering the period from 2001 to 2008 is employed. The results demonstrate that leverage has a positive impact on the growth of local companies, especially at low levels of leverage. On the other hand, leverage does not have a significant impact on growth of multinational companies. Credit constraints appear to hinder the growth of local companies while multinational companies seem to be more flexible in attracting financing. When shaping the regulatory environment, governments might wish to establish measures for enhancing companies' access to financing, especially for the ones with local ownership, in order to support company growth and thereby overall economic development.

Keywords: financing, corporate growth, Baltic countries, local companies, multinational companies

1. Introduction

The Baltic economies have demonstrated solid economic growth during the past decades until the recent economic crisis. However, the GDP per capita levels have not reached to the European averages yet and the countries would need to find sources for the convergence process to continue. As the real sector represents one of the cornerstones of an economy, it is essential to explore the determinants of corporate growth in that perspective. The linkage between company financing and growth has gained limited attention in empirical literature, especially in the context of transition economies. The current paper seeks to investigate the relationship between leverage and company growth with focus on the differences in the financial behaviour of local and multinational companies (MNCs). Empirical analysis of the financing related determinants of sales growth of MNCs compared to that of local companies in the Baltic countries (Estonia, Latvia and Lithuania) based on company-level data for 2001-2008 has been performed.

2. Literature review

Some of the classical capital structure theories shed light on the possible impact of leverage on company growth. The pecking order theory by Myers and Majluf (1984) demonstrates that due to asymmetric information, companies prefer internal financing sources to the external ones, and debt to external equity. The availability of internal financing may therefore be a determinant of the ability to grow, and companies with lower leverage might be able to grow faster.

The agency theory of capital structure has several (although controversial) implications on the impact of leverage on corporate growth. Jensen and Meckling (1976) show that debt functions as a monitoring device over managers. Higher debt levels might thus result in better performance. The debt overhang concept by Myers (1977) demonstrates however that high leverage may cause companies to underinvest since the benefits of additional capital investments accrue largely to debt holders instead of equity holders. This is likely to lead to slower company growth. At the same time, the overinvestment problem outlined by Jensen (1986) implies that managers may wish to expand the scale of companies even if it means investing into

poorly performing projects, whereas debt might limit the free resources available for such investments. This would result in a negative relationship between leverage and investment growth for companies that have weak growth opportunities.

The empirical works dealing with the impact of leverage on sales growth have been focussed either on SMEs or young companies. Most of the studies have identified a positive impact of leverage on sales growth (e.g. Heshmati 2001, Honjo and Harada 2006, Hermelo and Vassolo 2007 and Huynh and Petrunia 2010). The positive impact of leverage has been explained by the difficulties with access to credit of these types of companies in relation to informational asymmetries. The only paper concentrating on company growth in the CEE region (Mateev and Anastasov 2010) found the relationship between leverage and sales growth of SMEs to be insignificant.

3. The model

This paper seeks to investigate how financial leverage and credit constraints impact sales growth of companies operating in the Baltic countries, and whether the impact is different for local companies and MNCs. I build a fixed effects regression model in similar veins to the panel data regression model of Mateev and Anastsov (2010). Since access to finance is believed to be the most binding obstacle on company growth (Dinh et al. 2010), I have added a measure of credit constraints as one of the independent variables. In order to allow for differences in the impact of growth, I have included interaction terms between independent variables and the dummy variable for MNCs.

The growth of an i-th company at time t has been modelled as follows:

$$GROWTH_{it} = \beta_1 GDP_{it} + \beta_2 AGE_{it} + \beta_3 AGE^2_{it} + \beta_4 LEV_{i(t-1)} + \beta_5 LEV^2_{i(t-1)} + \beta_6 CRED_{it} + \beta_7 SIZE_{i(t-1)} + \beta_8 HHI_{i(t-1)} + \beta_9 AGE \times MNC_{it} + \beta_{10} AGE^2 \times MNC_{it} + \beta_{11} LEV \times MNC_{i(t-1)} + \beta_{12} LEV^2 \times MNC_{i(t-1)} + \beta_{13} CRED \times MNC_{it} + \beta_{14} SIZE \times MNC_{i(t-1)} + \beta_{15} HHI \times MNC_{i(t-1)} + \alpha_i + u_{it},$$

where α_i denotes company level fixed effects. The variables are described in Table 1 and explained in the text below.

Table 1. Variables used in the regression model

Variable	Abbrevation	Measurement
Company sales growth	GROWTH	[Real sales(t) / Real sales (t-1)] - 1
Country GDP growth	GDP	Real GDP growth; data from Eurostat
Company leverage	LEV	(Short-term debt + Long-term liabilities) / (Total equity + Long-term liabilities + Short-term debt)
Industry credit constraints	CRED	Industry level value of financing constraints; data from BEEPS
Company size	SIZE	Log of real assets
Company age	AGE	Number of years from incorporation
Industry Herfindahl index	HHI	Squared sum of market shares of sales of all firms in the industry
Company multinationality	MNC	1 if more than 50% owned by a foreign company, otherwise 0

The measure of leverage (LEV), the independent variable of main interest, is calculated similarly to several studies on capital structure (Rajan and Zingales 1995, Huizinga et al. 2008, Avarmaa et al. 2011). I have included both leverage (LEV) and the quadratic term of leverage (LEV^2) in the regression model given the characteristics of the data observed from descriptive statistics. I use company age (AGE) and size ($SIZE$) as the most common determinants of company growth as control variables. Quadratic form of company age is used similarly to Huynh and Petrunia (2010). GDP growth (GDP) is included to control for the impact of economic cycles on corporate growth. Since company growth tends to be industry specific, I control for this impact by including interaction terms between year and sector dummies. For that purpose, industries are divided into four sectors (manufacturing, trade, construction, and service).

In addition to the whole sample, the impact of leverage on company growth has been investigated by three groups of leverage: low ($0 < LEV \leq 21.2\%$), medium ($21.2\% < LEV \leq 51.5\%$), and high ($LEV > 51.5\%$). As another test of robustness, regressions covering different phases of the economic cycle have been run. Since the Baltic countries experienced an economic and credit boom during 2006-2007, and local companies increased their leverage substantially during that period (Avarmaa et al. 2011), the impact of

leverage on growth is expected to be different for the subsample.

4. Data

I have obtained financial and ownership information of companies operating in the Baltic countries from the Amadeus database compiled by Bureau van Dijk. The sample consists of 68,000 firm-year observations covering the period from 2001 to 2008. 14% of observations belong to MNCs and 86% to local companies. For every company, data are included in the sample for the years for which financial information was available in sufficient level of detail and all components of assets and liabilities were non-negative. Companies operating in the financial and public utilities sector were excluded from the sample since industry-specific regulations might impact capital structure in these sectors. Observations with sales growth above 200% were eliminated in order to minimise the impact of outliers on the regression results. For the same reason, I have counted the age of companies established before 1991 as starting from year 1991, when the Baltic countries regained their independence and the regulatory frameworks for operating a company were fundamentally changed.

The data for credit constraints have been obtained from the BEEPS survey conducted by EBRD and the World Bank. The indicator has been composed according to a similar procedure as applied by Avarmaa et al. (2011), using the BEEPS 2002, 2005 and 2009 data on access to finance. The original data provides companies' estimates regarding their ability to access finance in their country of operation on a four-point scale ranging from "No obstacle" to "Very Severe Obstacle". The variable has been normalised, taking values between 0 and 1. The missing observations for the years 2003-2004 and 2006-2007 have been derived using the cubic spline interpolation technique. The observations for 2000 and 2001 have been linearly extrapolated. The indicator allows for variance across industries and over time.

Descriptive statistics (Table 2) reveal that MNCs are considerably bigger than local companies in terms of sales and total assets but are relatively less leveraged and have experienced lower credit constraints. There are no major differences in the growth rates achieved by local companies and MNCs.

Table 2. Descriptive Statistics (monetary values in thousands of euros)

		Mean	Median	sd	Min	Max
Total Assets	Local	2,205	727	10,239	0	1,023,049
	MNC	6,520	2,026	15,093	1	286,731
Sales	Local	3,785	1,355	14,469	0	1,613,346
	MNC	12,197	3,729	33,926	1	730,074
Sales growth	Local	17%	10%	41%	-100%	200%
	MNC	17%	10%	39%	-100%	200%
Leverage	Local	32%	27%	29%	0%	100%
	MNC	29%	17%	31%	0%	100%
Credit Constraints	Local	0.46	0.45	0.06	0.27	0.65
	MNC	0.39	0.39	0.08	0.21	0.71
Age	Local	9	10	4	1	17
	MNC	9	9	4	1	17
HHI	Local	0.05	0.02	0.07	0.01	1
	MNC	0.05	0.02	0.08	0.01	1

5. Results

Regression results (Table 3, panel 1) show that MNCs operating in the Baltic countries differ from local companies in the impact of financing on growth. Leverage appears to have a positive impact on sales growth only for local companies and not to influence the growth of MNCs. Credit constraints appear to have a stronger negative impact on the sales growth of local companies compared to MNCs. This indicates that the ability to obtain debt financing is vital for the development of local companies. This could be related to a relatively low capital market development in the Baltic countries, as well as to informational asymmetries that make local companies dependant on bank lending rather than private or public equity capital. MNCs seem to be able to finance their growth without excess lending, potentially due to the support of their corporate group and better access to capital markets. An alternative explanation for the different impact for

MNCs stems from the agency theory - leverage might function as a disciplining device more effectively for local companies than MNCs.

The results by groups of leverage (Table 3 panel 2)[1] indicate that the increase of leverage tends to bring additional growth for the local companies only at low levels of leverage while high leverage does not enable to achieve additional growth. A similar outcome is arrived at by Avarmaa et al. (forthcoming) showing that at moderate levels of leverage increases in leverage help to improve labour productivity in the local companies operating in the Baltic counties, while high leverage tends to have an opposite effect.

Table 3. Regression results[2]

	Sales Growth whole sample (1)	Sales Growth low leverage (2)	Sales Growth boom (3)
GDP growth	0.250**	0.277	1.389***
	(0.115)	(0.226)	(0.299)
Age	-0.060***	0.003	omitted
	(0.023)	(0.055)	
Age^2	0.002***	0.001***	0.002***
	(0.000)	(0.000)	(0.001)
Leverage	0.023***	0.120***	0.308***
	(0.006)	(0.041)	(0.032)
Leverage^2	0.0002***	0.021**	0.036***
	(0.000)	(0.010)	(0.008)
Credit Constraints	-0.309***	-0.392*	-1.526***
	(0.045)	(0.089)	(0.241)
HHI	0.062	0.248	0.249
	(0.058)	(0.133)	(0.166)
Size	-0.124***	-0.232***	-0.345***
	(0.006)	(0.014)	(0.026)
Age × MNC	-0.024***	-0.038*	-0.089**
	(0.009)	(0.020)	(0.042)
Age^2 × MNC	0.001***	0.002**	0.003
	(0.000)	(0.001)	(0.002)
Leverage × MNC	-0.023**	-0.092**	-0.295***
	(0.010)	(0.042)	(0.034)
Leverage^2 × MNC	-0.0002***	-0.020**	-0.036***
	(0.000)	(0.010)	(0.008)
Credit Constraints × MNC	0.188**	0.250*	0.768*
	(0.080)	(0.152)	(0.399)
HHI × MNC	0.123	-0.094	-0.577
	(0.145)	(0.286)	(0.417)
Size × MNC	0.001	0.022	0.055
	(0.010)	(0.021)	(0.0363)
Number of observations	67,945	18,575	22,209
R^2	21.0%	27.1%	28.4%

The regression results for the boom period (2006-2007) in Table 3 panel 3 show that the positive impact of leverage on growth of local companies is strongly evident during the time when the availability of credit was rapidly improving. The growth of MNCs does not seem to depend on lending to the same extent as in local companies as MNCs had been more flexible in financing their growth already before the boom. The descriptive statistics show that the credit constraints have been lower for MNCs during the whole period covered in this paper. The strong negative impact of credit constraints of the local companies during the boom period implies that while the levels of leverage were increasing in the economy and availability of lending improved the financing needs of the companies increased even more rapidly and companies perceived increased obstacles for getting credit. (Avarmaa et al. 2011)

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[1] The results for high- and medium-level leverage available upon request.
[2] *, ** and *** indicate significance at 10%, 5%, and 1% level respectively. Robust standard errors in parentheses. Company fixed effects, year dummies and year-sector interactions included. The Hausman test showed fixed effects regression model to be preferred to the random effects model.

As regards to control variables, age has a more negative impact on the sales growth of MNCs compared to local companies, indicating that young MNCs are likely to grow faster, probably due to the availability of financial resources from their parent company.

6. Conclusions

I found the impact of leverage and credit constraints on company growth to be considerably different for MNCs and local companies operating in the Baltic countries. While there appears to be a positive relationship between leverage and growth for local companies, there is no evident impact of leverage on growth for MNCs. In addition, credit constraints do not seem to hinder the growth of MNCs to the same extent as in the case of local companies. The positive effect of leverage on growth seems to be the highest for local companies with low use of external financing. The most likely reasons for the differences might be the lower access of local companies to capital markets and lack of internal funding. These findings suggest that when shaping the regulatory environment, governments might wish to establish measures for enhancing companies' access to financing, especially for the ones with local ownership, in order to support company growth and thereby overall economic development.

7. Acknowledgements

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APPENDIX 3

Does leverage affect labour productivity? A comparative study of local and multinational companies of the Baltic countries

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Does leverage affect labour productivity?
A comparative study of local and multinational companies of the Baltic countries

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Abstract

This paper investigates the impact of leverage on labour productivity of companies operating in the Baltic countries, with a focus on differences between local and multinational companies. We employ a fixed effects regression model on company level data, covering the period from 2001 to 2008. Our results demonstrate that the impact of leverage on labour productivity is non-linear and it differs dramatically between local and multinational companies. In the case of local companies, at low levels of leverage, an increase in external financing tends to bring along an improvement in labour productivity, while at higher levels of leverage an increase in debt financing appears to result in a loss of labour productivity. For multinational companies, the impact of leverage on labour productivity tends to be more linear and leverage appears to have a negative impact on labour productivity. Although debt overhang is believed to be an issue in the Baltic countries in general, local companies with low leverage might be able to increase labour productivity by additional borrowing.

JEL classification: G32, D24

Keywords: labour productivity, leverage, credit constraints, multinational companies, local companies, Baltic countries

Acknowledgements

1. Introduction

Achievement of sustainable economic growth is a central goal for economies worldwide. The neoclassical growth theory drawn on the seminal work of Solow (1956) demonstrates that productivity growth is one of the main drivers for long-term GDP growth per capita. This relationship has found strong empirical support (e.g. Hall and Jones 1999, OECD 2003, Schadler et al. 2006, Arratibel et al. 2007). Understanding the determinants of productivity at a micro level as well as the related challenges and opportunities in a broader context are therefore key elements for exploring the paths for economic growth.

While access to credit has, to a large extent, been seen as a prerequisite for economic success (King and Levine 1993), the recent lending booms have rather demonstrated the risks to company viability resulting from excessive debt financing, highlighted by the global crisis of 2008/09. The impact of leverage on productivity and long-term growth hence deserves closer scrutiny.

As a result of the ageing population, many European economies will be increasingly under pressure in the decades to come. Output growth needs to be achieved with limited increase in labour force and improvements in labour productivity are essential for sustaining growth. [2]

This paper focuses on company financing and ownership as determinants of labour productivity. Our aim is to study the relationship between leverage and labour productivity comparing

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[1] Corresponding author
[2] Labor migration could be considered as alternative measure to relieve the shortage of labor force.

the multinational companies (MNCs) and local companies. Although the areas of capital structure and productivity have both been widely researched, the linkage between company financing, ownership structure and labour productivity has received limited attention in previous literature.

The scarce previous empirical research on the impact of leverage on labour productivity is controversial. While one study (Nunes et al. 2007) has found the impact of leverage on labour productivity to be negative, others have identified a positive (Dimelis and Louri 2002) or non-linear relationship (Kale et al. 2007). We seek to add some new evidence to resolve the puzzle.

We also contribute to the literature by showing that the impact of leverage on labour productivity is different for local companies and MNCs. Although some previous research (a summary of which is presented in a review paper by Bellak 2004, for example) has sought to identify the sources of productivity gap between local companies and MNCs, the impact of financing has been ignored.

Just like several other transition economies, the Baltic countries have been successful in attracting foreign investments. Empirical evidence shows that foreign direct investments play an important role in the labour productivity growth in the region (Bijsterbosch and Kolasa 2009). It would therefore be interesting to understand the drivers of labour productivity of multinational companies operating in the Baltic countries, and to identify whether these differ significantly from the determinants of labour productivity of local companies.

Empirical evidence indicates that MNCs in the Baltic countries have more flexibility in their financing decisions compared to local companies (Avarmaa et al. 2011). We seek to investigate whether such flexibility leads to any advantages for MNCs in achieving higher labour productivity. We perform a panel data regression analysis on a sample of 3,676 Baltic companies covering the period of 2001 to 2008. According to our knowledge, this is the first empirical research on the relationships between leverage and productivity covering the three Baltic countries.

The article is set up as follows: the next section provides overview of the literature on the relationships between leverage and productivity, as well as on the productivity differences between foreign and local companies, Section 3 presents the regression model and data, Section 4 explains our results, and the last section concludes the paper.

2. Literature overview

The classics of corporate finance theories offer some predictions on the influence of leverage on productivity. The agency theory of capital structure explains that debt functions as a monitoring device over managers (Jensen and Meckling 1976), meaning that higher debt levels might result in higher efficiency and productivity. The signalling theory of capital structure suggests that because companies which perform better use the issuance of debt as a signal about their quality (Ross 1977), higher debt might be associated with higher productivity. On the other hand, the debt overhang concept by Myers (1977) explicates that high leverage can cause companies to underinvest since the benefits of new capital investments accrue largely to debt holders instead of equity holders. Ultimately, this leads to weaker company performance. Coricelli et al. (2010) also point out that excessive leverage could lead to overcapacity and therefore result in lower productivity.

Concerning empirical research, several works show that leverage has a negative impact on productivity. Nucci et al. (2005), employing a sample of Italian companies, find a negative relationship between leverage and productivity. They show that there is a negative causal relationship from a company's leverage to its propensity to innovate, and that innovativeness leads to higher productivity. Ghosh (2009) makes a similar conclusion on a sample of Indian high-tech companies. Based on their quantile regression analysis of a sample of Portuguese companies, Nunes et al. (2007) also show that the relationship between leverage and labour productivity is negative, except for the most productive companies, in which case higher leverage tends to increase productivity. In contrast to the papers above, Kale et al. (2007), relying on a sample of US companies, find a positive concave relationship between leverage and labour productivity, which is in line with the agency theory. Hossain et al. (2005) analyse the components of productivity growth in US food manufacturing industry and find that increases in dividends contribute to the productivity growth, which, in its turn, is in line with the signalling theory.

2

Out of the limited research on the relationships between leverage and productivity as well as company ownership in Central and Eastern Europe (CEE), Coricelli et al. (2010) have focussed on the impact of leverage on total factor productivity (TFP) growth in twelve CEE countries (including Latvia) and found the relationship to be non-linear. The impact of foreign ownership on TFP growth appeared to be insignificant, except for the subsample with non-zero debt where a positive effect was found. Gatti and Love (2006), relying on a Bulgarian sample, find that access to credit is positively associated with productivity. Moreno Badia and Slootmaekers (2008) have investigated the relationship between productivity and financial constraints in Estonia. They conclude that financial constraints do not have an impact on productivity in most sectors, with the exception of R&D, where financial constraints have a large negative impact on productivity. They find that companies with majority foreign ownership are more productive.

Within the broad area of productivity related research, productivity differences between foreign-owned and domestically-owned companies have received increasing attention during the last two decades. Pfaffermayr and Bellak (2000) have summarised the main reasons for performance differences between foreign-owned and domestically-owned companies that have emerged from existing research. They have pointed out the following factors: the company-specific assets (such as production process, reputation or brand) of multinational companies transferred from and to affiliates; the more narrow specialisation of foreign-owned companies due to being part of a larger group; the access of foreign-owned companies to new technologies and opportunities for learning; different accounting practices, and different corporate governance structures. The review paper by Bellak (2004) provides a detailed discussion on the sources of productivity gaps between foreign-owned and domestic companies.

Empirical evidence on the productivity gap between foreign and domestic corporations is mixed, while the existence of such a gap tends to be supported. Girma et al. (1999) find that there is a productivity and wage gap between foreign and domestic companies in the manufacturing sector of the UK. Oulton (1998a) finds labour productivity of foreign manufacturing plants to be higher compared to the UK-owned plants as well as labour productivity of foreign companies to be better in the non-manufacturing sector in the UK (1998b). Greenaway et al. (2009) show that there is a U-shape relationship between foreign ownership and productivity in China, suggesting that foreign ownership is associated with improved performance only as long as it is accompanied by some degree of local participation. In their quantile regression analysis of foreign-owned and domestic corporations in Greece, Dimelis and Louri (2002) found that in the middle-productivity range, foreign companies exhibit higher efficiency while foreign ownership does not matter among the very productive and least productive companies. Nunes et al. (2007) show that foreign ownership increases labour productivity for all but the least productive companies in Portugal. However, in their plant-level comparative analysis of labour productivity in foreign and domestic establishments in Canada, Globerman et al. (1994) found no significant differences in productivity between these two groups after controlling for factors such as size and capital intensity.

There are some studies focusing on the performance of multinational versus non-multinational companies (as opposed to foreign versus domestic companies). Doms and Jensen (1998) find foreign-owned plants in the US to be more productive than the domestic ones, but less productive than the plants of US-owned multinational companies. Castellani and Zanfei (2004) arrive at a similar result for Italian manufacturing companies, showing that companies belonging to multinational groups outperform uninational companies. Pfaffermayr and Bellak (2000), in their study of productivity and profitability of Austrian companies, also conclude that performance gaps do not relate to the foreign ownership *per se* but rather to the gains from multinationality.

An area of research directly related to productivity differences is the study of productivity spillovers where the focus is on indirect benefits of FDI to productivity in the host country. Generally, productivity spillovers are said to take place when the entry or presence of MNCs leads to productivity or efficiency benefits in the host country's local companies, and the MNCs are unable to internalise the full value of these benefits (Blomström and Kokko 1998). In this area, several studies have been performed based on data from CEE countries. Vahter (2004) has studied the productivity spillovers in the manufacturing sector of Slovenia and Estonia and found that in both countries foreign companies exhibit higher labour productivity compared to domestic companies. Positive spillover effects were found only in Slovenia. Vahter and Masso (2006) have studied spillover effects in Estonia for 1995-

2002 and found that foreign companies demonstrate higher total factor productivity than domestic companies and that the existence of spillover effects were mixed. Geršl et al. (2007) have investigated productivity spillovers in CEE countries and found that the effects differ across countries and depend on various company-, industry- and country-specific characteristics.

Some authors have considered the impact of financing when analysing productivity gaps. Explaining the higher productivity of foreign companies operating in the UK compared to the local companies, Oulton (1998b) has pointed out that local companies might face higher cost of capital than foreign-owned companies while foreign companies are likely to be less constrained by the financial markets in the UK. Analysing productivity gaps in Greece, Dimelis and Louri (2002) have found a positive and significant effect of leverage as one of the control variables on labour productivity. Greenaway et al. (2009), on the other hand, have found no significant relationship between leverage and labour productivity on a Chinese sample of foreign and local companies.

In our study, we seek to link the relationship between financing and productivity with productivity gaps between foreign (multinational) and local companies. Our main focus is on the impact of leverage on the productivity of MNCs and local companies in the Baltic countries.

3. The model and data

3.1 The model

We use panel data regression analysis to study the determinants of labour productivity. Drawing on the work of Dimelis and Louri (2002), we use an augmented version of Cobb-Douglas production function for our empirical model. Just like these authors, we have included leverage as one of the independent variables. In order to allow for the differences in the impact of leverage on productivity between multinational and local companies, we have included an interaction term between leverage and a dummy variable for multinational companies. The model is complemented with additional control variables derived from the findings of previous research. We model labour productivity of an *i*-th company at time *t* as follows:

$$
\begin{aligned}
Log(Y/L_{it}) = \ &\beta_1 GDP_{it} + \beta_2 LEV_{it} + \beta_3 LEV^2{}_{it} + \beta_4 LEV \times MNC_{it} + \beta_5 LEV^2 \times MNC_{it} + \beta_6 CRED_{it} \\
&+ \beta_7 CRED \times MNC_{it} + \beta_8 AGE_{it} + \beta_9 AGE^2{}_{it} + \beta_{10} SIZE_{it} + \beta_{11} TANG_{it} + \beta_{12} HHI_{it} \\
&+ \beta_{13} LEV \times SKILL_{it} + \alpha_i + u_{it}
\end{aligned}
$$

(1)

where α denotes company-level fixed effects. The variables are explained in Table 1 below.

Table 1. Variables used in the regression model

Variable	Abb-reviation	Measurement	Expected sign
Labour Productivity	ln(Y/L)	Ln (Real sales/number of employees)	dependent variable
GDP Growth	GDP	Real GDP growth, data from Eurostat	+
Adjusted Leverage	LEV	(Short-term debt+Long-term liabilities)/(Total assets-Current liabilities+Short-term debt)	non-linear
Long-term Leverage	LEV	Long-term debt/(Total assets-Current liabilities+Short-term debt)	non-linear
Credit Constraints	CRED	Industry level value of credit constraints, data from BEEPS	-
Age	AGE	Number of years from incorporation	non-linear
Size	SIZE	Ln of real total assets	+
Tangibility	TANG	Fixed assets/Total Assets	-
Herfindahl Index	HHI	Squared sum of market shares in all firms in the industry based on 2-digit US SIC codes	+
Skill-intensive Industry	SKILL	1 if belonging to skill-intensive industry, otherwise 0	+
Multinationality	MNC	1 if more than 50% owned by a foreign company, otherwise 0	+

We employ a fixed effects model since it helps to control for unobserved heterogeneity between the companies that is constant over time and correlated with independent variables. The Hausman test showed that a fixed effects model was to be preferred to a random effects model. Robust standard errors have been employed, which control for the bias in the presence of heteroskedasticity and for the within-cluster serial correlation.

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There are various ways for measuring productivity. Syverson (2010) has brought out issues related to the measurement choice, concluding that the results of previous productivity research are generally not sensitive to the method of measuring productivity. The most common measure of productivity in company-level research appears to be total factor productivity (TFP) (e.g. Nucci et al. 2005, Ghosh 2009, Chen 2010, Coricelli et al. 2010). We, however, concentrate on studying labour productivity as one of the key factors for economic growth under the aging population. Several previous works on productivity have used value added per employee for measuring labour productivity (Globerman et al. 1999, Oulton 1998a, 1998b, Doms and Jensen 1998, Girma et al. 1999). Due to data limitations, we have not been able to calculate value added for our data set. Therefore, similarly to Dimelis and Louri (2002) and Pfaffermayr and Bellak (2000), logarithm of sales per employee was used as a measure of productivity (Y/L). Since sales are influenced by inflation, real sales figures have been used. In order to arrive at real sales, industry-level price-index deflators obtained from Eurostat have been used.

The main independent variable of interest in our model is leverage (LEV). We have used two alternative measures for leverage in our regression. First, we have included an adjusted measure of leverage (see Table 1), calculated similarly to several studies on capital structure (Rajan and Zingales 1995, Jog and Tang 2001, Huizinga et al. 2008). This measure takes into consideration the fact that some assets on the balance sheet are offset by specific non-debt liabilities. To calculate leverage, previous studies on productivity have used either the ratio of short and long term debt to net worth (Dimelis and Louri 2002) or the ratio of total liabilities to total assets (Greenaway et al. 2009, Weill 2008). We believe that our approach represents a more appropriate measurement of leverage. To consider the specifics of long-term financing compared to short term financing, we have employed long-term leverage as an alternative to adjusted leverage. While long-term investments should generally be financed from long-term financial resources, long-term debt could be more difficult to obtain compared to short-term debt. We have used the same denominator for the long-term leverage as for the adjusted leverage due to the advantages of such measurement pointed out above.

As some of the previous works have identified a non-linear relationship between leverage and labour productivity (see Table 2 below), we have included both leverage (LEV) and squared leverage (LEV^2) in our regression model. The possible endogeneity of leverage was tested with Davidson-MacKinnon test and the exogeneity of leverage was supported.

Table 2. Summary of previous studies on the impact of leverage on productivity

Authors	Producitivity measure	Formula for leverage	Sign for leverage
Dimelis and Louri 2002	Labour productivity	(Short-term debt+long-term debt)/total assets	+
Nucci et al. 2005	TFP	Debt/total assets	-
Kale et al. 2007	Labour productivity	(Book value of long-term debt+short-term debt) / (book value of debt+market value of equity)	non-linear
Nunes et al. 2007	Labour productivity	Total liabilities/total assets	-
Weill 2008	Cost efficiency	Total liabilities/total assets	varies by country
Ghosh 2009	TFP	Total debt/total assets	-
Greenaway et al. 2009	TFP	Total liabilities/total assets	-
Coricelli et al. 2010	TFP growth	Total debt/total assets	non-linear

Some previous studies (Gatti and Love 2006, Moreno Badia and Slootmaekers 2008) have investigated the impact of either financial constraints or access to credit on productivity. We have used credit constraints ($CRED$) as one of the independent variables in the productivity regression. Similarly to the results of Gatti and Love (2006) who found access to credit to be positively related to productivity, we expect credit constraints to be negatively correlated with labour productivity.

Real GDP growth *(GDP)* was added to control for the impact of economic cycles on labour productivity. The expected sign of the GDP growth variable is positive, as economic upturns should enable companies to expand sales and thereby improve productivity of labour.

Previous literature has brought out that larger companies tend to benefit from economies of scale. A comprehensive discussion of the reasons for the positive impact of company size on productivity is offered by Leung et al. (2008). Empirical evidence confirms this positive relationship

(Dimelis and Louri 2002, Greenaway et al. 2009, Moreno Badia and Slootmaekers 2008). Company size has been measured in previous research mainly by the logarithm of total assets (Dimelis and Louri 2002, Männasoo 2008, Greenaway et al. 2009) or by the number of employees (Kale et al. 2007, Hazak and Männasoo 2010). We prefer the logarithm of total assets as in our case labour productivity is calculated based on the number of employees. In order to eliminate the impact of inflation, real values of assets have been used.

In order to control for the impact of the capital factor, we have included tangibility in the regression. The results of previous research are inconclusive regarding the relationship between tangibility and productivity. Weill (2008) has found a negative relationship between tangibility and cost efficiency in all of the seven European countries included in his sample. In addition to industry effects, he explains the relationship with the fact that a higher tangibility level means lower working capital and therefore lower managerial performance. Greenaway et al. (2009) have found a negative relationship between TFP and tangibility in China, while the influence of tangibility on labour productivity remained insignificant. In their quantile regression analysis on a sample of Portuguese companies, Nunes et al. (2007) found a negative relationship between tangibility and labour productivity in most cases, except for the companies with very high productivity. They explain the outcome with the tendency that companies with high R&D investments tend to have less fixed assets. Chen (2010), on the other hand, has found a positive relationship between collateral (measured by tangible fixed assets by total assets) and TFP in China, but the magnitude of the impact was small. She concludes that companies' ability to collateralise external borrowing can improve their productivity.

As productivity is considered to vary by the overall level of innovativeness in the industry, the impact of leverage is observed separately for skill-intensive and non-skill intensive industries. We constructed a dummy variable for skill-intensive industries (*SKILL*) and interacted this with the leverage variable (*LEV×SKILL*). The classification of industries is based on the Pavitt taxonomy (Pavitt 1984) whereby industries are divided into four classes – scale-intensive, specialised suppliers, science based, and suppliers dominated. We consider the first three classes as skill-intensive. The concordance between the two-digit US SIC codes and Pavitt's categories is based on Greenhalgh and Rogers (2004). For the industries missing from the latter paper, we have used the classification according to NACE codes from Pianta and Bogliacino (2008).

Productivity is considered to be influenced by product market competition. A comprehensive discussion on the impact of competition on productivity is provided by Vahter (2006). He shows that in the empirical literature, a positive relationship between competition and productivity is generally found. To control for the intensity of product market competition, we have included the Herfindahl index (*HHI*) as an independent variable, similarly to Kale et al. (2007). The index is calculated as a squared sum of market shares of all companies in the industry based on the 2-digit US SIC-codes. However, as Vahter (2006) has pointed out, the Herfindahl index is based on a certain classification of industries and thus could be misleading. In addition, the Herfindahl index might excessively emphasise large market players (see e.g. Ginevičius and Čirba (2009) among others). Since there is no other appropriate proxy for competition available, and considering the nature of the available data, we have used the Herfindahl index despite the potential drawbacks mentioned above.

Since the level of labour productivity tends to be industry-specific, we control for this impact by including interaction terms between year and sector dummies. For that purpose, we have divided industries into four sectors (manufacturing, trade, construction, and service).

We have divided the sample into two subsets – multinational and non-multinational companies. If more than 50% of a company is directly owned by a foreign company, it is classified as a multinational company (*MNC*). Otherwise, the company is labelled as a non-multinational (i.e. local). The terms "local company" and "non-multinational company" are used interchangeably in this paper.

As the main focus of our article is the impact of leverage on productivity in the comparative perspective of multinational and local companies, and considering that multinationality does not vary much over time, we have interacted the MNC dummy with leverage (*LEV×MNC*) and the squared term of leverage (*LEV²×MNC*). Avarmaa (2011) has found that the impact of credit constraints on the growth of local and multinational companies is different. We have therefore included an interaction term between credit constraints and MNC dummy (*CRED×MNC*) into the regression model. In order to test whether the coefficients for leverage, leverage squared, and credit constraints are significantly

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different for MNCs and local companies, the Chow test was performed. The independent variables were interacted with the MNC dummy and the interaction terms were included in the regression. The null hypothesis that the coefficients are equal was rejected with 5% significance.

3.1 Data and descriptive statistics

We have extracted data on companies operating in Estonia, Latvia and Lithuania from the Amadeus database compiled by Bureau van Dijk. The database provides financial statements and information regarding the ownership structure of private and publicly owned European companies. Our sample covers the period from 2001 to 2008. Companies in the public utilities and financial sector (US SIC codes 4000-4999 and 6000-6999) are excluded from the analysis due to their fundamentally different financial structure. Branches of foreign companies, cooperative companies and partnerships are also excluded from the sample since their legal form makes financial decision-making different from regular limited liability companies. Similarly to Weill (2008), unconsolidated data are used. For every company, data are included in the sample for those years for which financial information was available at a sufficient level of detail and all components of assets and liabilities were non-negative. In order to avoid the unjustified influence of outliers to the regression results, the upper 2% of observations of labour productivity were eliminated.[3] For the same reason, for companies established before 1991, we have counted their age starting from year 1991 when the Baltic countries regained their independence and the regulatory frameworks for operating a company were fundamentally changed. In case ownership data were missing for a certain year, the latest available information on ownership was used. The companies for which no data on the number of employees were available were dropped from the sample.

The data for perceived credit constraints have been obtained from the Business Environment and Enterprise Performance Survey (BEEPS) conducted by EBRD and the World Bank. The indicator has been composed by using the BEEPS 2002, 2005 and 2009 data on access to finance by applying a similar procedure as in Avarmaa et al. (2011) and Avarmaa (2011). Namely, the survey data provides companies' estimates regarding their ability to access finance in their country of operation on a scale of four levels ranging from "No obstacle" to "Very Severe Obstacle". The variable has been normalised, taking values between 0 and 1. The missing observations for the years 2003-2004 and 2006-2007 have been derived using the cubic spline interpolation technique. The observations for 2001 have been linearly extrapolated. The indicator allows for variance across industries and over time, and between MNCs and local companies.

As our focus is on the analysis of the labour productivity of multinational companies compared to non-multinationals, we aimed to have an equal number of multinational and non-multinational companies in the sample. We therefore included all multinational companies that met our criteria and randomly selected the same number of local companies from each of the three countries. As a result, our sample consists of 18,401 company-year observations whereof 50% belong to multinational companies. 50% of observations are from Estonia, 26% from Latvia, and 24% from Lithuania. The total number of companies included in the sample is 3,676.[4]

Appendices 1-3 provide descriptive statistics regarding the two subsamples. On average, MNCs appear to be twice as productive as the non-multinational companies operating in the Baltic countries – the mean value of real labour productivity of non-multinationals is 83 thousand Euros per employee compared to 152 thousand Euros in multinationals. It becomes evident that MNCs are generally considerably bigger than local companies in terms of sales, assets and headcount but are relatively less leveraged and carry relatively less tangible assets. As discussed in Section 4, the different size and productivity levels for MNCs compared to local companies tend to have an impact on the relationship between leverage and labour productivity.

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[3] As the distribution of labour productivity is skewed to the right, there was no need to remove outliers from the left side of the distribution.
[4] When using the whole sample, the regression results were qualitatively the same.

Average labour productivity by company age is presented in Figure 1. The figure reveals that for both local companies and MNCs labour productivity increases rapidly after the start-up phase and starts decreasing gradually thereafter.

Figure 1. Labour productivity (in thousands of Euros) by company age
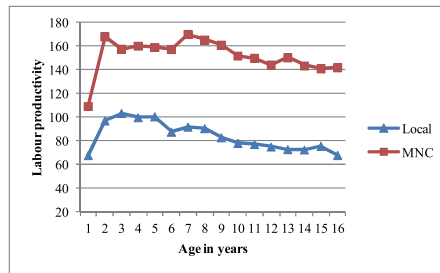
Average labour productivity has been constantly growing throughout the nine years in the Baltic countries (Figure 2), especially for local companies. At the same time, average leverage has not increased considerably. There is a slight upward trend for both adjusted leverage and long-term leverage of local companies in the boom years of 2005 to 2007, and a respective drop in 2008, in accordance with the financial and economic crisis. Trends of average leverage of MNCs, on the other hand, are relatively stable throughout the years under review.

Figure 2. Average labour productivity (in thousands of Euros) and leverage of multinational and local companies by years
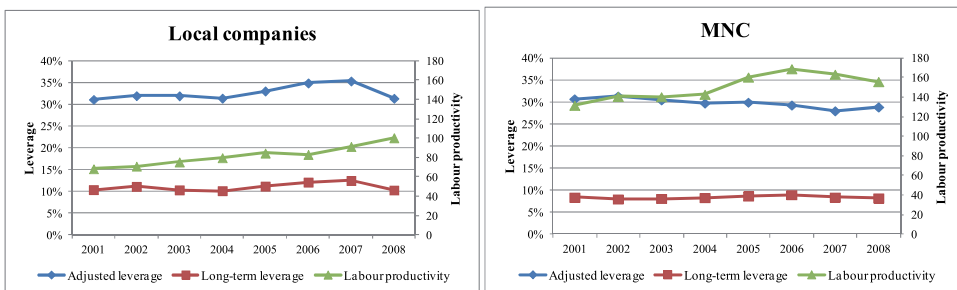
Average labour productivity calculated for ten leverage brackets with a step of 10% (Figure 3) indicates that the relationship between leverage and labour productivity tends to be non-linear and the nature of this relationship seems to differ for local and multinational companies. The nature of this relationship is to be studied in regression analysis, presented in the next section.

Figure 3. Average labour productivity (in thousands of Euros) by levels of adjusted and long-term leverage

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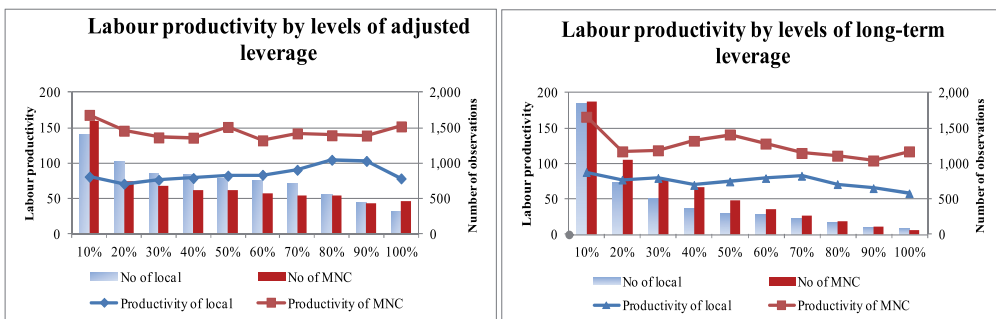
4. Results

In our panel regression analysis, we find support for the prediction that the relationship between leverage and labour productivity in the Baltic countries is non-linear (see Table 3 below). Namely, the results for Model 1 show that at low levels of adjusted leverage, increase in debt tends to bring along an increase in labour productivity, while in highly leveraged companies an increase in debt financing appears to be associated with a decrease in labour productivity.

Table 3. Regression results

| Labour Productivity	No interaction terms		With interaction terms		Subsample with LEV>0	
	Adjusted leverage (1)	Long-term leverage (2)	Adjusted leverage (3)	Long-term leverage (4)	Adjusted leverage (5)	Long-term leverage (6)
GDP	0.40*	0.41*	0.40*	0.40*	0.52**	0.50
	(0.23)	(0.23)	(0.23)	(0.23)	(0.26)	(0.33)
Leverage	0.15*	0.07	0.32***	0.21**	0.25**	0.21*
	(0.08)	(0.08)	(0.10)	(0.10)	(0.12)	(0.13)
Leverage^2	-0.37***	-0.33***	-0.51**	-0.47***	-0.41***	-0.39**
	(0.08)	(0.11)	(0.11)	(0.15)	(0.13)	(0.17)
Leverage×MNC			-0.36**	-0.31*	-0.26*	-0.11
			(0.15)	(0.16)	(0.15)	(0.18)
Leverage^2×MNC			0.29*	0.33	0.18	0.07
			(0.17)	(0.22)	(0.17)	(0.24)
Credit Constraints	0.10	0.10	0.28**	0.31**	0.13	-0.05
	(0.10)	(0.10)	(0.14)	(0.14)	(0.15)	(0.17)
Cred×MNC			-0.32**	-0.36**	-0.21	-0.03
			(0.15)	(0.14)	(0.16)	(0.17)
Age	0.00	0,00	-0.01	-0.001	-0.02	0,00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Age^2	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tangibility	-0.55***	-0.56***	-0.56***	-0.57***	-0.61***	-0.59***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)
Size	0.34***	0.34***	0.34***	0.34***	0.28***	0.26***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
HHI	-0.10	-0.09	-0.09	-0.08	-0.02	0,00
	(0.15)	(0.15)	(0.16)	(0.15)	(0.17)	(0.24)
Leverage×skill	0.10*	0.05	0.11**	0.06	0.05	-0.08
	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.08)
Constant	1.82***	1.84***	1.85***	1.86***	2.26***	2.39***
	(0.25)	(0.25)	(0.25)	(0.25)	(0.28)	(0.25)
No of obs	18,401	18,401	18,401	18,401	14,402	10,371
R^2	0.92	0.92	0.92	0.92	0.93	0.93
Company fixed effects	yes	yes	yes	yes	yes	yes
Sector-year interactions	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes

*, ** and *** indicate significance at 10%, 5%, and 1% level respectively. Robust standard errors in parentheses.

This outcome is similar to Kale et al. (2007) who find a non-linear relationship between leverage and labour productivity based on a sample of US companies. Kale et al. (2007) argue that debt functions as a disciplinary mechanism up to a certain breakpoint starting from where the threat of financial distress or underinvestment due to the debt overhang problem begins to outweigh the incentives from the bonding mechanism. We believe that the positive coefficient of leverage might also show that the lack of debt financing sets limits to companies' ability to increase sales and thereby hinders the achievement of productivity improvements through economies of scale in labour utilisation. In case of long-term leverage (Model 2) the relationship between leverage and labour productivity is also non-linear. The squared term of leverage is negative and significant while leverage remains insignificant, indicating that long-term leverage tends to have a negative impact on productivity.

Our results indicate that the relationship between financing and labour productivity is considerably different for MNCs compared to local companies. For adjusted leverage as well as long-term leverage (Models 3 and 4, respectively), the interaction term between leverage and the MNC dummy is negative and significant while the coefficient for the interaction term between squared leverage and MNC dummy is positive and significant for adjusted leverage and insignificant for long-term leverage. This implies that labour productivity of MNCs, in contrast to local companies, appears to be more linear and tends to decrease as a reaction to increased leverage. The relationship is illustrated in Figure 4.

The breakpoint leverage, starting from where the impact of adjusted leverage for local companies becomes negative, is 32%, while the average level of adjusted leverage for local companies is 33% and the median value 27%. Thus, for more than half of the observations, additional leverage might bring along improvements in labour productivity. On the other hand, for MNCs, additional leverage does not seem to have any positive impact on labour productivity. This outcome might indicate that the availability of debt financing does not considerably limit the productivity of MNCs operating in the Baltics unlike local companies. A possible explanation for the different impact of leverage on the labour productivity of MNCs might be that in their case the disciplinary role of debt is weaker compared to local companies. Belonging to a corporate group, MNCs might be potentially able to utilise intra-group financial resources and are therefore less dependent on external debt providers. As the size of the operations of the subsidiaries of multinational groups in the Baltic countries tends to be relatively small compared to the size of the entire group, providing financing for such operations is not likely to be significantly constrained. In some cases, maintaining presence in the Baltic market might be of higher priority for corporate groups than improving short-run results. Additionally, the part of financing that comes in the form of intra-group lending might not function as a monitoring device.

Figure 4. Impact of adjusted leverage on labour productivity of MNCs and local companies
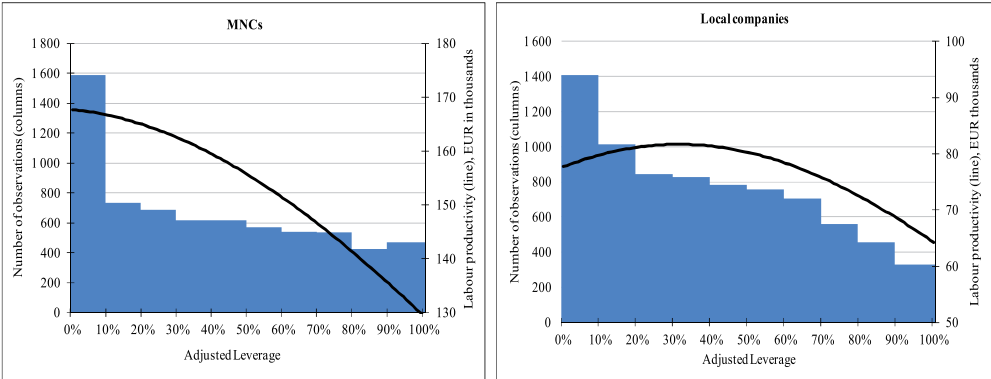
The impact of perceived credit constraints on labour productivity is different from our expectations, or more specifically, this relationship seems to have a more complex nature than we

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expected. Namely, the perceived obstacles in obtaining credit appear to have a positive influence on the productivity of local companies and only a minor impact on the productivity of multinational companies. When credit constraints increased by 1 point in the four-point scale, labour productivity of local companies in our sample would increase by approximately 7%. This implies that the perceived (and materialised) obstacles in accessing credit, combined with competitive pressure, are likely to force local companies to find ways to increase efficiency by using less workforce to generate a unit of sales. On the other hand, similar obstacles do not seem to put such a pressure on multinational companies as they generally tend to have a broader choice of financing sources in addition to third party credit, and can therefore more easily attract financing to support growth. As the descriptive statistics indicate, the average level of perceived credit constraints is higher for local companies compared to MNCs. Beck et al. (2002) have demonstrated that perceived financing constraints are generally higher for those companies which have a high demand for external financing either due to the growth opportunities or a lack of internal resources. High perceived credit constraints may therefore reflect that companies are active at the credit market and see opportunities for expansion. Empirical results of Avarmaa et al. (2011) also indicate a positive relationship between credit constraints and leverage in the local companies operating in the Baltic countries.

Interestingly, both perceived credit constraints and leverage appear to have a positive relation to labour productivity in local companies. While experienced obstacles in getting credit are related to productivity improvements, the ability to increase leverage also has a positive influence on productivity up to a certain point in local companies. A possible explanation to this somewhat puzzling result might be that limited financial resources, which constrain growth, motivate companies to look for ways of achieving the existing activity level with fewer resources. Avarmaa (2011) has found that credit constraints have a negative impact on sales growth in local companies operating in the Baltics, while the negative influence on sales growth of MNCs is relatively low. The positive impact of credit constraints on labour productivity in our study is therefore likely to indicate that productivity improvements are gained through increased efficiency rather than sales growth. However, in the circumstances where local companies are able to increase leverage despite the faced obstacles for getting credit, the increase of leverage enables to achieve further productivity improvements (i.e. higher sales per employee) through economies of scale.

As expected, GDP growth has a positive impact on labour productivity. Concerning the other control variables, the relationship between labour productivity and company size is positive, reflecting the existence of economies of scale in terms of labour productivity. A 1% change in assets appears to result in a 0.34% change in productivity.

We find the relationship between tangibility and labour productivity to be negative. In our sample, a 1% reduction in tangibility results in an increase of labour productivity by 0.56%. This might be explained by the trade-off theory of capital structure (Kraus and Litzenberger 1973) whereby companies rich in intangible assets have less collateral, a higher bankruptcy risk and are thus less leveraged. At the same time, innovative companies are proved to be highly productive (Egger and Keuschnigg 2010). The interaction term between leverage and high-skilled industries is positive, supporting the argument that skill-intensive sectors seem to benefit more from higher leverage than others. This could be related to the fact that their tendency to innovate creates a need for higher financing while the innovative activities might not be transparent for outside agents, and innovative companies are therefore credit rationed (Egger and Keuschnigg 2010). However, we note that in our study, skill-intensive industries include more industries than the R&D one.

Company age and the Herfindahl index remained insignificant in explaining labour productivity. In case of the Herfindahl index, this might be related to the shortcomings of proxying as described in Section 3.

We have tested robustness of the results by running the regression on a limited subsample where the leverage of observations is above zero. In case of adjusted leverage (Model 5), the outcome remained the same with the exception that the interaction term between MNC and squared leverage is insignificant in explaining labour productivity for the subsample, potentially explained by the small size of the subsample. For the same reason, the effect of credit constraints on labour productivity remained insignificant. Regarding long-term leverage (Model 6), the impact of leverage also remained the same while the interaction terms between leverage and MNC dummy as well as credit constraints

remained insignificant since the sample size was almost two times smaller for this regression compared to the main sample.

5. Conclusions

Our findings contribute to the literature by showing that the relationship between leverage and labour productivity is non-linear. At low level of leverage an increase in leverage appears to be related to an improvement in labour productivity, and after a certain breakpoint leverage tends to have a negative impact on labour productivity. Overall, this finding supports the previous evidence by Kale et al. (2007).

We find the impact of leverage on labour productivity to be considerably different for MNCs and local companies operating in the Baltic countries. While there appears to be a positive concave relationship between leverage and labour productivity for local companies, the impact is slightly negative in case of MNCs. We show that at moderate levels of leverage (up to an adjusted leverage of 32%) lending tends to have a positive impact on labour productivity of local companies in the Baltic countries. On the other hand, at high levels of leverage, there appears to be a considerable negative impact of leverage on labour productivity.

For MNCs, the impact of leverage on labour productivity tends to be more linear than for local companies and additional leverage does not seem to bring along any improvements in labour productivity. The different impact of leverage on MNCs can be explained by the weaker role of debt as a monitoring device and easier access to all forms of financing.

While perceived credit constraints are positively related to the labour productivity of local companies, limited access to credit seems not to be a sufficient tool for sustainable productivity growth. The positive impact of credit constraints on labour productivity found in our study is likely to indicate that such productivity improvements are gained through higher efficiency rather than sales growth. In the circumstances where local companies are able to increase leverage despite the experienced obstacles for getting credit, the increase of leverage enables to achieve further productivity improvements.

Although the debt overhang problem is considered to be threatening the Baltic economies (Hertzberg 2010), additional leverage might bring along some improvements in labour productivity for many local companies. On the other hand, it is essential for companies to pay attention to the measures for avoiding excess borrowing as this appears to hinder productivity. Companies' unawareness of the critical level from where additional leverage starts to generate non-productive or non-sustainable growth may also be a key in understanding why some companies perform in a procyclical way, propagating economic booms and bubbles. This remains an interesting area for future research.

Appendix 1. Descriptive statistics for multinational and local companies (monetary values in thousands of Euros)

		Mean	Median	Sd	Min	Max	No of obs	Wilcoxon rank-sum test (z)
Total Assets	Local	1,959	749	5,473	0	174,424	9,282	-45.8***
	MNC	5,673	1,933	12,658	1	272,140	9,119	
Long-term Debt	Local	294	17	1,620	0	64,669	9,282	8.6***
	MNC	744	0	4,133	0	104,508	9,119	
Short-term Debt	Local	213	20	936	0	22,489	9,282	3.6***
	MNC	510	7	1,996	0	79,583	9,119	
Sales	Local	3,361	1,392	7,354	0	174,582	9,282	-46.7***
	MNC	9,248	3,569	17,825	1	401,879	9,119	
Net Profit	Local	192	55	797	-7,538	39,981	9,282	-19.8***
	MNC	471	123	1,816	-15,657	49,357	9,119	
Adjusted Leverage	Local	0.33	0.27	0.29	0.00	1.00	9,282	10.8***
	MNC	0.30	0.18	0.31	0.00	1.00	9,119	
Long-term Leverage	Local	0.11	0.03	0.16	0.00	0.99	9,282	18.0***
	MNC	0.08	0.00	0.16	0.00	0.99	9,119	
Credit Constraints	Local	0.46	0.45	0.06	0.27	0.65	9,282	47.56***
	MNC	0.39	0.39	0.09	0.21	0.71	9,119	
No of employees	Local	50	27	77	1	1,557	9,282	-13.3***
	MNC	86	33	157	1	4,985	9,119	
Labour Productivity	Local	83	39	126	0	1,024	9,282	-39.2***
	MNC	152	86	176	0	1,030	9,119	
Age	Local	9.0	9.3	4.2	0.1	17.0	9,282	5.7***
	MNC	8.6	8.8	4.1	0.1	17.0	9,119	
Tangibility	Local	0.33	0.30	0.24	0.00	1.00	9,282	22.4***
	MNC	0.26	0.17	0.25	0.00	1.00	9,119	

*** denotes significance at 1% level.

Appendix 2. Number of observations per industry

		Agriculture, forestry, and fishing	Mining	Construction	Manufacturing	Wholesale trade	Retail trade	Services	Total
Local	Labour productivity	29	43	49	48	177	57	48	83
	No of obs.	418	29	1,657	2,520	2,450	1,333	875	9,282
	% of obs.	5%	0%	18%	27%	26%	14%	9%	100%
MNC	Labour productivity	99	41	115	78	258	87	89	152
	No of obs.	95	110	429	2,965	3,589	612	1,319	9,119
	% of obs.	1%	1%	5%	33%	39%	7%	14%	100%
Total	Labour productivity	42	41	63	64	225	67	73	117
	No of obs.	513	139	2,086	5,485	6,039	1,945	2,194	18,401
	% of obs.	3%	1%	11%	30%	33%	11%	12%	100%

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Appendix 3. Pairwise correlations between variables

	Labour Productivity	GDP Growth	Adjusted Leverage	Long-term Leverage	Credit Constraints	Tangibility	Size	Age	HHI
Labour Productivty	1.00								
GDP Growth	-0.01**	1.00							
Adjusted Leverage	-0.03***	0.04***	1.00						
Long-term Leverage	-0.09***	0.05***	0.68***	1.00					
Credit Constraints	-0.09***	0.05***	0.07***	0.07***	1.00				
Tangibility	-0.32***	0.01**	0.31***	0.36***	0.09***	1.00			
Size	0.15***	-0.02**	0.06***	0.06***	-0.03***	0.10***	1.00		
Age	-0.06***	-0.09***	-0.10***	-0.05***	0.01	0.09***	0.09***	1.00	
HHI	-0.13***	-0.02**	0.03***	0.04***	0.04***	0.16***	0.15***	0.03***	1.00

*, ** and *** denote significance at 10%, 5%, and 1% level respectively.

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APPENDIX 4

Credit constraints, corporate investments and economic fluctuations: Implications for local versus multinational companies

MARI AVARMAA

Credit constraints, corporate investments and economic fluctuations: Implications for local versus multinational companies

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Abstract

We develop a conceptual framework predicting that companies exposed to high credit constraints are forced to shift some of their investments to periods of economic upturn while relatively unconstrained companies can spread their investments more evenly throughout the economic cycle. We also show that companies experiencing higher credit constraints are more vulnerable to adverse economic fluctuations. Our panel regression analysis on a sample of 65,000 observations of companies from the Baltic countries shows that companies perceiving higher credit constraints tend to invest more during periods of economic growth compared to companies experiencing lower credit constraints. Furthermore, we have identified a difference between the investment behaviour of local companies and the overall less credit constrained multinationals (MNCs) during recessions, when MNCs seem to invest more compared to their local counterparts and appear therefore to be less vulnerable to economic fluctuations. Our results imply that since MNCs are able to spread their investments over the economic cycle, they are in a better position to avoid potential overinvestment. Local companies, on the other hand, might be more susceptible to overinvestment and suffer losses under adverse economic fluctuations.

Keywords: investments, credit constraints, economic fluctuations
JEL Classifications: E22, E32; G31, G32

1.   Introduction

Company viability and sound performance throughout the economic cycle are among the cornerstones of economic development. Efficient investments remain often a key to healthy performance at the company level and determine the productivity of the entire economy. At

the same time, the dynamics in investment spending is considered to be a driving force of economic fluctuations (Freeman and Perez 1988, Harvey 2010). Therefore, factors influencing corporate investments deserved ample attention in finance research.

The interaction between financing frictions and investment decisions is a widely researched matter in contemporary finance. Ever since the seminal paper of Modigliani and Miller (1958) showing that, upon certain conditions, investment and financing choices should be independent, researchers have focused on studying the various factors that cause financing and investment decisions to interact. As a result, financing constraints that are associated with financial market imperfections have emerged as an important subject of research.

Literature on the impact of financing constraints on investment behaviour mainly deals with cash-flow sensitivities of investments as a measure of financing constraints (Fazzari et al. 1988, Kaplan and Zingales 1997, Moyen 2004, Kozhan and Pal 2009 etc). Some models consider investment in tangible assets as means of mitigating financing constraints (Almeida and Campello 2007, Giambona and Schwienbacher 2008 etc). A model presented by Almeida et al. (2011) focuses on the impact of future financing constraints on the choice of investments with different level of liquidity, risk and tangibility.

Credit constraints that represent a specific form of financing constraints have, however, gained limited attention in the context of investment decisions. Eisfeldt and Rampini (2007) show that credit constrained companies are more likely to invest in used assets. Aghion et al. (2010) and Perez (2010) model how credit constraints function as a propagating mechanism in the economy by way of affecting investment choices between long-term and short-term projects.

The main contribution of this paper is to formalise some of the differences in the investment behaviour of companies with varying degrees of credit constraints as a reaction to economic fluctuations. Such a generalised framework has several practical interpretations. For a specific example, our previous empirical study (Avarmaa et al. 2011) shows that multinational companies operating in the Baltic countries are characterised by lower credit constraints compared to the local companies, and therefore the outcomes of the conceptual model could be applied in this context to explain the interrelations between financing and investment decisions as well as the related competitiveness, risk and company survival issues. More importantly, the model may help to explain differences in the investment behaviour of other types of companies that face different financing constraints.

In order to gain empirical support for our propositions, we perform a panel data regression analysis on a sample of 13,723 companies operating in the Baltic countries (Estonia, Latvia and Lithuania) covering the period from 2001 to 2008. We seek to understand whether the investments of local companies tend to be driven by economic fluctuations more than the investments of MNCs.

The article is set up as follows. The next section provides overview of the literature. In Section 3, the conceptual framework is developed. In Section 4, the implications of the conceptual model are discussed. Section 5 presents the empirical evidence and the last section concludes the paper.

2.   Literature Overview

Whether financing frictions influence investment decisions is a widely researched matter in contemporary finance. While Modigliani and Miller (1958) in their seminal paper on capital structure show that upon certain conditions investment and financing choices should be independent, the subsequent literature has brought out various factors that cause financing and investment decisions to interact. The debt overhang concept by Myers (1977) explicates that high leverage can cause companies to underinvest since the benefits of new investments

accrue largely to debt holders instead of equity holders. Another distortion caused by the agency relationship is overinvestment. Namely, managers have a propensity to expand the scale of their company even if it means undertaking poor projects (Jensen 1986). Leverage could be a mechanism for overcoming the overinvestment problem since debt may function as a monitoring device over managers (Jensen and Meckling 1976). Pecking order theory of capital structure introduced by Myers (1984) and Myers and Majluf (1984) is inspired by the informational imperfections phenomenon in a corporate environment. The theory advocates that companies prefer internal funds to external ones, and when external funds are needed, debt would be preferred to equity. These tendencies might set limits to companies' investment decisions.

The existence of financial frictions implies that the investment spending of some companies may be constrained. Financial constraints can be defined as financial obstacles that hinder companies in accessing external funds to finance their investments (Ismail et al. 2010). In other words, financing constraints refer to the inability of companies to finance the desired level of investment that they would have undertaken in a perfect capital market. In perfect capital markets companies would be indifferent between what sources (internal or external) they use to finance their investments (Hashi and Toçi 2010).

Credit constraints can be considered as a specific form of financing constraints, denoting a situation where access to debt is limited. The concept of credit constraints stems from the seminal paper by Stiglitz and Weiss (1981) who develop a model of credit rationing and demonstrate how adverse selection leads to the restraining of loan issuance by banks.

Overall, there are two forms of credit constraints mentioned in finance literature – quantity constraints (see e.g. Giambona and Schweinbacher 2008, Liu and Wang 2010) and cost constraints (refer to e.g. Fazzari et al. 1988, Kaplan and Zingales 1997, Lin and Paravisini 2012). Almeda and Campello (2007) have explained that in the case of quantity constraints, companies cannot raise additional external funds irrespective of how much borrowing costs they would be ready to pay, while in the case of cost constraints, attracting external funds beyond a certain limit entails some deadweight costs in addition to the fair costs of raising funds.

One of the main reasons for credit constraints to occur is asymmetric information. There are various forms of asymmetric information evident in financial markets, such as adverse selection, moral hazard or monitoring costs (Bebczuk 2003). A lender suffers from adverse selection when he is not able to differentiate between projects with different risks when allocating credit. Given two projects with seemingly equal (but actually different) expected value, the lender prefers the safer one and the borrower the riskier option. In this context, those undertaking risky activities with potentially high returns find it convenient to hide the true nature of the project, thereby exploiting the lender's lack of information. Moral hazard represents the borrower's ability to utilise the loan for financing projects different from those agreed with the lender. Monitoring costs occur due to the need to discover a hidden agenda by a borrower, who takes advantage of his superior information to report lower than actual earnings (Bebczuk 2003). Another factor considered to be causing credit constraints is relatively low development of financial markets and institutions (Almeida et al. 2011). It has also been argued that overall cautiousness in the banking system can be a source of credit constraints during recessions (Drehmann et al. 2011). From among the demand-side factors, current or expected financial distress of the borrower could be among the reasons for experiencing credit constraints (Almeida et al. 2011). Empirical evidence (Canton et al. 2010, Brown et al. 2012, Beck et al. 2006) shows that young, small and locally-owned companies tend to be more credit constrained.

There is a variety of literature dealing with the essence and implications of financing constraints. A major strand in the literature (e.g. Fazzari et al. 1988, Kaplan and Zingales

1997, Whited and Wu 2006, Hadlock and Pierce 2010 etc) has looked into methods for identifying and measuring the severity of financing constraints. Various models have been developed to outline the interaction between macroeconomic fluctuations and financing constraints (e.g. Kiyotaki and Moore 1997, Baccetta and Caminal 2000, Levy and Hennessy 2007, Liu et al. 2010, Liu and Wang 2010) and some empirical investigations of the same relationship have been carried out (e.g. Korajczyk and Levy 2003).

A few models have been constructed on the impact of financing constraints on investment behaviour. Some of the models (Almeida and Campello 2007, Giambona and Schwienbacher 2008 among others) concentrate on investment in tangible assets as means of mitigating financing constraints. A recent work by Almeida et al. (2011) focuses on the impact of future financing constraints on the choice between investments with different level of liquidity, risk and tangibility. Our study is most related to this strand of literature.

While the majority of the studies deal with financing constraints in general, there are some papers focusing on the interaction of credit constraints and investments. Eisfeldt and Rampini (2007) show that credit constrained companies are more likely to invest in second hand assets. Aghion et al. (2010) deal with the impact of credit constraints on the cyclical compositon of investment and show how the share of long-term investment turns from countercyclical under complete markets to pro-cyclical under sufficiently tight credit constraints. Perez (2010) demonstrates that the anticipation of credit constraints results in an increase in the share of short-term projects that produces a temporary increase in output at the expense of lower long-run investment and future output, and leads to the dampening of productivity shocks in the short term and propagation of these in the long term.

A related branch in the finance literature deals with determinants of corporate investments. Financing choices are examined among the driving forces of investments in several empirical studies. The impact of leverage on investments has generally been found to be negative whereas the negative relationship is stronger for the firms with lower growth opportunities (Lang et al. 1996, Aivazian et al. 2005, Ahn et al. 2006, Umutlu 2010). The results are explained by the agency theory (Jensen 1986) whereby the tendency of companies (especially the ones with weak growth opportunities) to overinvest is constrained by leverage. There are also some studies carried out using data from emerging markets that have found the impact of leverage on investments to be insignificant (Saquido 2004, Bokpin and Onumah 2009). The only work dealing with the determinants of investment decisions in the Baltic countries is the one by Tuusis et al. (2010) on Estonian companies where the impact of three main categories of factors (risk factors, financing constraints and business confidence) is investigated using the survey methodology. The authors of the latter paper conclude that financing constraints play a considerable role in the investment decisions of Estonian companies.

MNCs are considered to be more flexible in their financing choices than companies in local ownership (Desai et al. 2004, Aggarwal and Kyaw 2008, Avarmaa et al. 2011, Avarmaa 2011). We seek to show in the discussion section and empirical analysis of this paper that this advantage of MNCs makes their investment behaviour less vulnerable to the economic cycles in comparison with local companies.

3.   Model

We develop a two-moment company-level investment model, reflecting the investment behaviour of two companies being exposed to different levels of credit constraints. We assume that credit constraints occur in the form of cost constraints, i.e. the model does not apply to quantity constraints, an (intuitively rather rare) situation where a company is not able to raise funds at whatever cost of financing.

Similarly to Zábojník (2009) and Almeida et al. (2011), among others, we assume that if financing constraints exist, the increasing of external financing would bring along deadweight costs. As Almeida et al. (2011) explain, the deadweight costs might arise from different sources, such as informational asymmetries or poor investor protection. Also, companies that face credit constraints due to the poor development of financial markets or other reasons may be considered financially constrained and carry deadweight costs.

We assume that a company would incur a deadweight costs of $C(D,\theta)$ if it raises debt in the amount of D ($D \geq 0$). The parameter θ ($0 \leq \theta \leq 1$) is the measure of frictions (credit constraints). The higher θ is, the higher the deadweight costs of raising a given amount of D are. This means that $C > 0$ if $D > 0 \wedge \theta > 0$; $C = 0$ if $D = 0 \vee \theta = 0$.

While several other studies divide companies into constrained and unconstrained in terms of access to credit, we allow for various degrees of credit constraints between the two companies. We note that such an assumption covers also the situation where one of the companies is not exposed to credit constraints, i.e. if $\theta = 0$.

We assume that company A experiences lower credit constraints than company B, i.e. $\theta_A < \theta_B$. This is assumed to be the only difference between the two companies in the model, i.e. for simplicity we regard credit constraints as exogenous and we model the reactions to credit constraints in this model.

Assumed there is an investment project with a cost of I ($I \geq 0$) that both companies consider to undertake, i.e. if undertaken by both, $I_A = I_B$, and if it is not economically justified to make the investment right away, the company would consider it again at any later moment of time. Similarly to Kiyotaki and Moore (1997), we assume that the investment is a lump sum payment. For the sake of simplicity, we consider only one investment and leave aside any other projects that might become available for the companies.

Net present value of the investment related cash flows is assumed to equal $NPV = aV - I - C$. V (to exclude obviously unattractive investments, assume $V \geq 0$) represents the net present value of all cash flows related to the project (incorporating any costs of borrowing), excluding (a) the initial investment I, (b) deadweight costs C, and (c) any changes in expectations about V due to cyclical changes (cf. a). The coefficient a depends on the state of the economy: $a = 1$ in the case of a stable state, $a > 1$ in the case of an upturn (i.e. a growth compared to the steady state) and $a < 1$ in the case of a downturn (i.e. a contraction compared to the steady state).

The investment project is assumed to be undertaken if $NPV > 0$, i.e. if the expected net present value of cash inflows exceeds the initial investment net of any deadweight costs.

Assuming that there are no internal resources available, both of the companies would need to raise external financing for the project. Similarly to Giambona and Schweinbacher (2008), we assume that the companies prefer debt financing to additional equity financing due to the relatively higher issuance costs of equity in relation to informational asymmetries. Therefore, $D = I + C$.

We consider two moments of time $t = 0$ and $t = 1$, and a period between these two moments.

3.1. Model 1: Upturn

First, for Model 1, we assume that there has been a positive shock (upturn) in the economy in the period between moments 0 and 1.

Credit constraints are believed to vary along with the phase of the business cycle and to be countercyclical (Eisfeldt and Rampini, 2006). An increase in asset prices during an upturn (boom) is considered to ease the constraints and thus help to expand production and investment, while drops in equity value during a downturn (recession) reduce the availability of credit (Liu and Wang, 2010). We therefore assume that credit constraints are relieved

during economic upturns and get tighter during a downturn. In period 1, due to an upturn, θ would drop unless there are no constraints already in the initial moment, i.e. if $\theta_0 > 0$ then $\theta_{A0} > \theta_{A1}$ and $\theta_{B0} > \theta_{B1}$.

Proposition 1: *Companies' different exposure to credit constraints leads to companies having different breakeven levels of projects with otherwise similar returns.*
Proof:
$\theta_A < \theta_B \rightarrow C_A < C_B \rightarrow aV_t - C_A - I_t > aV_t - C_B - I_t \rightarrow NPV_A > NPV_B$

This means that if at moment 0 the investment related expected present value of net cash inflows, net of any deadweight costs, exceeds the initial investment, i.e. $aV_0 - C_A > I_0$, company A would be able to make the above investment. However, starting from a certain point where $aV_0 - C_B = I_0$ or less, B could not make the investment in period 0, since the net cash inflows from the project, net of deadweight costs, would not be high enough to cover the investment due to the credit constraints.

Evidently, the higher the credit constraints, the more discriminating the effect.

Proposition 2: *A company that experiences credit constraints needs to postpone certain investments from the current period to an upturn (i.e. a "boomier") period.*
Proof:
If $\theta_0 = \theta_1 = 0 \rightarrow C_0 = C_1 = 0$
If $\theta_0 > \theta_1 \rightarrow C_0 > C_1 \rightarrow aV_0 - C_0 < aV_1 - C_1 \rightarrow NPV_0 < NPV_1$

We can easily see that in case $\theta_0 = 0$, any difference between NPV_0 and NPV_1 is not driven by credit constraints (but may be caused by the effects that cyclical changes have on expectations regarding future cash flows, i.e. coefficient a; please refer to Proposition 3). However, if $\theta_0 > \theta_1$, the relaxation of credit constraints would have a positive impact on NPV and might thus lead to the postponement of certain investments to a period of upturn in order to achieve sufficient returns.

It is important to note that the higher the credit constraints are, the stronger the effect described in Proposition 2.

3.2. Model 2: Downturn

For Model 2, we assume that between moments 0 and 1 there is an unexpected downturn in the economy. For the avoidance of doubt, the state of the economy at moment 0 could be whatever, i.e. a moment after a boom or a stable period or even a downturn. What matters, is that there is an unexpected worsening in the state of the economy in the period between moments 0 and 1. We also assume that both company A and company B are able to make investment I at moment 0, or in other words $NPV_{A0} > 0$ and $NPV_{B0} > 0$.

As there is a downturn, coefficient a drops for both companies, and NPV goes down for both since $a_1 < a_0$.

Proposition 3: *A company experiencing credit constraints is more exposed to generating losses during a downturn.*
Proof:
If $\theta = 0 \rightarrow C = 0 \rightarrow NPV_0 = a_0V - I; NPV_1 = a_1V - I$
If $\theta > 0 \rightarrow C > 0 \rightarrow NPV_0 = a_0V - I - C; NPV_1 = a_1V - I - C$
Since $a_1 < a_0 \rightarrow a_1V - I - C < a_0V - I - C$; $a_1V - I < a_0V - I$
$a_1V - I - C < a_1V - I$

If both A and B experience some degree of credit constraints, the consequences of declining a are less severe for company A since $\theta_A < \theta_B$ and the deadweight costs are not as high. If the difference between θ_A and θ_B is sufficiently high, there exists a point starting from

where the project becomes value destroying for company B while company A is still able to cover the initial cost of the project. In this case, in the light of the subsequent economic downturn, company B has overinvested at moment 0.

Propostion 4: *The higher the credit constraints, the stronger the effect described in Proposition 3.*
Proof:
If $(1 - a_1/a_0)V > \text{NPV}_0$ then $NPV_1 < 0$.
If $\theta_A < \theta_B \rightarrow C_A < C_B$, and for $V_{A0} = V_{B0}$, $NPV_{A0} > NPV_{B0}$.

Since $NPV_{A0} > NPV_{B0}$, it requires a less dramatic drop in coefficient a for company B to face the situation where $NPV_1 < 0$.

4. Discussion of the Model

The model presented in the previous section can be applied to various real-life situations where different types of companies experience varying degrees of credit constraints. As mentioned in Section 2, small, young and local companies have been found to be confronted with higher credit constraints.

We discuss the implications of the conceptual framework on the example of local versus multinational companies. A recent work by Avarmaa et al. (2011) has demonstrated based on data from Business Environment and Enterprise Performance Survey (BEEPS), gathered jointly by EBRD and the World Bank, that the average level of credit constraints perceived by locally-owned companies in the Baltic countries during 2000-2008 was 18% higher compared to subsidiaries of MNCs.[1] Beck et al. (2006) have demonstrated based on survey data of the World Business Environment Survey from 1999, covering 80 countries, that financing constraints are lower for foreign-owned companies compared to local ones. It is important to note that the evidence presented pertains to perceived constraints as opposed to objective constraints. Beck et al. (2002) have argued that perceived financing constraints are generally higher for those companies that have a high demand for external financing either due to growth opportunities or a lack of internal financial resources. High perceived credit constraints may therefore show that companies are active in the credit market and see opportunities for expansion which are difficult to be financed.

Propositions 1 and 2 of the model in Section 3 demonstrate that due to their higher credit constraints, local companies operating in the Baltic countries might be forced to shift investments to the boom period while MNCs might be more flexible in choosing the timing of investments. Ultimately, such a procyclical investment behaviour of local companies might lead to the propagation of economic fluctuations on a broader scale.

It has been brought out in previous literature that companies tend to invest in riskier projects during a boom while being less prone to undertake risky projects during downturns (Bonfirm 2009, Veirman and Levin 2011, Nanda and Rhodes-Kropf 2011). This tendency can be well interpreted in the context of our model. As company B is forced to postpone its investments to the "boomier" period, it is likely that it would prefer a riskier investment than the one that it would have made during the less "boomy" period. This implies that local companies might be taking more risks than the less credit constrained MNCs, and thus be more vulnerable to the adverse events in the economy.

Propositions 3 and 4 show that since the more credit constrained local companies tend to concentrate their investments to the upturn period, there might be an inclination to

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[1]*We differentiate between financing constraints and credit constraints. While financing constraints refer to obstacles in attracting financing of any kind (i.e. both additional equity and loans), credit constraints refer to the specific obstacles in obtaining additional loans.*

overinvest because the investment decisions could be influenced by the positive economic state and might turn out to be unprofitable under deteriorating economic conditions. This could cause a waste of scarce (capital) resources in the economy.

Based on our modelling framework, it appears that MNCs might have considerable advantages over local companies stemming from their easier access to financing. In summary, MNCs seem to be less prone to potential overinvestment and accomplishment of excessively risky projects under the positive sentiment during boom periods, while the potential inclination of local companies to do the opposite might be among the factors propagating economic fluctuations.

5. Empirical Evidence

We investigate whether the potentially different investment behaviour of local companies and MNCs over the economic cycle, as discussed from the theoretical perspective in the previous chapter, finds empirical support based on data from the Baltic countries. We build a fixed effects regression model where the dependent variable is investment growth. We seek to observe how GDP growth combined with credit constraints impacts the investment growth of local companies and MNCs. We model investment growth of an i-th company at time t as follows:

$$
\begin{aligned}
INV_{it} = {} & \beta_1 GDP\_UP_{it} + \beta_2 GDP\_DOWN_{it} + \beta_3 GDP\_UP \times CRED_{it} + \beta_4 GDP\_DOWN \times CRED_{it} + \\
& \beta_5 GDP\_UP \times CRED \times MNC_{it} + \beta_6 GDP\_DOWN \times CRED \times MNC_{it} + \beta_7 LEV_{i(t-1)} + \beta_8 LEV^2_{i(t-1)} + \\
& \beta_9 LEV \times MNC_{i(t-1)} + \beta_{10} LEV^2 \times MNC_{i(t-1)} + \beta_{11} CRED_{it} + \beta_{12} CRED \times MNC_{it} + \beta_{13} AGE_{it} + \beta_{14} AGE^2_{it} \\
& + \beta_{15} AGE \times MNC_{it} + \beta_{16} AGE^2 \times MNC_{it} + \beta_{17} SIZE_{i(t-1)} + \beta_{18} SIZE \times MNC_{i(t-1)} + \beta_{19} PROF_{i(t-1)} + \\
& \beta_{20} PROF \times MNC_{i(t-1)} + \beta_{21} TANG_{i(t-1)} + \beta_{22} TANG \times MNC_{i(t-1)} + \beta_{23} HHI_{i(t-1)} + \beta_{24} HHI \times MNC_{i(t-1)} + \alpha_i \\
& + u_{it}
\end{aligned}
\tag{1}
$$

where α denotes company-level fixed effects. The variables are defined in Table 1 and explained in the text below.

Table 1: Description of Variables

Variable	Abbr.	Measurement
Investment growth	INV	[Real tangible fixed assets(t) - Real tangible fixed assets (t-1)]/ Real tangible fixed assets (t-1)
Positive GDP growth	GDP_UP	Real GDP growth if positive, zero otherwise
Negative GDP growth	GDP_DOWN	Real GDP growth if negative, zero otherwise
Leverage	LEV	(Short-term debt + Long-term liabilities)/(Total assets-Current liabilities + Short-term debt)
Credit constraints	CRED	Industry level value of financing constraints from BEEPS, normalised [0;1]
Size	SIZE	Log of real assets
Age	AGE	No of years from incorporation
Herfindahl index	HHI	Squared sum of market shares of sales of all firms in the industry
Profitability	PROF	EBIT/Sales
Tangibility	TANG	Tangible fixed assets/Total assets
Multinationality	MNC	1 if more than 50% owned by a foreign company, otherwise 0

Since data on gross investments is not available for our dataset, we calculate investment growth (*INV*) as the growth of net tangible fixed assets, similarly to Lang et al. 1996 and Saquido 2004. Real values of tangible fixed assets have been used in order to correct for the impact of inflation.

Our aim is to observe the simultaneous impact that economic cycles and credit constraints have on the investment growth of local companies and MNCs operating in the Baltic countries. For that purpose, we have included interactions between GDP growth (*GDP_UP*) or GDP decline (*GDP_DOWN*) and credit constraints (*CRED*) in the regression model. *GDP_UP* equals to the real GDP growth rate if real GDP growth is positive and to zero otherwise, while *GDP_DOWN* equals to the real GDP growth if the growth rate is negative and to zero otherwise. Sectoral data of real GDP growth have been used. In order to observe any differences in the behaviour of MNCs compared to local companies, interaction terms between all independent variables and the dummy variable for MNCs (*MNC*) are included in the regression model.

Due to the existence of financial frictions, net cash flow is considered to be one of the determinants of investment growth. Pecking order theory predicts that investments should be positively related to internal funds available. This idea has gained wide empirical support (Fazzari et al. 1988, Lang et al 1996, Saquido 2004, Aivazian et al. 2005). In contrast, Bokpin and Onumah (2009) have found company cash flow as well as profitability to have a negative relationship with corporate investment in emerging economies. Welch and Wessels (2000) have found profitability to have a positive influence on investments in the US and Japan but not in other regions. Since information on cash flows is not available for our data set, we have used lagged profitability (*PROF*) as a proxy for internal funds available for investments.

It has been argued that bigger companies tend to make relatively less investments. Bokpin and Onumah (2009) have found company size to have a negative relationship with investments. Similarly to Welch and Wessels (2000) we measure company size (*SIZE*) with one year lagged total assets.

Due to the existence of financial frictions, financing choices are considered to affect investment behaviour (see Section 2). We have therefore included leverage (*LEV*) as one of the control variables. In line with the agency theory the relationship between leverage and investments has generally been found to be negative (Lang et al. 1996, Aivazian et al. 2005).

We have included tangibility (*TANG*) as one of the control variables to describe the composition of assets that generally tends to vary in terms of industry. It has been argued that high tangibility might put limits to additional investments (Saquido 2004). Since competition is believed to impact companies' willingness to make investments (Crotty and Goldstein 1992, Schmutzler 2008), we use the Herfindahl-Hirschman index (*HHI*) measuring industry concentration to control for the influence of competition. The existing literature is inconclusive regarding the direction of that impact.

We employ a fixed effects regression model since it helps to control for unobserved heterogeneity between the companies that is constant over time and correlated with independent variables. The Hausman test showed that a fixed effects model was to be preferred to a random effects model. Robust standard errors have been employed, which control for the bias in the presence of heteroskedasticity and for the within-cluster serial correlation.

We have obtained financial and ownership information of companies operating in the Baltic countries from the Amadeus database compiled by Bureau van Dijk. The sample consists of 65,000 company-year observations covering the period from 2001 to 2008. 14% of the observations belong to MNCs and 86% to local companies. For every company, data are included in the sample for the years for which financial information was available at a sufficient level of detail and all components of assets and liabilities were non-negative.

Companies operating in the financial and public utilities sector were excluded from the sample since industry-specific regulations might impact investment behaviour in these sectors. Observations with investment growth above 280% were eliminated in order to minimise the impact of outliers on the regression results.[2] For the same reason, we have counted the age of companies established before 1991 as starting from year 1991. At that time the Baltic countries regained their independence and the regulatory frameworks for operating a company were fundamentally changed.

Table 2: Descriptive Statistics (monetary values in thousands of Euros)

		Mean	Median	Sd	Min	Max	No of obs.	Wilcoxon rank-sum test (z)
Total Assets	Local	1,810	600	8,901	0	891,935	56,053	-60.67***
	MNC	5,493	1,730	12,784	1	257,620	8,960	
Equity	Local	826	230	5,536	0	560,969	56,053	-47.58***
	MNC	2,432	575	6,835	0	119,689	8,960	
Long-term Debt	Local	260	15	1,657	0	180,321	56,053	12.17***
	MNC	702	1	3,555	0	83,143	8,960	
Short-term Debt	Local	186	19	857	0	59,461	56,053	5.86***
	MNC	493	7	1,963	0	75,434	8,960	
Sales	Local	3,105	1,116	12,242	0	1,278,404	56,053	-62.36***
	MNC	10,139	3,148	26,948	2	578,506	8,960	
Net Profit	Local	154	39	1,674	-28,000	354,656	56,053	-28.40***
	MNC	397	97	1,653	-13,161	36,561	8,960	
Leverage	Local	0.32	0.27	0.28	0.00	1.00	56,053	14.14***
	MNC	0.29	0.18	0.31	0.00	1.00	8,960	
HHI	Local	0.05	0.02	0.07	0.01	1.00	56,053	5.70***
	MNC	0.05	0.02	0.08	0.01	1.00	8,960	
Age	Local	9.4	9.8	3.9	1.0	17.0	56,053	8.71***
	MNC	9.1	9.2	3.8	1.1	17.0	8,960	
Tangibility	Local	0.33	0.29	0.24	0.00	1.00	56,053	28.09***
	MNC	0.27	0.18	0.25	0.00	1.00	8,960	
Investment Growth	Local	0.17	0.00	0.59	-1.00	2.80	56,053	15.64***
	MNC	0.09	-0.05	0.54	-1.00	2.79	8,960	
GDP Growth	Local	0.09	0.11	0.07	-0.11	0.67	56,053	7.65***
	MNC	0.09	0.11	0.07	-0.11	0.67	8,960	
Credit Constraints	Local	0.46	0.45	0.06	0.27	0.65	56,053	63.56***
	MNC	0.39	0.39	0.08	0.21	0.71	8,960	

Note: Monetary values are expressed in real terms, using industry-level price-index deflators obtained from Eurostat.

The data for credit constraints have been obtained from the BEEPS. The indicator has been composed by using the BEEPS 2002, 2005 and 2009 data on access to finance. The survey provides companies' estimates regarding their ability to access finance in their country of operation on a 4-point-scale, ranging from "No obstacle" to "Very Severe Obstacle". The variable has been normalised, taking values between 0 and 1. The missing observations for the years 2003-2004 and 2006-2007 have been derived using the cubic spline interpolation technique. The observations for the year 2001 have been linearly extrapolated. The indicator allows for variance across industries and over time.

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[2] As the distribution of investment growth is skewed to the right, there was no need to eliminate outliers from the left side of the distribution.

Descriptive statistics (Table 2) reveal that MNCs are considerably bigger than local companies in terms of sales and total assets and have experienced lower credit constraints. The average rate of investment growth of local companies has been almost twice as high compared to the MNCs. This could be explained by the relatively smaller size of local companies while there are more opportunities for enlargement of smaller size operations. Another possible explanation is that MNCs might be involved in functions that require less tangible investments. The difference also suggests that local companies might be overinvesting. Additional statistics are available in Appendix 1 and 2.

The regression analysis provides empirical support for our predictions (see regression results in Table 3). The level of perceived credit constraints seems to impact companies' investment behaviour in different phases of the economic cycle. Economic growth combined with credit constraints has had a significant positive impact on the investment growth of both MNCs and local companies operating in the Baltic countries. Companies perceiving higher credit constraints appear to invest more during periods of economic growth compared to the companies experiencing lower credit constraints. We also found that the investment behaviour of local companies and MNCs reacts differently to the (simultaneous) impact of economic cycles and credit constraints. The difference between local companies and MNCs appear mainly during recessions, when MNCs seem to invest relatively more compared to local companies. Thus, MNCs appear to be less susceptible to economic fluctuations from this perspective.

Our results also imply that MNCs are better able to spread their investments over the economic cycle and therefore perhaps avoid the risks involved in concentrating their investments on the boom period. As mentioned in Section 3, companies tend to invest in riskier projects during boom periods and are less prone to undertake risky projects during downturns. Thus, local companies might be inclined to invest into projects that eventually turn out to be value-destroying.

Concerning control variables, leverage and size appear to have a negative impact on investment growth of both local companies and MNCs, as expected. In accordance with our predictions, the impact of tangibility is also negative, indicating that companies that have already achieved a high proportion of fixed assets tend to invest less. The effect of the Herfindahl-Hirschman index appears to be positive, meaning that high industry concentration tends to support investment growth.

Table 3: Regression Results

Investment Growth	Coef.	Std. Err.	t	P>|t|
GDP Growth	-0.33	0.40	-0.84	0.403
GDP Decline	1.53	0.98	1.56	0.118
GDP Growth × Credit Constraints	1.48	0.85	1.74	0.082
GDP Decline × Credit Constraints	-1.62	2.19	-0.74	0.459
GDP Growth × Credit Constraints × MNC	0.59	0.40	1.47	0.141
GDP Decline × Credit Constraints × MNC	-3.57	0.80	-4.46	0
Age	-0.02	0.01	-2.87	0.004
Age × MNC	-0.03	0.01	-2.12	0.034
Age^2	0.00	0.00	3.03	0.002
Age^2× MNC	0.00	0.00	1.28	0.2
Leverage	-0.02	0.01	-2.04	0.042
Leverage × MNC	0.01	0.02	0.62	0.534
$Leverage^2$	0.00	0.00	-2.61	0.009
$Leverage^2$ × MNC	0.00	0.00	2.32	0.021
Credit Constraints	-0.19	0.10	-1.97	0.049
Credit Constraints × MNC	-0.19	0.12	-1.59	0.111
HHI	0.19	0.08	2.3	0.021
HHI × MNC	-0.05	0.19	-0.28	0.776
Tangibility	-1.33	0.03	-43.89	0
Tangibility × MNC	0.11	0.08	1.44	0.149
Size	-0.17	0.01	-21.44	0
Size × MNC	0.01	0.01	0.89	0.374
Profitability	0.00	0.00	1.1	0.272
Profitability × MNC	-0.01	0.00	-1.78	0.074
Constant	1.87	0.06	28.8	0
R^2				0.17
Company fixed effects				Yes

Note: Robust standard errors calculated to control for heteroskedasticity and the within-cluster serial correlation.

6. Conclusions

We develop a conceptual framework predicting that companies exposed to high credit constraints are forced to shift their investments into periods of economic boom while relatively unconstrained companies can spread their investments more evenly throughout the economic cycle. We also show that companies facing higher credit constraints are more vulnerable to the adverse cyclical effects in the economy.

The empirical part of the paper, aiming to substantiate the theoretical propositions, is based on a sample of companies from Estonia, Latvia and Lithuania. Since local companies operating in the Baltic countries have experienced higher credit constraints during 2001-2008 compared to the MNCs, the predictions can be applied to these two differently credit constrained types of companies.

With our regression analysis exercise we found empirical support to the predictions of our conceptual model. Namely, we find that companies perceiving higher credit constraints tend to invest more during periods of economic growth compared to the companies experiencing lower credit constraints.

We also find that investment behaviour of local companies and MNCs reacts differently to the (simultaneous) impact of economic cycles and credit constraints. The difference between local companies and MNCs becomes obvious mainly during recessions, when MNCs seem to invest relatively more compared to local companies. As a consequence, MNCs appear to be less vulnerable to economic fluctuations in this respect. Being more flexible in attracting financing for their investments, MNCs seem to possess a competitive advantage over local companies.

Our results imply that since MNCs are able to spread their investments over the economic cycle, they are in a better position to mitigate risks related to excessive investments during economic booms. Local companies, on the other hand, might be more susceptible to overinvestment and suffer from the resulting losses under adverse economic events.

Due to the potential harm of credit constraints on the real sector, it would be necessary to find measures for alleviating these impacts. We suggest that supporting easier access for local companies (as well as of any other types of otherwise sustainable companies experiencing high credit constraints) to the sources of credit, especially during economic downturns, would help to reduce the vulnerability of the whole economy to fluctuations and warrant a more efficient use of resources.

Since the results of the paper provide evidence on the smoother behaviour of MNCs over the economic cycles, it is worth studying the impact of foreign direct investments on the economic fluctuations in the future.

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Appendix 1: Pairwise Correlations between Variables

	Investment growth	Leverage	GDP Growth	Credit Constraints	Profitability	Total Assets	Age	HHI	Tangibility
Investment growth	1								
Leverage	0.10***	1							
GDP Growth	0.08***	0.01**	1						
Credit Constraints	0.00	0.03***	-0.02***	1					
Profitability	0.06***	-0.11***	0.04***	-0.001	1				
Total Assets	-0.01***	0.04***	-0.02***	-0.03***	-0.003	1			
Age	-0.09***	-0.08***	-0.09***	0.01**	0.01***	0.06***	1		
HHI	-0.01**	0.02***	-0.04***	0.06***	-0.001	0.12***	0.04***	1	
Tangibility	0.14***	0.29***	-0.06***	0.07***	0.01**	0.03***	0.10***	0.14***	1

Note: *** denotes significance at 1% level and **significance at 5% level.

Appendix 2: Number of Observations by Industry

		Industry							
		A	B	C	D	F	G	I	Total
Local	Investment Growth	24.8%	23.0%	19.1%	18.1%	17.6%	15.1%	11.2%	17.4%
	No of Observations	2,307	268	9,975	15,226	14,995	7,908	5,374	56,053
	% of Observations	4.1%	0.5%	17.8%	27.2%	26.8%	14.1%	9.6%	100.0%
MNC	Investment Growth	18.3%	14.3%	4.4%	10.4%	7.8%	8.5%	6.1%	8.5%
	No of Observations	100	109	398	2,908	3,528	660	1,257	8,960
	% of Observations	1.1%	1.2%	4.4%	32.5%	39.4%	7.4%	14.0%	100.0%
Total	Investment Growth	24.5%	20.5%	18.6%	16.9%	15.8%	14.5%	10.2%	16.1%
	No of Observations	2,407	377	10,373	18,134	18,523	8,568	6,631	65,013
	% of Observations	3.7%	0.6%	16.0%	27.9%	28.5%	13.2%	10.2%	100.0%

Note: A. Agriculture, forestry, and fishing; B. Mining; C. Construction; D. Manufacturing; F. Wholesale trade; G. Retail trade; I. Services.

APPENDIX 5. ELULOOKIRJELDUS

1.   Isikuandmed

Ees- ja perekonnanimi: Mari Avarmaa
Sünniaeg ja –koht: 23.08.1972, Tartu maakond, Lemmatsi
Kodakondsus: Eesti

2.   Kontaktandmed

Aadress: Tallinna Tehnikaülikool, Akadeemia tee 3, Tallinn 12618
Telefon: +372 6204 057
E-posti aadress: mari.avarmaa@nordea.com

3.   Hariduskäik

Õppeasutus	Lõpetamise aeg	Haridus (eriala/kraad)
Tallinna Tehnikaülikool	(2012)	Finantsökonoomika/ doktorikraad
Bentley Kolledž	1996	Juhtimine/ magistrikraad, kõrgeima kiitusega
Tartu Ülikool	1994	Välismajandus/ bakalaureusekraad, *cum laude*

4.   Keelteoskus

Keel	Tase
Eesti keel	emakeel
Inglise keel	kõrgtase
Vene keel	kesktase
Saksa keel	algtase

5.   Täiendusõpe

Õppimise aeg	Täiendusõppe läbiviija nimetus
Juuni 2007	Helsinki School of Economics, doktorikooli suvekursus "Empiiriline ettevõtte rahandus"

6.   Teenistuskäik

Töötamise aeg	Tööandja nimetus	Ametikoht
2006- praeguseni	Nordea Pank Eesti	finantsjuht
2005-2006	Tele2 Eesti	finantsanalüüsi ja -arvestuse juht
2005-2006	Tallinna Tehnikaülikool	lektor
1997-2005	Tele2 Eesti	finantsanalüütik
1998-2004	Estonian Business School	lektor
1996-1997	P&P Consultancy	konsultant

7.   Teadustegevus

Ettevõtete jätkusuutlikkus majandustsükliliste tegurite ja seadusandlike regulatsioonide mõju tingimustes (Eesti Teadusfond, grant ETF 8796; 01.01.2011-31.12.2013), põhitäitja

8.   Kaitstud lõputööd

Loit Linnupõld, Silva Rajas, magistrikraad, 2003, (juh) Mari Avarmaa, Eraisiku rahandus. Käsiraamat, Estonian Business School
Helen Linnupõld, magistrikraad, 2004, (juh) Mari Avarmaa, Erasektori võimalused EAS partnerluse rakendamisel infrastruktuurivaldkonnas, Estonian Business School
Elrike Kumar, magistrikraad, 2005 (juh) Mari Avarmaa, Eraisikute krediteerimine. Õppematerjal, Estonian Business School
Janar Tammjärv, magistrikraad, 2006 (juh) Mari Avarmaa, Kapitali hinna määramine Eesti puidutööstussektoris, Estonian Business School
Jaana Poltimäe magistrikraad (teaduskraad), 2006 (juh) Mari Avarmaa, Kapitali struktuuri mõjutegurid Eesti ettevõtetes, Tallinna Tehnikaülikool, Rahanduse ja Panganduse Õppetool

9.   Teadustöö põhisuunad

Ettevõtte kapitali struktuur, ettevõtte investeeringud, rahvusvaheliste ettevõtete finantsjuhtimine

10.   Teised uurimusprojektid

Majandussüsteemi fluktuatsioonid Kesk- ja Ida-Euroopas: Põhjused, tagajärjed ja väljakutsed (Sihtfinantseerimine, SF0140059s12, 01.01.2012 - 31.12.2014), täitja

APPENDIX 6. CURRICULUM VITAE

1. Personal data

Name: Mari Avarmaa
Date and place of birth: 23.08.1972, Estonia

2. Contact information

Address: Tallinn University of Technology, Akadeemia tee 3, Tallinn 12618
Phone: +372 6204 057
E-mail: mari.avarmaa@nordea.com

3. Education

Educational institution	Graduation year	Education (field of study/degree)
Tallinn University of Technology	(2012)	Financial Economics (PhD)
Bentley College	1996	Management (MBA), highest honours
Tartu University	1994	International Economics (BSc), *cum laude*

4. Language competence/skills

Language	Level
Estonian	mother tongue
English	fluent
Russian	average
German	basic skills

5. Special Courses

Period	Educational or other organisation
June 2007	Helsinki School of Economics Doctoral School; summer course on Empirical Corporate Finance

6. Professional Employment

Period	Organisation	Position
2006- present	Nordea Bank Estonia	CFO
2005-2006	Tele2 Estonia	Financial Manager
2005-2006	Tallinn University of Technology	Lecturer
1997-2005	Tele2 Estonia	Financial Analyst
1998-2004	Estonian Business School	Lecturer
1996-1997	P&P Consultancy	Consultant

7. Scientific work

Companies' Viability under Economic Fluctuations and Statutory Regulations (Estonian Science Foundation, grant no ETF 8796; 01.01.2011-31.12.2013), team member

8. Defended theses

Loit Linnupõld, Silva Rajas, MBA, 2003, (sup) Mari Avarmaa, Personal Finance. Handbook, Estonian Business School
Helen Linnupõld, MBA, 2004, (sup) Mari Avarmaa, PPP in Infrastructure Projects – Private Sector Opportunities, Estonian Business School
Elrike Kumar, MBA, 2005 (sup) Mari Avarmaa, Financing Private Individuals. Textbook, Estonian Business School
Janar Tammjärv, MBA, 2006 (sup) Mari Avarmaa, Cost of Capital in Estonian Woodworking Sector, Estonian Business School
Jaana Poltimäe, MSc, 2006 (sup) Mari Avarmaa, Determinants of Capital Structure in Estonian Companies, Tallinn University of Technology, Chair of Finance and Banking

9. Main areas of scientific work/Current research topics

Capital structure, capital budgeting, MNC financial management

10. Other research projects

Economic Fluctuations in Central and Eastern Europe: Causes, Consequences and Challenges (Estonian Targeted Financing, SF0140059s12, 01.01.2012 - 31.12.2014), team member

ABSTRACT

The doctoral thesis concentrates on studying determinants of capital structure as well as investigating the impact of capital structure and credit constraints on various aspects of company performance, such as company growth, productivity and investments. The focus of the thesis is on highlighting differences between local companies and subsidiaries of multinational companies (MNCs) operating in the Baltic countries. In addition, a conceptual framework describing the impact of credit constraints on companies' investment behaviour under various economic states is built and tested empirically. The doctoral thesis is based on four publications in international academic journals.

Empirical analysis of the thesis is performed on companies operating in Estonia, Latvia and Lithuania during the period of 2000-2008. Data on financial statements and ownership from the Amadeus database compiled by Bureau van Dijk are used. The data for credit constraints were obtained from the Business Environment and Enterprise Performance Survey conducted jointly by EBRD and the World Bank.

Like in the majority of empirical studies on a similar subject, panel data regression is used for empirical analysis presented in the thesis in order to investigate the determinants of leverage and analyse the impact of company financing on company investments, productivity and growth. Fixed effects regression is applied for estimating all the models due to the nature of the panel data and goals of the thesis. Depending on the model, the empirical studies are based on 18,000 to 87,000 company-year observations.

The results of the regression analysis on the determinants of capital structure indicate that the impact of credit constraints on company leverage is positive in the case of local companies while the influence is slightly negative in the case of MNCs. This difference implies that MNCs have had more flexibility in attracting external financing as well as in using internal financing compared to local companies operating in the Baltic countries. Local companies are therefore likely to be more vulnerable to adverse cyclical effects.

The empirical analysis presented in the thesis provides insight into the impact of financing choices on company performance. The results on the impact of leverage on productivity indicate that additional leverage might bring along some improvements in labour productivity for many local companies. The thesis provides similar evidence on the impact of leverage on company growth. The results of the analysis show that the increase of leverage tends to bring additional growth for local companies at low levels of leverage while high leverage does not enable the achievement of additional growth. MNCs seem to be able to improve productivity and finance their growth without excess lending, potentially due to the support of their corporate group and better access to capital markets. Due to the positive impact of leverage, it would be necessary to encourage local companies to use borrowing at reasonable levels.

The empirical results of the thesis indicate that despite the potential advantages of leverage, it is essential for companies to pay attention to the measures for avoiding excess borrowing as this appears to hinder productivity. Companies' unawareness of the critical level at which additional leverage starts to generate non-productive or non-sustainable growth may also be a key in understanding why some companies perform in a pro-cyclical way, propagating economic booms and bubbles.

The results of the thesis also imply that since MNCs are able to spread their investments over the economic cycle, they are in a better position to mitigate risks related to excessive investments during economic booms. Local companies, on the other hand, might be more susceptible to overinvestment and suffer from the resulting losses under adverse economic events. Due to the potential harm of credit constraints on the real sector, it would be necessary to find measures for alleviating these impacts. We suggest that supporting easier access for local companies (as well as for any other types of otherwise sustainable companies experiencing high credit constraints) to the sources of credit, especially during economic downturns, would help to reduce the vulnerability of the whole economy to fluctuations, and warrant a more efficient use of resources.

KOKKUVÕTE

Käesolevas doktoritöös uuritakse Baltimaades tegutsevate ettevõtete empiiriliste andmete põhjal kapitali struktuuri mõjutavaid tegureid ning finantseerimise mõju ettevõtte kasvule, tootlikkusele ning investeeringutele. Töö rõhuasetus on erinevuste leidmisel kohalike ja rahvusvaheliste ettevõtete käitumises. Samuti esitatakse töös kontseptuaalne raamistik kirjeldamaks krediidipiirangute mõju ettevõtte investeerimiskäitumisele erinevates majandussituatsioonides ning testitakse empiiriliselt esitatud kontseptuaalsete väidete paikapidavust. Töö põhineb neljal teadusartiklil.

Töös sisalduv empiiriline analüüs on tehtud Eestis, Lätis ning Leedus tegutsevate ettevõtete põhjal ning käsitleb perioodi 2000-2008. Ettevõtete finantsandmed ning info omanike kohta on kogutud Euroopas tegutsevate ettevõtete andmeid koondavast Amadeus andmebaasist. Krediidipiiranguid puudutavad andmed pärinevad Maailmapanga ning EBRD poolt koostatavast ettevõtete küsitlusest.

Sarnaselt enamusele antud valdkonnas koostatud uurimustele kasutatakse uurimismeetodina paneelandmete regressioonianalüüsi. Kõigis mudelites on kasutatud fikseeritud efektidega regressiooni, mis võimaldab kontrollida ettevõttespetsiifilisi ajas püsivaid erinevusi. Valimi suurus on sõltuvalt hinnatavast mudelist 18 000 kuni 87 000 vaatlust.

Kapitali struktuuri mõjutegurite uurimisel selgub, et krediidipiirangute mõju kohalikele ettevõtete finantsvõimendusele on positiivne, samas kui mõju rahvusvaheliste ettevõtete finantsvõimendusele praktiliselt puudub. See erinevus annab tunnistust rahvusvaheliste ettevõtete suuremast paindlikkusest finantsvahendite kaasamisel ning viitab sellele, et kohalikud ettevõtted võivad olla tundlikumad tsükliliste muutuste suhtes.

Empiiriline analüüs toob välja ka finantseerimise mõju ettevõtte tegevuse erinevatele aspektidele. Uurides finantseerimise mõju ettevõtte tootlikkusele, selgub, et täiendav finantsvõimendus toob kohalikele ettevõtetele kaasa kõrgema tootlikkuse juhul, kui finantsvõimendust kasutatakse mõõdukalt. Sarnane on järeldus ka finantsvõimenduse mõjust ettevõtte kasvule. Ilmneb, et rahvusvahelised ettevõtted suudavad käibe kasvu ja tootlikkuse tõusu samas saavutada ilma finantsvõimendust suurendamata, kuivõrd nad saavad arvatavasti toetuda omanike tugevusele ning omavad seeläbi paremat juurdepääsu kapitaliturgudele. Et finantsvõimendusel on kohalike ettevõtete arengule positiivne mõju, oleks oluline pakkuda neile piisavalt võimalusi mõõdukaks laenamiseks.

Käesolev töö juhib tähelepanu ka finantsvõimendusega seotud ohtudele. Ettevõtetel on soovitatav pöörata tähelepanu asjaolule, et teatud tasemest alates hakkab finantsvõimenduse tõstmine tootlikkust kahandama ning laiemalt vaadatuna võib selline protsükliline käitumine kaasa tuua majanduse volatiilsuse kasvu.

Töö tulemused viitavad sellele, et tänu stabiilsemale investeerimiskäitumisele suudavad rahvusvahelised ettevõtted paremini vältida riske, mis tulenevad kasvuaegsest kiusatusest liigselt investeerida. Kohalikud ettevõtted on tõenäoliselt rohkem altid ülemäära investeerima ja peavad seega halvenevas majandussituatsioonis suhteliselt suuremaid kahjusid kandma.

Et krediidipiirangutel on käesoleva töö põhjal hinnates ebasoovitav mõju reaalsektorile, tuleks leida vahendeid selle mõju leevendamiseks. Doktoritööst tuleneb soovitus toetada kohalike (ja muude krediidipiirangute all kannatavate) ettevõtete ligipääsu finantseerimisvõimalustele ja seda eriti tsükli langusfaasis, et tagada majandusstabiilsus ja ressursside mõistlik kasutamine.

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