FINANCIAL CONSTRAINTS AND EXPORT DECISION

FIRM-LEVEL EVIDENCE

By

Kinga Ritter

Submitted to

Central European University

Department of Economics

In partial fulfillment of the requirements for the degree of MA in Economics

Supervisor: Gábor Békés

ABSTRACT

In my thesis I study the relationship between financial constraints of Hungarian companies and their export decisions between 1998 and 2004. I test the effect of two different financial variables, liquidity and leverage, which measure the credit constraints for a company. The question is studied in a heterogeneous firm trade framework *á la* Melitz (2003), where the importance of constraints originates in the assumption that sufficient liquidity is also necessary to cover the fixed costs related to export. In the analysis I focus on medium-sized companies for which financial constraints might be binding. I carry out cross-section and pooled estimations on a panel dataset containing balance sheet information and find that the main determinant in export entry was productivity, size and number of employees during the studied period. Studying the change in financial variables for export beginners I show that less liquid and more leveraged firms are more likely to become exporters.

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Gábor Békés for providing me with insightful advice and valuable feedback throughout the thesis writing process. I also would like to thank for the outstanding opportunity provided by the Central European University to consult with Volker Nitsch from Technische Universität Darmstadt. I am grateful for the comments I received from the professor. Hereby I would like to thank senior managers of a credit department of a Hungarian bank for explaining credit decision process. The research design was heavily influenced by the meetings.

I am also grateful to my family and friends, especially Boldizsár and Bence, for their help and support.

CONTENTS

1. INTRODUCTION

The positive macro level relationship between financial development and trade balance has been claimed by several authors (see e.g. Beck, 2002). This recognition is important as both financial development and openness increase economic growth, which is essential in a country's development. This line of literature claims that countries with developed financial solutions in sectors requiring external finance, for which manufacturing is an excellent example[1], have a comparative advantage in starting expensive expansion through export. Therefore governments tend to implement policies seeking to encourage local firms to become global and to attract platforms for FDI. This is reflected in the policy agenda of the OECD that claims growth in export markets has a supporting role to foster recovery. Behind this there lies the assumption that it would be profitable for the firms to start internationalization. (Economic Outlook November 2013 in Manez et al., 2013) The usual tools to reach an increase in export activity are loans and subsidies. (Muuls, 2008) Although financial assistance seems to be accepted, the exact burdens behind the lack of export activity and the role of financial constraints in the decision are rarely studied.

In my thesis I study the role of financial constraints on the export entry decision of Hungarian small- and medium sized enterprises in the manufacturing sector between 1998 and 2004, and answer whether financial assistance is an appropriate tool to enhance export participation.

[1] Credit plays an important role in financing the activity of Hungarian manufacture sector as well. According to the information provided by the National Bank of Hungary on average 22% of all loans provided by banks and domestic or foreign credit institutes was provided to the manufacturing sector between 1998 and 2004. (MNB, 2015)

Since the 2003 paper of Melitz, there is a great deal of evidence on the importance of sunk costs associated with starting foreign sales. Later the heterogeneous trade model was extended in several ways, from which I focus and test the models that introduced financial constraints to the original setting. They claim that the need of liquidity can explain the imperfect selection of productive firms to exporting, as firms also need enough financial sources promptly to cover the costs. (Forlani, 2010) However as Chaney (2013) argued the relationship between productivity and financial structure remains an empirical question. Yet this question has not been studied in Hungary. My thesis contributes to the literature that studies the critical role of financial constraints on export decision, and within that it focuses to the narrower field of the relationship between export and financial health.

The question has been studied in different countries. The importance and the size of the effect varied greatly, and usually decreased after the authors controlled for firm-level characteristics or used methods to account for endogeneity. (Arndt et al., 2012) The first work which directly addressed the question was Greenaway et al. (2007), who found that UK exporters already had several desirable characteristics before exporting, which was not improved by exporting. Forlani (2010), in a panel of Italian firms, and Muuls (2008) for Belgian companies, also found a negative and significant correlation between export probability and financial constraints. Papers studying the relation in developing countries, where constraints seem to be more binding showed evidence in favor of the theoretical predictions. (Berman and Héricourt 2010) On the other hand there are examples which found no relationship between the two mentioned fields. Stiebale (2011) found no effect for French companies, and Arndt et al. (2012) also questioned the hypothesis using a sample of German firms. The findings presented in my thesis are partially supported by the results of the literature.

Studying the institutional setting during the named period makes Hungary a very desirable choice, as it differs from both developed and developing states. Hungary just

recovered from the socialist transition and formed its new institutions. According to a 2000 report of the National Bank of Hungary, which was published at the middle point of the studied period, from 1998 an increasing trend in long-term debt was observed for firms. As the report claims the amount of business credit increased by 17% in real values from 1999 to the next year and firms didn't face constraints in their expansion. (MNB, 2000) The increasing credit supply could possibly tear down the difficulties associated with financial needs.

I use firm-level balance sheet and profit-and-loss statement data for the seven-year long panel to estimate the impact of financial variables on export decision. The panel is considerably long and contains a lot of firms with detailed information, which makes it very promising for the question addressed compared to previous studies. It also enables me to study the change in small balance sheet subcategories and to define a great variety of financial variables. Unfortunately the problems associated with the quality of the data raised several questions and greatly restricted my analysis. As a consequence I could not exploit the time dimension of the dataset and could only estimate cross-sections and pooled regressions. The main reasons behind the difficulties are the turbulent regulatory environment and the measurement error that could bias my estimations. Measurement error is partly caused by the widely spread practices in Hungary to manipulate the balance sheet information of the company. Minor corrections can turn the outcomes of the company more appealing, but cause problems in analyzing causal effects. The problem is especially severe for small firms.

The research design was heavily influenced by the interviews with senior managers of a commercial bank who provided me insights about the credit application process.[2] They strengthened the mentioned concerns. They also argued that not only the quality of the data is

[2] Hereby I would like to thank them for the opportunity to carry out interviews with them. The provided information influenced the choice of empirical strategy and helped to identify the factors that determine the ease of receiving credit.

worse for small companies, but balance sheet information is only partially used in their application process, personal interactions are important in their case. Therefore I did not expect to measure any effect in their case.

In my analysis I focus on the group of medium-sized companies (definition is provided later), for whom the lack of available external sources can be a real constraint. I use widely accepted indices from business economics literature to identify constrained firms: different liquidity and leverage ratios. Estimating the standard model to measure the effect of external financial constraints on export decision with including several firm level characteristics, shows no relationship with export entrance. I find that for medium-sized Hungarian companies productivity was the key driver in export decision. While I find instable results for small enterprises.

To better identify the credit channel, I also measure the difference between non-exporters and those companies who just overcome the burdens of export and start exporting.[3] This approach is also reinforced by credit department interviews. This comparison is critical as it captures the change in financial constraint associated with export decision. These estimations suggest that before export starters are less liquid and more leveraged on average, which can reflect on paid costs related to export. A period after export no development in their financial outcomes was observed, but as I find no significant difference between non-exporters and permanent exporters, the financial variables of the firms recover to the original values. These results contradict to the positive effect export may have on firms.

The paper is organized as follows. In Section 2 I discuss the relevant theoretical literature. In Section 3 the empirical strategy is described. In Section 4 the dataset is introduced and in

[3] The length of the panel helped me to precisely identify firms belonging to each group.

Section 5 I present results. In Section 6 I conclude and point to future research questions and policy implications.

2. THEORETICAL BACKGROUND

In this section I introduce the theoretical relationship between a firm's financial background and its growth decisions. Using the Melitz (2003) heterogeneous trade model and its extensions I describe the relevant literature which demonstrates that financial constrained firms are less likely to start exporting. Based on the authors' theory view, I derive empirically testable hypotheses, which are estimated in Section 5. Firstly I describe the relationship between external and internal financial sources, then introduce the heterogeneous trade model and its extensions. Finally I present an alternative hypothesis for the relationship between export and financial constraints.

2.1 Internal and external financial sources are not perfect substitutes

A firm's investment decisions[4] would be independent of its financial background if all companies have access to capital markets and internal and external financial sources are perfect substitutes. The irrelevance of financial structure on firm operation was first suggested in the middle of the last century by Modigliani and Miller (1958). However in the presence of market imperfections, financing constraints will be reflected in a firm's operative decisions. It is claimed that internal and external capital are not perfect substitutes: the ability to use internal finance and the access to external sources differ greatly among firms. (Fazzari et al., 1988) If there is a cost difference between financial sources, financial hierarchy makes the firms' financial and investment decision interrelated. (Bond and Meghir, 1994) The most common reasons behind the cheaper internal source is claimed to be transaction costs and asymmetric information on the credit market. (Fazzari et al., 1988) The explanation based on asymmetric information is widely accepted and has been proved empirically, e.g. by Oliner and Rudebusch

[4] Where investment refers to all activities that require remarkable initial investment and the profits are realized only later.

(1992). It assumes that managers have better knowledge about the quality of the firm than outside investors, which leads to adverse selection. Good investments become undervalued and therefore the cost of using external finance increases compared to internal sources.

If the two financial sources are not perfect substitutes, there might be firms who are lack of sufficient internal source to finance its activities, but also cannot opt for external finance. (Fazzari et al., 1988) These companies won't be able to get sufficient liquidity to invest in expansion. In this paper I focus on an area which is affected by the constraints: export decision.

The assumption of imperfect substitutability between internal and external financial sources, and the financial hierarchy is tested by measuring the sensitivity of investment decision to the firms' internal sources, which is usually measured by cash flow or captured with productivity. Once the estimated relationship is positive and significant, the available financial sources are important determinants in investment decision, which means that the company prefers it compared to external sources. If capital markets are perfect, financial variables should have no impact on investment decision: a firms would use any of the sources to finance all profitable decisions. (Fazzari et al. 1988)

2.2 Financial constraints and export

The literature analyzing the relationship between financial constraints and export decision originates in the heterogeneous firm trade model of Melitz (2003). The model introduces an important innovation to the traditional trade setting: firms face sunk costs in connection with their potential new markets (e.g. market research, spread information on the market[5]). These costs are considered in an entry decision and imply that all firms should earn enough profit to recover the initial costs as well. The dynamic industry model gives an explanation for the

[5] For more examples see Robert and Tybout 1977 in Melitz 2003.

observed phenomena that even in a narrowly defined industry there will be exporters and non-exporters as well. In this setting only the most productive firms within an industry self-select themselves for exporting. It reproduces the empirically observed patterns (already discovered by Bernard and Jensen, 1995) of the exit of the least productive firms and the optimal resource allocation to the most productive firms whose productivity is increased to even higher levels. The basic setup of the Melitz model also implies that more productive firms will be bigger, charge a lower price and as a result they will earn higher profits than their counterparts in the industry.

The model can be easily generalized to an open economy with the assumption that some costs only arise in the case of foreign market entry. The different nature of contracting and informational environment imply that the entry costs are higher for foreign entrance. Some reasons behind it are the riskiness of foreign activities, e.g. because they involve the use of foreign currency and it is also more difficult to recover unpaid dues abroad. Firms who produce for a domestic market but have a productivity below a higher threshold, which should be reached to cover both sunk costs, are predicted to remain only on the domestic market. Those who exceed the higher productivity cutoff start exporting. Another consequence of exporting is that it will further boost the productivity of exporting firms as the allocation of resources provides them even better chances to exploit their opportunities.

In my thesis I focus on the second, higher threshold and on the differences between the firms close to it. Therefore I estimate the differences between non-exporters and those who just entered the export market. This helps to understand the mechanisms that determine export participation.

Based on the heterogeneous trade model developed by Melitz (2003) several papers studied the impact of different firm-level heterogeneities. One way to develop the model is

including financial constraints. The most important approaches are Muuls (2008), Chaney (2013) [6] and Manova (2013), who introduced financial constraints to the Melitz (2003) heterogeneous trade model. The works are strongly interrelated and build heavily on each other as Chaney (2013) and Manova (2013) were used as a basis by Muuls (2008). Besides setting up a new theoretical structure, the authors also provided empirical evidence for their findings. These models explain the self-selection of most productive firms into exporting.

Chaney (2013) intuitively clarifies the role of financial constraints: if firms have to pay a great cost to enter the export market, only those who have enough liquidity can pay it and become exporters. There are some firms who are productive enough, but in the absence of enough liquidity the barriers of exporting are too high for them. They cannot exploit their potential due to difficulties in paying the sunk costs.

Chaney's model (2013) adds liquidity constraints to Melitz's (2003) in the simplest way: firms cannot borrow externally to finance their entrance to foreign markets so they have to finance their expansion from internal sources. Muuls (2008) incorporates external financing into Chaney's model and shows that even if external finance is possible, liquidity constraints can explain the self-selection into export. In this richer setting three types of financing are available: internal financing, random liquidity shocks and external financing from financial institutions using tangible assets as collateralize. The last two are necessary to start exporting in the absence of enough internal sources.

Liquidity constraint interacts with productivity heterogeneity: only the most productive firms are able to generate enough profit and liquidity to enter foreign markets. If financial

[6] The model of Chaney (2013) originates in an earlier work of his, however the 2013 paper gives an extended analysis and that is why I use it here.

markets are imperfect, the lack of liquidity to cover sunk costs leads to ex-ante underinvestment in exporting activity, as not everyone who is productive enough will enter the foreign markets.

Both models state that only companies with small liquidity shocks and great productivity level or those with a high level of external liquidity can export. Between the two extremes there lies the subset of constrained firms, for whom the lack of liquidity is a real burden, as internationalization would be profitable for them.[7] These firms cannot produce enough liquidity to finance their expansion and cannot apply for external finance, so they remain constrained and have to rely only on internal resources. In my thesis I compare them with companies who could collect sufficient liquidity and had a chance to export during the observed period.[8]

Chaney (2013) derives differences in the characteristics of exporters and non-exporters that can be empirically tested: exporters are more productive, larger, more capital intensive and tend to belong to business groups. The model has implications for the dynamics of trade as well. The most productive and least constrained firms enter foreign markets first. If liquidity constraints matter, the financial history of the firm becomes an important determinant in future expansion. On the other hand it makes a significant difference between those who have been exporting for a longer period and beginners.

Manova (2013) examines the question not at firm-level but at country-level, and focuses on the role of financial institutions in export. She claims that financial institutions and policies can significantly lower credit constraints which supports the internationalization of productive but constrained firms. She shows that financial distortions reduce foreign export disproportionately more than domestic production, because of the previously discussed differences in the nature of the emerging sunk costs. Although the focus of this paper differs

[7] The necessary conditions for the existence of constrained firms are described in the cited papers.
[8] Obviously other aspects of trade (e.g. iceberg costs) affects the threshold which separate the subset of companies, but they are not discussed it this paper.

from my firm-level analysis it gives important insights to derive policy recommendation based on micro-level results.

The literature has ambiguous view on the relationship between financial constraints and the volume of export. Chaney (2013) and Muuls (2008) argue that it should not be affected, as no further sunk costs arise. However Manova (2013) finds that it should be depressed in the presence of credit constraints. The difference comes from the assumption that in the model of Manova (2013) firms can raise external sources to improve their export capability, while in the other models there is no channel for that. Therefore I concern this topic only partly and the main focus is on the determinants of export decision.

2.3 How does export influence firm finance?

The previously mentioned papers all addressed the question whether the observed correlation between constraints and export is implied by the theory they developed or in the other way around. As it was claimed e.g. in Van Biesebroeck (2005) export significantly improves productivity. Therefore the authors checked the possibility that export can help to reduce liquidity constraints and the lower level of constraint is an outcome of expansion and not a causer. There exists several possible explanations in the literature for the reverse effect.

Campa and Shaver (2002) argue that exporting has important effect on firm behavior, as more stable future income flow and an income source which is less correlated with domestic changes can cause long-run strategic advantage. This implies an increase in the value of the company. The authors claim another possibility that export can operate as a signal and show that these firms are more productive. The authors expect and show in a theoretical and empirical setting that the promise of stable future income flow can lower the severity of liquidity constraints; and once these companies enter foreign markets their liquidity is predicted to increase. The hypothesis that export can serve as a signal for more stable future growth was

also strengthened by the bank professionals. The alternative hypothesis is also tested in Section 5.

3. EMPIRICAL STRATEGY

Based on theoretical evidence, not only internal but external financial sources also play a role in export decision, which has been tested in different forms. These results have important consequences on the design of financial institutions and therefore must be tested in different environments. The connection between financial development and trade was a macro-level question for a long time and the relationship was analyzed using cross country comparisons. (see e.g., Beck, 2002) After the pioneering work of Greenaway et al. (2007) a new wave concentrating on firm-level analysis started. This was the first empirical paper that added financial background to the determinants of export and showed evidence for the described role of financial constraints on export decision. As Forlani (2010) argues these papers build on the assumption that for constrained firms entry choice may depend on liquidity sources as well. The extensive availability of micro level data made it a very popular research field, but the question has not been examined in Hungary.

Wagner (2014) provides an exhaustive summary about the existing literature and the different empirical strategies applied. He provides three stylized facts about the relationship between financial background and export. In this section I derive the estimated equations to test these hypothesis. I also describe the greatest difficulty in the empirical strategy, the identification of constrained firms.

Differences between exporters and non-exporter

It was already showed by Melitz (2003) that exporters are on average larger in all terms (employment, assets, age and productivity) than non-exporters. Chaney (2013) extended the original setting with the characteristic that higher productivity implies less constraints. As Forlani (2010) claims these have positive impact on export activity, which leads to the observed imperfect selection to foreign markets. From the theoretical overview it is clear that the nature

of the process will be reflected in the difference between non-exporters and those starters who become liquid enough to export.

Self-selection of less constrained firms

According to the described models only less constrained firms with sufficient productivity level can overcome the initial costs of export and self-select to export. The extensive margin of export is influenced by financial constraints, while the effect on the intensive margin is unambiguous. A critical empirical question is the choice of appropriate measure for financial constraints.

Papers studying the supply side of the external finance availability have two choices: use indirect measures calculated from balance sheet data or apply an independently determined index reflecting on the financial situation of the company. Muuls (2008) uses Coface score[9] to identify constrained firms and summarizes the advantages of the second type of measures. Variables calculated by independent financial bodies use similar methods to banks' credit decision and they are not affected by firms' export decision. Unfortunately no similar measures are available for Hungarian firms.

Instead, as Wagner (2014) claims, I rely on commonly used indices from the business economics literature, which capture the credit constraints the firm faces. I describe the calculated variables in the Data section. Their use is verified by several studies (see one possible test in Forlani, 2010). Although they are widely applied, critics have been articulated, as it is never known whether the balance sheet patterns reflect on financial constraints or only the outcome of operation decisions. Studying the relationship between investment decision and constraints, Kaplan and Zingales (1997) carried out interviews with firm managers to justify

[9] Coface score measures the probability of insolvency for a company in a 12 months long period. It is measured by a credit insurer company. (Coface webpage, 2015)

whether the financial background (e.g. ratio of debt to equity and liquidity which are crucial variables in my analysis) really matters in decision making (e.g. pay dividends). The authors found that only a small portion of firms' access to capital is questioned among those who are considered to be constrained based on the usual variables indicating liquidity. They argued that the structure of balance sheet might only reflect on strategic managerial decisions. Similar results were carried out by Farre-Mensa and Ljungquist (2013), who tested the popular Kaplan-Zingales index which is widely accepted to describe publicly traded companies. Forlani (2010) argues that using balance sheet data is not ideal, as more constrained companies are likely to hoard short-run assets, which means that the usual variables captures the opposite effect compared to the desirable. These potential problems are taken into consideration in the interpretation of the results.

As the focus of my paper is starting export and not the impact on export flow, I use a binary choice model. The following discrete choice model on export commitment is estimated:

$$I\_export_t = constant + \beta_1 internal\ constraints_{t-1} + \beta_2 external\ constraints_{t-1} + \boldsymbol{\beta X_{t-1}} + error\ term \quad (1)$$

By including measures for both internal and external constraints, the impact of the different types of constraints can be determined. Once the coefficient on external constraint is significant, external constraints are determinants of the export decision and the selection of least constrained firms is supported. If internal constraints have significant impact, it means that the inner ability of the firm to produce finance matters in the export decision. **X** contains firm-level characteristics which determine export entry. In the literature all explanatory variables are lagged once as the decision of export is determined by the financial history of the firm (Melitz 2003). However it doesn't solve the problem that the variables in the regression are determined at the same time, which rises endogeneity concerns.

I chose linear probability strategy in my paper. LPM has the advantage that the coefficients of the linear probability estimations can be easily interpreted as they measure the variable's contribution to the probability of becoming an exporter. It is also suitable for my empirical estimation as fixed effects can be included, which cause problems in probit estimation (see e.g. the argument of Muuls 2008), and it can also handle a great number of dummy variables. On the other hand it has some drawbacks: the predicted values can be greater than one or less than zero and sometimes the assumption of linearity cannot be maintained. (Wooldridge, 2012) As I do not want to build a predictive model, only capture the effect of the right hand side variables, predictions exceeding one do not cause problem.[10] Alternatively, one could use logit model, which allows for the explanatory variables and the firm-specific component of the error term to be correlated. (Chamberlain, 1980)

I carry out two further tests. By restricting the data to non-exporters and export starters and estimating the effect of financial background on the probability of becoming an exporter in this subsample, the role of using external sources can be estimated at the threshold. In this sample the difference between non-exporters and those who can overcome financial constraints can be captured.

The effect on the intensive margin of trade can be estimated by replacing the export dummy to continuous measures of export volume (in my paper I used log export sales and the export to total sales ratio). In that case I used an OLS strategy.

[10] I estimated the presented equations with probit as well, and the signs and magnitude were in line with the results of the comparable linear probability models. These results are available on request.

The effect of export on the financial status

To distinguish between self-selection and the introduced alternative hypothesis, the effect of export on future values of financial constraints should be determined. I estimated the following equation to identify the effect of export on future financial outcomes:

$$financial\ constraint_{t+1} = constant + \beta_1 export_t + \boldsymbol{\beta X_t} + error\ term \qquad (2)$$

If export at time t has significant effect on financial constraints, the findings are consistent with the supporting role of export in changing the firm's financial stability.

As it will be introduced in the next section due to data considerations I could only estimate cross-sections and pooled regressions. The results presented in the thesis are from the pooled sample of all 7 years, as they are expected to be more precise. I also estimated each specifications separately for three-year pooled samples and for every year. The results for the 1998-2000 period and for the year 2001 are available from the author at request.

4. DATA AND KEY VARIABLES

4.1 Data source

The dataset I use includes all Hungarian firms that prepare double-digit accounting and is restricted to companies with employment above five persons. It contains all details from the balance sheet and profit-and-loss statement. Therefore all changes can be easily and accurately tracked in the companies' operation. Empirically, the details make it suitable for the addressed question. The dataset is used to extract information about firm level annual characteristics, total factor productivity calculated based on the stock values, financial situation and sector activity. The dataset is available at the Central Statistical Office with the permission of the Institute of Economics CERS-HAS.[11] More information about the data can be found in the Appendix 1.

Although the data is available for many years, I focused on the period between 1998 and 2004. This restriction is necessary to mitigate the effect of important changes in the political and social status of Hungary and was partly driven by data considerations (discussed in details in Appendix 1). I wanted to avoid post-socialist transition, as during these years several shocks hit the country with essential changes in its institutions. Therefore studying the effect of financial constraints on export in this period would raise questions about the identification. Another important change happened in 2004 when the country joined the European Union (EU.kormany.hu, 2015), which connected Hungary to new, large markets that can be served as export destinations. The EU also became an important supporter (e.g. in financial and development issues) of the country, so an increase in the available financial sources was also expected. Hungary started to prepare to its access already several years before the exact date. In my opinion the financial markets and expectations have already accommodated to the

[11] The dataset I received was partly cleaned, as decimals were corrected and some outlier values were already deleted.

expected changes before entering the EU, therefore 1998 can be a good border to define as the beginning of the period. The end of the studied period is the year of access, 2004. I used the years 1996-1997 to calculate lagged variables and 2005 to define export status of the firms.[12]

The trustworthiness of the information provided by the managers of small companies was found ambiguous by the interviewees as well. Because of the different methods banks use to evaluate the financial health of the companies and the lack of sufficient data, I separate the dataset to two subsamples: small- and medium companies. I considered firms to be small when none of their annual sales income exceeded 100 million HUF. I excluded the largest firms from the sample (whose annual sales exceeded 1 billion HUF) as I did not want my results to be driven by extreme outliers and also because they are expected to be productive enough to finance their export from internal sources. As Kaplan and Zingales (1997) have already claimed the importance of dropping both outliers and extreme stressed companies is important, as they can mislead the estimation.

I restricted the sample to manufacturing firms based on the statistical classification of economic activities in the European Community (NACE2 code). Restriction to manufacturing is necessary as in their case the income from export is more likely to come from export activity, and not only sales to foreign entities. Companies from class 19 are excluded as firms in patrol sector have outlier total factor productivity values and can significantly distract the results. (see same practice in e.g. Manova, 2013)

These restrictions led to a sample of 19,402 firms, from which 4,570 are considered to be medium sized and the rest are small. The seven-year long panel is unbalanced: only 4,654 firms have observations for each year. Altogether my dataset contains 74,864 firm-year pairs from

[12] Studying the period after 2004 would have been great, but several question arose. First it is necessary to avoid the effect of financial crisis (start in 2009). Second serious modifications were carried out in the accounting law, which made data even within a firm, hard to compare. This issue is discussed in details in Appendix 1.

which 20,031 belong to medium-sized companies. These sample size is large compared to previous analysis.

4.2 Data problems

The dataset has some disadvantages. Firstly, it should never be forgotten that the balance sheet is only a snapshot about the company at one point in time, and therefore it can be manipulated to display a better picture about the companies' performance. (Damodaran, 2011) Secondly, the turbulent regulatory environment also caused difficulties in the estimations. The Hungarian accounting law changed at the millennium and came to effect in 2001. (2000/C. Act about Accounting) The law included several important changes in the valuation and classification of assets and liabilities, which did not affect firms randomly. These changes in the accounting system cannot be easily handled. To correct the values, changes should be detected on both assets and liabilities side, which is unknown for an outside observer. As I did not have the possibility to track modifications in each companies' history I could not correct changes in valuation methods. Therefore I could not use the time series characteristic of the dataset and had to restrict my analysis to cross-section and pooled estimations.

4.3 Key variables

Outcome variables

I used the available information from profit-and-loss statement to classify firms based on their foreign activity as *exporters*.[13] I defined all firms in a given year as exporter which had positive sales revenue from export.[14] The *export ratio* is income from foreign markets over total sales. Greenaway et al. (2007) found that around 70% of UK manufacturing firms exported in their sample. Similar ratio was observed by the reviewed authors. In my sample around one

[13] I also used trade data to check the validity of the resource. The accounting information has the advantage that export volumes appear even if the amount of foreign sales is small.
[14] Defining a 5% cutoff leads to same results.

third of the firms exported during the observed period, which increased during the sample with increasing sales.

Based on theoretical considerations I divided companies into three disjunct subsets, for which the theory has testable implications. *Permanent exporters* are companies who exported at least in three years in a row. *Non-exporters* are their opposites, who did not export three years in a row. [15] The most important group to measure the effect of financial constraints in starting export activity is the subset of *switchers*. These are the firms who changed their status and became exporters. For switchers after a period of not exporting a 2 years of export activity is observed. The category of switchers is stronger than permanent exporters in a sense that if a change in export status is detected (independently from the length of continuous export activity), an enterprise is classified as a switcher. [16]Their number with important observable characteristics between 1998 and 2004 is summarized in Appendix 1. From the analysis I dropped temporary traders and those firms who exited from export, as the theory described previously provides no explanation for their behavior. Their choice to stop and restart cannot be analyzed in the framework applied here.

Explanatory variables: credit rationing

The most relevant class of independent variables in my estimation is financial variables measuring credit constraints. The applied variables are consistent with the categories that were emphasized in the interviews: liquidity and leverage ratio.[17] Each type captures a different

[15] This definitions capture well the companies that exported in each year or exported in none of the years. I would like to emphasize that I used an extended dataset from 1996 to 2005 to define the export types. Intuitively a firm can only become a continuous exporter after it is observed for at least three years in the dataset, however it behaves as a continuous exporter in every year. Therefore I projected the value of the dummies for all years.

[16] For switchers I checked the trade history during the period. If a change from non-exporting to two years of exporting was observed I checked their export patterns in details. In this category I only kept companies that remained in export status after the switch. All others were considered to be temporary exporters and dropped from the sample.

[17] The managers mentioned a third variable that is applied in the process, the Debt Service Coverage Ratio (DSCR). They use it to measure the inner ability of the firms to payback its interest rates. In this paper I use tfp to account for internal financial constraints.

aspect of financial stability of the firm and all are accepted proxies for credit constraints. I use more versions of the variables collected from the literature to check their validity, however only one of them is presented here. The other variables are available in Appendix 1. The definition and interpretation of the variables are described based on Brealy and Myers (2011).

Liquidity ratio

Liquidity ratio is used to determine a company's ability to pay back its short-term loans, which is a good approximation of the financial safety. A higher liquidity ratio means that the financial structure of the company is more balanced. It also shows that if something unexpected happens and the firm is obliged to pay back its creditors, the company is able to cover its liabilities. A higher liquidity ratio implies that the firm is more likely to pay back its debts from assets with similar short-run expiration date and funds its ongoing operations. However the opposite type has difficulties to run its usual business and cover its existing debts. In every case the amount of current assets is compared to the liability level of the company. The interpretation of liquidity has its drawbacks as it was showed in Section 3, but the introduced interpretation seems to be widely accepted in the literature.

According to business literature the broadest variable is *current ratio*, which compares current assets to current liabilities. The ratio of current assets and liabilities shows whether a company's short term assets are promptly available to pay its short-term liabilities. The underlying assumption behind the ratio is that a healthy firm, which has better chances to receive credit, should not only match the amount, but also the expiry of its assets and liabilities. The current ratio was used by Muuls (2008) and it is also my main variable to control for firms' liquidity.

Besides current ratio I calculated the *difference of current assets and liabilities over total assets (thereafter Liquidity 2)* for robustness checks. The variable was applied e.g. in

Greenaway et al. (2007), Minetti and Zhu (2011), Whited (1992) or Fazzari et al. (1988). The choice of a commonly applied proxy has the advantage that it makes the comparison of results easier. The interpretation of the value is similar to the previously discussed: the higher the ratio, the more balanced the financial background of the country is. The value is also negatively correlated with the cost of external capital. (Stiebale, 2011)

Leverage ratio

Leverage ratio looks at the amount of capital comes in the form of loans and assesses the ability of the company to meet financial obligations. Evaluating the company's health based on leverage ratio is not obvious. Too much or too low debt level can both be dangerous for a company, and the ideal level strongly depends on the industry it operates. The healthy level of debt enables a company to generate a higher rate of return than the interest on its loans, so it can maintain its debt at a stable level. A high ratio means that a company is aggressive in financing its growth with debt, which has several dangers (going bankruptcy, volatile earnings etc.) A lower value may be more preferable for most companies as it helps to keep the debt burden at manageable levels. The higher the leverage ratio of the company is, the less likely it can maintain its debt stock, and therefore it is less likely to receive new sources to overcome financial difficulties. The exact optimal level can greatly differ between industries. In the interpretation it should not be forgotten that their interpretations are not as clear as it is for the liquidity measures.

I calculated *the ratio of the sum of short- and long-term debts over the previous sum plus equity (thereafter Leverage)*. For robustness checks I compared *long-term liabilities to the sum of long-term liabilities and equity*. In the second case I took the logarithm of the variable (thereafter Leverage 2 denotes the logarithm of the ratio).

Control variables

As it was argued in Section 2 exporters are systematically different from non-exporters. There is evidence that exporters are bigger in all terms, older, more productive and have better educated workers (see e.g. Bernard and Jensen, 2004). It has also been shown that these are related to the financial constraints of the company. Once it is true including appropriate control variables is essential to avoid serious omitted variable bias.

I measured *firm size* with the number of employees[18] and included it together with the *age of the company*. *Age* was calculated as the difference of the first appear in the sample and the date of observation. It can be misleading as it is possible that some firms already existed before the dataset was constructed. These old firms already started their operation during the socialism, so they might be very different from the new companies. This confusion for the oldest company can be neglected as they are mainly the largest firms that are excluded from the sample. Another fact supporting that it does not cause any problem is the uniform distribution of entry years observed in the data.

A great advantage of my database is that I could successfully measure the *productivity* of all firms. Including productivity is essential as it measures the ability of firm to produce sufficient financial sources. As Manez et al. (2013) claims productivity captures the inner ability of the firm to produce profit in the future. For that I carried out a total factor productivity estimation based on Wooldridge (2009) using value added and labor intensity of the firms. As low productive firms are more likely to face constraints and remain non-exporters; the positive correlations implies that the effect will be overstated in the absence of accurate controls. (Minetti and Zhu, 2011).

[18] In the estimations I used the logarithm of the variable.

It would have been great to control for the fact whether a firm belongs to a business group or not. As Minetti and Zhu (2011) shows firms in a corporate group can have easier access to distribution channels or have cheaper access to internal financial sources. Although the mechanisms and cooperation within a group are not clear, one might expect that firms in a business group have advantage in both access to finance and export activity. As I cannot control for this, it remains an unobserved characteristic and makes the estimated effect likely to be overstates. I could only control for the presence of foreign ownership in the firm's equity, which is also related to better relations. The *foreign* dummy equals one, if the proportion of foreign ownership in the equity is greater than 25% (the results are robust to changes in the cutoff), which means control on the decision making process.

As Stiebale (2011) argues there are other important unobservables, which have an effect on both export decision and financial constraints can be managerial ability, corporate culture and attitude towards risk. I could not account for the bias they potentially cause.

In the baseline regressions industry controls and year dummies are always included. Including industry dummies is necessary as different fields have altering financial needs and distinct ability to access credit, which both are determined by the capital need and availability. Time dummies capture macroeconomic shocks.

5. RESULTS

This section shows the estimation results of the models introduced in the previous sections. I focus on medium companies, as they are expected to be constrained by external liquidity (Chaney, 2013) and follow patterns described in the literature. I show evidence for the significant difference between exporters and non-exporters, which disappears for the group of medium firms if I control for individual characteristics. Small Hungarian companies are subject to a different credit application process, where subjective elements and personal interactions are more important, therefore the predictions of the model are not applicable in their case. I always mark when the estimated results alter in the two cases and show evidence for the fact that indeed these companies behave differently.[19] The robustness of the results is also tested with respect to the choice of measurement for financial constraints, sample size, time interval and the effect of financial constraints on investment decision.

5.1 Descriptive statistics

TABLE 1: SUMMARY STATISTICS ABOUT DIFFERENT EXPORT TYPES, MEDIUM COMPANIES

	Non-exporters		Switchers		Continuous exporters	
Revenue	451804.7	(581238.9)	672274.6	(985196.3)	1287121	(1.14E+07)
Revenue from export sales		NA	105414.9	(510184.4)	837909.3	(1.14E+07)
Fixed assets	111746.9	(238541.3)	239526.4	(1008195)	419602.9	(1307693)
Intangible assets	1459.788	(13877.19)	16254.91	(816508.1)	22451.23	(627192.9)
Total assets	249092.9	(399872)	487166.4	(1218232)	936656	(4430073)
Number of employees	49.45	(80.115)	66.28	(107.408)	125.47	(178.6993)
Age	5.5	(3.006)	5.96	(2.905)	6.03	(3.106428)
TFP	6.752	(0.971)	7.225	(0.887)	7.742	(1.012047)
Average wage	1426.98	(1191.294)	1694.92	(1250.778)	1807.042	(1225.509)
Percentage of foreign owned firms	0.08	(0.269)	0.21	(0.410)	0.44	(0.496)

Notes: Each column reports the averages with their standard deviation for a given group in medium-sized firms. The first five rows are measured in thousand HUF.

[19] The results for all specifications and for all groups are available at the author.

First I provide clear evidence for the differences in observed characteristics between the exporter categories. Table 1 shows pooled averages for non-exporters, switchers and permanent exporters.

Exporters[20] exert higher revenue from domestic sales, while foreign sales are significantly greater on average for companies who permanently trade. Not only sales, but the value of each types of assets are greater for these enterprises. Exporters have on average a greater number of employees who receive higher wages, and greater foreign share.[21] There is also significant difference in the total factor productivity, where the order displays the expected relationship: continuous exporters are the most productive and it decreases as we reach non-exporters on average. Appendix 2 presents further evidence for the yearly differences, which is apparent not only at the levels but also at the growth rates.

The observed firm characteristics are in line with the predictions of the Melitz (2003) model, which have already been argued by e.g. Bernard and Jensen (2004). The only exception is age, where the difference is moderate. It can be explained by the imprecise measurement that cannot distinguish the age of firms born before the start of the dataset. This measurement error is likely to be correlated with the unobserved characteristics of the firm (one assumption can be that younger firms born after the transition are more opened) and therefore the effect of age is underestimated.[22] The results for small companies are in line with the expectations and with the measured order for medium firms. The table is presented in Appendix 2.

All papers that include financial heterogeneity claim that external financial constraints interact with productivity negatively, so more productive firms are expected to be less

[20] There is difference in the two types of exporters (starters and continuous) as well, but it is generally smaller.
[21] There were some changes in the accounting rules of foreign shares starting in 2005. This year was not included, but it would cause difficulties in the expansion of the sample period.
[22] Opposite assumption can also be motivated, but it seems to be sure that the measurement error is not random.

constrained on average. I checked the correlation between total factor productivity and the defined financial variables.[23] The results are presented for the pooled sample in Table 2.

TABLE 2: CORRELATION BETWEEN FINANCIAL CONSTRAINTS AND PRODUCTIVITY, MEDIUM COMPANIES

	Current ratio	Leverage	Current ratio	Leverage
	(1)		(2)	
Log(tfp)	0.542***	-0.357***	1.778***	-0.553***
	(0.0761)	(0.0227)	(0.133)	(0.0413)
Year dummies	yes	yes	yes	yes
Industry dummies			yes	yes
Observations	17,367	18,487	17,367	18,487

Notes: Each column reports the results of a firm level OLS regression of dependent variable noted at the top of each column on the covariates noted in the first column. Results for the constants are suppressed. Year dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

The main interest is in the coefficient on the logarithm of tfp. The table shows two specifications which differ in the number of included control variables as in (1) industry dummies are not included. Productivity interacts with the financial variables in the expected way, which correlation is significantly greater in magnitude if industry differences are considered. The results show that in a given year and 4-digit industry a more productive firm is significantly more liquid and less leveraged on average. The co-movements are significant at all usual significance levels and great in magnitude. The results are robust for the choice of financial variable.

Comparing simple means show that non-exporters differ from the two sets of exporters in favor of the later in their financial structure. However the standard errors are great, so I could not distinguish simple averages. (The average value of current ratio is 1.54 for non-exporters, 1.52 for switchers and the highest average, 1.59 belongs to permanent exporters. Average leverage is 0.51 for non-exporters, 0.52 for switchers and 0.49 for permanent exporters.) The

[23] In every case I excluded the outlier values of the financial control variables. I checked the importance of them by replacing the outliers with their border values, which led to the same results in every specification. Because of the lack of value added, these results are not presented in my thesis. Results for small companies is presented in the Appendix.

exact differences are displayed in the next subsection. Table 3 shows the estimated coefficients of financial variables in the regression on export decision for different subsamples.

TABLE 3: CORRELATION BETWEEN EXPORT AND FINANCIAL VARIABLES, MEDIUM COMPANIES

	Medium firms			Small firms		
	Total (1)	Foreign owner (2)	Domestic owner (3)	Total (4)	Foreign owner (5)	Domestic owner (6)
	exporter					
Current ratio	0.0018	0.0165***	-0.0003	0.0022	0.0188**	0.0073***
	(0.0053)	(0.00569)	(0.00679)	(0.00284)	(0.00763)	(0.00279)
Leverage	-0.0501**	-0.0604**	-0.0803***	0.0694***	0.0835***	0.0245*
	(0.0223)	(0.0244)	(0.0283)	(0.0131)	(0.0291)	(0.0130)

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. The subset of firms that I used in the estimation is reported at the top of each column. Results for the constants are suppressed. Year and industry dummies are always included, but not showed in the column of covariates. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Table 3 shows that after controlling for year and industry effects the difference in the liquidity is insignificant between medium exporters and non-exporters[24], but on the contrary exporters have significantly lower leverage on average. My results differ from the findings of Greenaway et al. (2007) as exporters do not display less constrained financial structure based on all variables. It is possible that the results are driven by measurement error in the variables I used to construct the liquidity ratio, or some composition effect.

For small firms the estimated correlations show a less clear pattern and the interpretation needs deeper analysis. For the pooled sample current ratio and export activity are not correlated and leverage has a positive relationship with export choice.[25]

[24] Here exporter refers to firms that had positive revenues from export activity in a given year.
[25] These results are not robust for the choice of measurement. If current ratio is replaced with other variables used to proxy for liquidity, the relationship becomes negative, while export decision and other leverage measures are negatively correlated. The reason behind the result can be the bad quality of the data for these companies, which can make them instable.

When the correlations for foreign and domestic companies are estimated separately, it turns out that after controlling for the important attribute of ownership, there is still great difference in the important financial variables of the companies. This distinction is interesting as foreign owned company especially after the transition, can be better in adopting to market needs and put more focus on financial stability. For medium foreign-owned companies, the liquidity measure has a positive and significant relationship with exporting and exporters on average have lower leverage ratio. These findings support the intuition described previously. Domestic firms' leverage and exporting has significant negative correlation, but inversely to foreign enterprises the significance of liquidity is diminished.[26]

For small firms the previously calculated results are robust for the separation of the sample as all the correlations remain important and positive.[27] The instable results presented here strengthens the hypothesis that these firms behave differently compared to large companies.

5.2 Basic model

I estimated a linear probability model on the export decision controlling separately for the external financial constraint proxies (financial variables), internal constraint (total factor productivity), size, age of the firm and foreign ownerships. This equation was derived in Section 3. I used a pooled model, as the changes in the accounting rules would cause significant bias in the panel analysis. The coefficients of the different financial sources are important, as they provide evidence for the availability and use of internal and external resources. As Muuls (2008) showed the theoretical model predicts no evidence for the changing effect of financial constraints. All time-varying explanatory variables are lagged once as in previous literature

[26] The significance of the results depends on the choice of measurement.
[27] These results are not robust for the choice of measurement. If current ratio and leverage are replaced with other variables used to proxy for both leverage and liquidity, the relationship with export becomes zero or even negative. The reason behind it can be the quality of the data for these companies, which can make the results instable.

(e.g. Bernard and Jensen, 1995, 2004)[28]. Compared to theory a surprising result is presented in the Table 4.

TABLE 4: ESTIMATION OF THE BASIC MODEL, MEDIUM COMPANIES

Dependent variable	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Log(tfp)_{t-1}$	1.017*** (0.0398)	0.865*** (0.0699)	0.553*** (0.0799)	0.630*** (0.0831)	1.034*** (0.0402)	0.876*** (0.0703)	0.557*** (0.0817)	0.641*** (0.0847)
$Log(emp)_{t-1}$		0.026*** (0.0096)	0.054*** (0.0107)	0.0574*** (0.0107)		0.0268*** (0.0095)	0.054*** (0.0108)	0.0566*** (0.0107)
$Foreign_{t-1}$			0.172*** (0.0145)	0.214*** (0.0155)			0.171*** (0.0147)	0.213*** (0.0156)
Age_{t-1}			0.0033 (0.0026)	0.0009 (0.0028)			0.00345 (0.0026)	0.00117 (0.0029)
Current $ratio_{t-1}$	-0.0175*** (0.0045)	-0.0154*** (0.00453)	-0.0031 (0.0056)	0.0003 (0.0061)				
$Leverage_{t-1}$					0.0923*** (0.0211)	0.0844*** (0.0213)	0.0156 (0.0250)	0.0174 (0.0290)
Year dummies	included	included	included	included	included	included	included	included
Industry dummies	included	included	included	not included	included	included	included	not included
Observations	16,353	16,353	10,706	10,706	16,353	16,353	10,706	10,706
R-squared	0.307	0.308	0.361	0.185	0.307	0.308	0.361	0.185

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. The subsample I used is the group of medium companies. Results for the constants are suppressed. Year dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

For the pooled sample of medium Hungarian firms between 1998 and 2004 none of the defined financial variables has an effect on export decision after controlling for firm-level characteristics.[29] In column 3 after considering common effects within industries and firm-level characteristics, the small negative coefficient on current ratio vanishes. The same holds for the small positive coefficient on leverage.[30] Both coefficients are precisely estimated. Similarly to

[28] The results for all types are robust for using contemporaneous explanatory variables.
[29] The cross-section estimations support the results. I also checked for subsamples separated based on productivity, and the same relationship was maintained, which is evidence against the changing impact of financial constraints. These results are not presented.
[30] The results are robust for the choice of financial variable and for including the lower and upper bounds instead of dropping the extreme values.

Muuls (2008) I found no effect for financial constraints once firm-level differences are considered. She argued that the insignificant positive impact can be explained by the high correlations between financial background and productivity. The strong correlation was verified previously and it can drive my results as well.

Table 4 shows that control variables have significant coefficients with expected signs and are generally precisely determined. One percentage increase in tfp has a significant positive effect on the probability of starting export, the estimated values vary around 50% depending on the specification. A percentage change in the number of employees increases the probability of export by around 5% and foreign ownership increases the export by around 15% holding everything else constant.[31] Including foreign ownership in the regression seriously impacts the coefficients of current ratio and leverage, as it explains a large part of the variation (left after including tfp) in the left hand side variable. One possible explanation can be that these firms probably belong to a business group, where within group finance is available. Industry dummies capturing industry specific shocks captures a large part of the variation. On the other hand I found no effect for the age of the firms.

Small firms display a very different pattern. For them companies with ex ante lower liquidity and greater leverage have *ceteris paribus* higher probability of becoming an exporter in the next period. These results are not robust to any small modifications, as significance and signs of estimated coefficients are distorted in different specifications. These results are only presented in Appendix 2.

I estimated two other specifications for medium-sized companies to provide further evidence for my results, which are presented in Appendix 2. First I checked whether the external constraints have decreasing effect as productivity increases, as it was claimed in Berman and

[31] The exact values depend on the specification and on the choice of financial variable.

Héricourt (2010). I found no effect for the interaction terms in any of the specifications for medium companies. Second I included two-period lags for the explanatory variables. This was motivated by the interviews I carried out, where managers claimed that during the credit application process outcomes of the last two available years are taken into account. The results suggest that two-periods before the export activity a higher level of leverage, *ceteris paribus*, increases the probability of exporting for medium firms. The estimated coefficient is 0.0456 and significant only at 10%. The results from these estimations can be biased by the non-random selection caused by the availability of all necessary data. It is likely that mature firms with long export history are selected to the sample as better measurement is available for them. For these companies the theory predicts that external constraints are less important, so the effect is underestimated.

5.3 The effect on switchers

To understand the dynamics of changes in financial constraints connected to export, I restricted the sample to companies where external constraints can be knife-edge and studied the difference between non-exporters and switchers in the case of medium-sized companies. The possibility to describe the exact dynamics is limited by the length of the panel, so I only measured the effect of export one period before and after firms start exporting. Switchers are the companies who were able during the observed period to pay the sunk cost related to export and start internationalization. According to the model of Muuls (2008) firms have three possibilities to overcome the burdens: internal sources, liquidity shocks and external financial opportunities. There is a consensus about the existence of difference between the two groups, but its direction remains an empirical question. By comparing constrained non-exporters and starters the dynamics observed in their financial background can be connected to the accommodation or consequence of export activity. In this subsample I test for both ex-ante and

ex-post differences in the financial structure of the firms, to identify the mechanism through which export is related to firm-level financial decisions.

TABLE 5: THE IMPACT OF LAGGED FIRM LEVEL CHARACTERISTICS ON EXPORT DECISION. MEASURED ON THE SUBSAMPLE OF SWITCHERS AND NON-EXPORTERS, MEDIUM COMPANIES

Dependent variable	Exporter $_t$	Exporter $_t$	Exporter $_t$	Exporter $_t$
Independent variables	(1)	(2)	(3)	(4)
Log(tfp) $_{t-1}$	0.806***	0.854***	0.690***	0.744***
	(0.0916)	(0.0981)	(0.100)	(0.110)
Log(emp) $_{t-1}$	0.00680	0.00631	0.0193	0.0153
	(0.0147)	(0.0150)	(0.0167)	(0.0170)
Current ratio $_{t-1}$	-0.0368***		-0.0209**	
	(0.00686)		(0.00814)	
Leverage $_{t-1}$		0.183***		0.0982**
		(0.0326)		(0.0388)
Foreign $_{t-1}$			0.183***	0.176***
			(0.0291)	(0.0301)
Age $_{t-1}$			0.00527	0.00609
			(0.00369)	(0.00371)
Year dummies	included	included	included	included
Industry dummies	included	included	included	included
Constant	-1.320***	-1.570***	-1.209***	-1.388***
	(0.135)	(0.155)	(0.148)	(0.178)
Observations	7,515	7,862	4,984	5,140
R-squared	0.196	0.191	0.245	0.245

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. The sample contains switchers and non-exporters. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

There is significant difference between the financial variables of non-exporters and starters. Comparing the probability of being a switcher to remaining a non-exporter *ceteris paribus* decreases in the amount of available liquidity and increases with leverage ratio. As lower liquidity and higher leverage are associated with a higher probability of being a switcher, starters on average have less balanced financial structure and tend to depend more on external resources. It is also clear that productivity have a great impact in becoming a switcher. The estimation of the probability of being a switcher compared to remain a non-exporter controlling for financial constraints and individual characteristics is presented in Appendix 2. The

estimations suggest that switchers are significantly less liquid and more leveraged than continuous exporters, who are similar to non-exporters.

The aim of this section is to determine the impact of financial constraints on export decision, therefore I compared the period of exporting to non-exporting times. This specification captures the effect of financial constraints on overcoming the difficulties in starting export. Table 5 shows results for that.[32]

The probability of exporting is higher for companies who are more leveraged and less liquid a period before export. This relationship is maintained even after the important firm-level control variables are included. This suggests that companies who are more indebted and have less liquid assets are more likely to become exporters. Table 5 also shows that productivity is an important determinant in the export decision, a unit increase in total factor productivity increases the possibility of export by around 70%.[33] The estimated impact of the external constraint is in line with e.g. Greenaway et al. (2007) who also found that exporters do not have ex-ante financial advantage, but contradicts the findings of Forlani (2010) who found that financial healthier self-select into exporting.

Theory suggests that not only financial constraints can be a determinant in export decision, but export can also develop financial stability. I checked this hypothesis with a pooled OLS regression for starters and non-exporters. In that case the exporter dummy works as a before-after dummy indicating a switch in the activity. Controlling for year dummies enables to estimate the average impact of export decision on financial constraints a period after

[32] For both medium and small companies the results are robust for the choice of variable.
[33] The results are similar for medium companies, so I did not include it in the paper. The estimated effects are more significant but smaller in magnitude.

exporting compare to non-exporting times. [34] Table 6 shows the differences in financial variables.

TABLE 6: THE IMPACT OF EXPORTING ON FUTURE FINANCIAL CONSTRAINTS, MEDIUM COMPANIES

Dependent variables Independent variables	Current ratio $_{t+1}$ (1)	Current ratio $_{t+1}$ (2)	Current ratio $_{t+1}$ (3)	Leverage $_{t+1}$ (4)	Leverage $_{t+1}$ (5)	Leverage $_{t+1}$ (6)
Exporter $_t$	-0.124*** (0.0368)	-0.114*** (0.0360)	-0.0612 (0.0422)	0.0393*** (0.00850)	0.0370*** (0.00840)	0.0181* (0.0104)
Log(tfp) $_t$	0.867*** (0.144)	2.329*** (0.225)	2.080*** (0.263)	-0.498*** (0.0366)	-0.792*** (0.0552)	-0.835*** (0.0698)
Log(emp) $_t$		-0.286*** (0.0352)	-0.284*** (0.0431)		0.0582*** (0.00871)	0.0699*** (0.0110)
Age $_t$			0.0326*** (0.00923)			-0.0101*** (0.00240)
Foreign $_t$			-0.0920 (0.0803)			0.0836*** (0.0191)
Observations	7,537	7,537	5,016	7,936	7,936	5,223
R-squared	0.105	0.127	0.134	0.172	0.190	0.220

Notes: Each column reports the results of a firm level OLS regression of the financial variable on the covariates (the focus is on export dummy, which works as a before/after dummy) noted in the first column. The sample contains switchers and non-exporters. Results for the constants are suppressed. Year and industry dummies are always included. The coefficient on the exporter dummy helps to compare the average outcomes after exporting to the previous levels. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

The first and fourth columns show the effect if only industry dummies and tfp are used; exporting decreases the liquidity by 0.124 and the firms a period after are more leveraged on average. If the firm-level controls are included, the impact of export on future liquidity diminishes.[35] Although the effect on leverage is maintained, but significant at only 10% and decreases in magnitude. It shows that one period after exporting firms have on average higher leverage ratio by 0.018. For small companies the effects remain significant after all controls are included and exporters remain both less liquid and more leveraged after exporting.[36] These findings suggest that exporting does not improve financial constraints promptly compared to

[34] The estimation could be improved by using panel data methods, which I could not apply in my thesis. These methods can measure firm-level changes and provide better evidence.
[35] The results are robust for the choice of financial variable.
[36] The results are presented in Appendix 2.

the previous year's state. It is possible that accommodation takes longer and that is why no effect was measured in the regression.

The results for the intensive margin are only presented in Appendix 2. Significant negative effect was found for liquidity and a positive impact for leverage on both export flow and export ratio. This finding is consistent with the Manova model (2013), which argued that besides productivity, financial constraints are key drivers in determining the number of destinations reached.

6. CONCLUSION

My thesis is the first empirical paper that examines the relationship between financial constraints and export decision in an Eastern European country. It provides evidence for the widely observed relationship using Hungarian firm-level data between 1998 and 2004. It is also unique in a sense that different exporter types are precisely defined with the help of an outstanding long dataset. Studying the changes in the financial constraints of companies that switched to exporting shows evidence for the changes in credit constraints around export.

I test the effect of financial constraints on firm export entry decision in a heterogeneous firm trade framework *á la* Melitz (2003). I used two different indices from the business economics literature (liquidity and leverage ratio) to measure the credit constraints a firm potentially face.

I showed that after controlling for important firm-level characteristics (size, ownership, productivity) the effect of financial constraints diminishes for medium-sized companies. Focusing on the subsample of switchers, which is supposed to capture the exact changes observed around exporting, it turned out, that export beginners are indeed depend more on external financial resources a year before they switch. Exporting does not develop the financial variables of the firms promptly, but the results showed that it returns back to its original value. The empirical analysis has some drawbacks, which should be improved in further analysis and can have important policy implications. I think the results presented here are good starting points in analyzing the relationship between financial constraints and export entry in Hungary.

The empirical analysis strengthened the importance of separating small and medium sized companies. This distinction is not only important as the two groups tend to behave differently, but also their credit application process differs greatly. The instable results I found for small companies can be the outcome of the bad quality of the data, as in their case I could only measure the explanatory variables with great variance that could cause attenuation bias. But it could also be because the financial variables I used do not play an important role in the credit decision, as bank managers put more focus on subjective information and personal interactions. Therefore overcoming liquidity needs and financial constraints only have a weak relation.

On the other hand I found significant correlation between leverage and export for medium firms, which vanished when I controlled for observable characteristics. It is partly driven by the strong negative correlation between productivity and financial constraints, which was argued in the paper. Foreign ownership also plays an important role in export decision, and the exact mechanism it contributes needs further analysis. These results are robust for different specifications. My results for medium enterprises suggest that in Hungary between 1998 and 2004 the main drivers in internationalization were productivity, foreign ownership and size, which had very strong and consistent impacts on the extensive margin.

It seems that financial constraints are not major obstacles in internationalization; rather the distinction between exporters and non-exporters is driven by productivity and size for Hungarian firms. It is possible that sunk costs for foreign market entry are not that high or access to finance does not cause difficulties, so for those firms that are productive enough to earn profits on foreign markets, financial constraints are not binding. This is supported by the cited documents of the National Bank of Hungary in the Introduction. The same was found by Arndt et al. (2012) who claimed that due to the cooperation between firms and banks or savings cooperates, German firms do not face barriers in applying for external funds. However the institutional setting for Hungary needs more detailed analysis to strengthen the assumption.

On the other hand I found that there is a change in financial variables during the one year period before and one year after exporting. Firms that are committed to exporting are significantly more leveraged at both time points, which can be the result of the paid sunk costs. Before exporting switchers display lower liquidity as well. These together suggests that exporters use external financial sources to cover the sunk costs associated with exporting. The difference in financial variables disappears as they become continuous exporters. Unfortunately the recovery cannot be observed due to the limited length of the panel.

All these finding have clear policy implications: exporting can be supported if the state focuses on activities that develop productivity, instead of financial assistance. During the studied period Hungarian firms could have been supported by productivity enhancement to tear down the barriers in exporting. Financial support does not seem to be necessary, as the regressions showed it was not a burden in the firms' decision. One possibility is to favor innovation and research and development programs.

My study can be improved in several ways to verify the already existing results and reach more convincing conclusion about causality. Firstly the dataset could be extended after controlling for the important shocks that affected the studied fields. This would help to answer the question whether the observed relationship is a unique attribute of the period or characterizes Hungary only.

The potential pitfalls of using balance sheet proxies have been discussed in the body of the paper. One way to improve the precision of the way constraints are measured is focusing on the supply side of credit and use information about banks. This approach is very different from studying the intentions of the companies, which was applied in this paper. It assumes that firms tend to have long-lasting relationship with their customers and once they are in trouble, firms connected to them face real constraints in using external finance. (Del Prete and Federico, 2014)

A convenient tool to analyze the impact of export on the financial constraints would be the use of propensity score matching. Matching firms that are identical in all observed characteristics except from export, and compare their outcomes, identifies the causal relationship, but it requires more information about the timing of the decisions. (see e.g. Grima et al, 2004)

Finally available information about trade destinations and volume can be used to extend the study. The determinants of trade volume and the number of countries served can be examined to reach a more conclusive impression about the behavior of Hungarian exporters.

REFERENCE LIST

ARNDT C., BUCH C. M., MATTES A. (2012). *Disentangling barriers to internationalization.* Canadian Journal of Economics. Vol. 45. No. 1. pp. 41-63.

BECK T. (2002). *Financial development and international trade. Is there a link?* Journal of International Economics, Vol. 57. pp. 107-131.

BERMAN N., HÉRICOURT J. (2010). *Financial factors and the margins of trade: Evidence from cross-country firm-level data.* Journal of Development Economics, Vol. 93. Issue 2. Pp. 206‑217

BERNARD A. B., JENSEN J. B. (1995). *Exporters, Jobs and Wages in U.S. Manufacturing, 1967-87.* Brookings Papers on Economic Activity: Microeconomics.

BERNARD A. B., JENSEN J. B. (2004). *Why Some Firms Export.* The Review of Economics and Statistics. Vol 86. No. 2. pp. 561-569.

BOND S., MEGHIR C. (1994). *Dynamic Investment Models and the Firm's Financial Policy.* The Review of Economic Studies, Vol. 61. No. 2. pp. 197-222

BREALY R. A., MYERS S. C. (2011). *Modern Vállalati Pénzügyek* (in English: Principles of Corporate Finance). Panem Kiadó.

CAMPA J. M., SHAVER J. M. (2002). *Exporting and Capital Investment: In the Strategic Behavior of Exporters.* CFF-IESE Research Paper No 49. Downloaded from: http://core.ac.uk/download/pdf/6536338.pdf. Last access: 01.06.2015.

CHAMBERLAIN G. (1980). *Analysis of Covariance with Qualitative Data*. Review of Economic Studies, Vol. 47. pp. 225-238.

CHANEY T. (2013). *Liquidity Constrained Exporters.* NBER Working Papers 19170. Downloaded from: http://www.nber.org/papers/w19170.pdf. Last access: 01.06.2015.

CHEN L., ZHAO X. (2006). *On the relationship between the market-to-book ratio, growth opportunity, and leverage ratio.* Finance Research Letters, Vol. 3. pp. 253-266.

COFACE WEBPAGE (2015). *About Coface.* Available at: http://www.coface.rs/en/About-Coface. Last access: 01.06.2015.

DAMODARAN A. (2011). *The Little Book of Valuation: How to Value a Company, Pick a Stock and Profit.* John Wiley & Sons Inc., New Jersey.

DEL PRETE S., FEDERICO S. (2014). *Trade and finance: is there more than just 'trade finance'? Evidence from matched bank-firm data.* Banca D'Italia Eurosistema. Temi di Discussione-Working Papers. No. 948.

EU.KORMANY.HU (2015). *The history of Hungarian EU membership*. Available at: http://eu.kormany.hu/the-history-of-hungarian-eu-membership. Last access: 01.06.2015.

FARRE-MENSA J., LJUNGQVIST A. (2013). *Do Measures of Financial Constraints Measure Financial Constraints?* NBER Working Paper No. 19551

FAZZARI S. M., HUBBARD R. G., PETERSEN B. C. (1988). *Financing Constraints and Corporate Investment.* Brooking Papers on Economic Activity, Vol. 1988. Issue 1. pp. 141-195.

FORLANI E. (2010). *Liquidity Constraints and Firm's Export Activity.* Centro Studi Luca D'Agliano Development Studies Working Papers. No. 291

GREENAWAY D., KNELLER R. (2007). *Firm Heterogeneity, Exporting and Foreign Direct Investment.* The Economic Journal. Vol.117. No. 517. pp. F134-F161.

GREENAWAY, D., GUARIGLIA, A., KNELLER, R. (2007). *Financial factors and exporting decisions. Journal of International Economics.* Vol. 73. No.2. pp. 377–395.

GRIMA S., GREENAWAY D., KNELLER R. (2004) *Does Exporting Increase Productivity? A Microeconomic Analysis of Matched Firms.* Review of International Economics. Vol. 12, No. 5, pp. 855-866.

KAPLAN S. N., ZINGALES L. (1997). *Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?* The Quarterly Journal of Economics. Vol. 112. No. 1. pp. 169-215.

LÍZAL L., SVEJNAR J. (2002). *Credit Rationing, and the Soft Budget Constraint: Evidence from Czech Panel Data.* The Review of Economics and Statistics. Vol. 84. No. 2, pp. 353-370

MANEZ J. A., ROCHINA-BARRACHINA M. E., SANCHIS-LLOPIS J. A., VICENTE O. (2013). *Financial constraints and Spanish manufacturing firms' R&D and exporting strategies.* Universitat de Valencia and ERICES Working Papers in Applied Economics. WPAE-2013-24. Downloaded from: ftp://147.156.210.157/RePEc/pdf/eec_1324.pdf. Last access: 09.05.2015

MANOVA K. (2013). *Credit Constraints, Heterogeneous Firms, and International Trade.* Review of Economic Studies. Vol. 80. pp. 711-744.

MELITZ M. J. (2003). *The impact of trade on intra-industry reallocations and aggregate industry productivity.* Econometrica Vol. 71. No.6. pp. 1695-1725.

MINETTI R., ZHU S. C. (2011). *Credit constraints and firm export: Microeconomic evidence from Italy.* Journal of International Economics. Vol. 83. pp. 109-125.

MNB (2000). *Éves jelentés (in English: Yearly Report) by the Monetary Strategy and Economic Analysis Department in the National Bank of Hungary.* Edited by Zsuzsa Sötét. Available at: http://www.mnb.hu/Root/Dokumentumtar/MNB/Kiadvanyok/mnbhu_evesjel/eves_jelentes_2000_hu.pdf. Last access: 02.06.2015.

MNB (2015) *Statistical Information About Monetary and Other Balance Sheet Information.* Available at: http://www.mnb.hu/Statisztika/statisztikai-adatok-informaciok/adatok-idosorok. Last access: 03.06.2015.

MODIGLIANI, F., MILLER, M. H. (1958). *The cost of capital, corporation finance and the theory of investment.* American Economic Review Vol. 48. No.3. pp. 261–297.

MUULS M. (2008). *Exporters and credit constraints. A firm level approach.* Downloaded from: http://cep.lse.ac.uk/seminarpapers/27-06-08-MUU.pdf Last access: 9 May 2015

OLINER S. D., RUDEBUSCH G. D. (1992). *Sources of Financial Hierarchy for Business Investment.* The Review of Economics and Statistics. Vol. 74. No. 4. pp. 643-654.

STIEBALE J. (2011). *Do Financial Constraints Matter for Foreign Market Entry? A Firm-level Examination.* The World Economy. Vol. 34. No. 1. pp. 123-153.

VAN BIESEBROECK J. (2005). *Exporting raises productivity in sub-Saharan African manufacturing firms.* Journal of International Economics. Vol. 67. No. 2. pp. 373-391

WAGNER J. (2014). *Credit constraints and exports: a survey of empirical studies using firm-level data.* Industrial and Corporate Change. Vol. 23. No 6. pp. 1477-1492.

WHITED T. M. (1992). *Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data.* The Journal of Finance. Vol. 47. No. 4., pp. 1425-1460.

WOOLDRIDGE J. (2012). *Introductory econometrics: A modern approach.* Cengage Learning, 5th Edition.

WOOLDRIDGE J. M. (2009). *On estimating firm-level production functions using proxy variables to control for unobservables.* Economics Letters, Vol. 104, No. 3, pp. 112–114.

APPENDIX 1 – DATA

In Appendix 1 I provide detailed explanation for the modifications I carried out on the dataset and the problems arose with the balance-sheet data. I also give more information about the defined variables and about the other versions that I excluded from the body of the paper, but the results are used as robustness checks.

1.1 Restrictions on the sample

Bank managers, I spoke to, stated that there is a great difference in the valuation of small and medium companies and in their credit application procedure. For medium companies the decision can be derived based on objective and measured variables, while for small firms subjective elements are more important as balance sheet data are not entirely reliable. The cutoff value between medium- and small companies is a matter of faith. The interviewees argued that today they use the threshold of 1 billion HUF annual income. Therefore in the sample I applied 100 million HUF annual income as a threshold, which is likely to be similar to the difference in current HUF. The results are robust to small modifications in the cutoff value. (The largest value I checked was 200 million HUF, where the differences became smaller but were still detectable.) I also dropped the largest companies (with the smallest annual sales over 1 billion HUF) as the implications of the theory suggest that they do not face financial constraints.

1.2 Details on data issues

There are several factors that can cause distortions in measuring current assets and liabilities. First, the timing of sales or payback of liabilities can be a tool to show more balanced operation at the end of accounting year. Second, because of the composition of current assets, using them as proxies for the financial constraints of the company has drawbacks. They hide the difference between the categories of current assets, which can be misleading, as a great level

of stocked materials is not equivalent to owning the same amount of profitable securities with high return. Third, the cash conversion circle can also greatly modify the interpretation of the ratios. It is possible that without knowing the exact operation of the companies, the analysis treats two companies equally based on the observed variables; however they can be very different in their ability to convert resources to cash flow. (Damodaran, 2011)

Another important problem with using Hungarian balance sheet data is the troubles caused by the changes in the accounting system. According to my research the effect systematically differed based on export status and the reason behind it is unclear. It is possible that the composition of their assets alters greatly, therefore changing the valuation e.g. of intangible assets have a serious impact on one group, while the other remains untouched. Even if a change in regulation is detected in the balance sheet data, it cannot be easily corrected. The correction implied by the regulation cannot be distinguished from real changes and an undefined category at the opposite side of the balance sheet should be modified as well. In some cases the valuation methodology changed, e.g. from book value to real value, for which the basis is hard to find. I show this issue using the example of changes in the value of intangible goods for medium-sized firms.

The level of intangible goods changed dramatically for continuous exporters in 2003 and a year later for non-exporters. The average amount of intangible goods nearly tripled. The change in the average is not driven by outliers, as studying the standard deviation, median and percentiles shows that the whole distribution shifted. Behind the changes lie different modifications of regulation: the rules for amortization changed and the valuation methods and the categories belonging to intangible goods were modified. Unfortunately the difference in the date of shift remained questionable for me. It is also hard to correct the changes back to the old regulation, as real changes and changes due to regulation are impossible to distinguish. I did not find any papers using Hungarian data which was able to control for these facts.

TABLE A 1.1: THE DIFFERENCES BETWEEN THE VALUE OF INTANGIBLE GOODS FOR NON-EXPORTERS AND PERMANENT EXPORTERS, MEDIUM COMPANIES

Year	Non- exporters		Permanent exporters	
1996	905.6585	(3574.646)	4827.994	(27075.06)
1997	1057.906	(3616.624)	6525.618	(34270.09)
1998	1292.767	(4982.263)	11884.72	(184327.1)
1999	1178.052	(4253.431)	12315.67	(170852.8)
2000	1961.289	(23135.74)	11604.77	(154944.3)
2001	1002.068	(3202.139)	12255.67	(143118.1)
2002	985.1979	(3491.06)	13850.8	(134457.7)
2003	1423.097	(8791.896)	***49116.94***	***(1248529)***
2004	***2276.277***	***(24930.18)***	42520.48	(168108.3)
2005	3048.144	(27471.77)	16623.65	(139973.6)

Note: The table shows the average value of intangible goods in the companies belonging to the group noted at the top of each column. The value is measured in thousand HUF. Standard errors are in parenthesis. The comparison contains only medium firms.

Leaving balance sheet data without correction raises issues, as it also heavily affects the values of financial constraint measures and does not reflect on real economic activity. If the change effects exporters and non-exporters differently (e.g. due to a different level of sales) it is possible to get a biased estimation for external constraints. I could only filter outliers for each parameter and drop them or replace them with the upper and lower bounds.

1.3 Additional information on variables

Information about foreign activity

Table A 1.2 shows the number, the average annual income and export ratio for the three defined subsets (non-exporters, permanent-exporters and switchers).

TABLE A 1.2: THE NUMBER, AVERAGE REVENUE AND EXPORT RATIO OF DIFFERENT TYPES OF EXPORTERS, MEDIUM COMPANIES

	Non-exporters		Switchers			Permanent exporters		
	No.	Average sales revenue	No.	Average sales revenue	Average export ratio	No.	Average sales revenue	Average export ratio
1996	530	8730.149	437	29343.9	0.087655	1043	270836	0.456228
1997	618	7418.955	511	37924.22	0.09685	1162	514135.1	0.453215
1998	592	12222.78	544	40473.28	0.088057	1246	697126.1	0.48189
1999	630	9161.332	590	60113.51	0.100487	1275	916995.1	0.479552
2000	658	9663.368	624	90695.05	0.117712	1332	1013240	0.48937
2001	692	9120.896	639	100764.3	0.123984	1382	981199.4	0.493803
2002	779	3386.513	653	118206.5	0.130997	1452	814027.6	0.474134
2003	850	1002.748	664	153841	0.134065	1468	741821	0.473444
2004	810	927.316	641	159130.7	0.146921	1432	708858.6	0.462197
2005	785	6035.742	631	218165.1	0.157588	1382	833842.2	0.467129

Note: The table shows differences for the three exporter types. Average sales revenue is measured in thousand HUF.

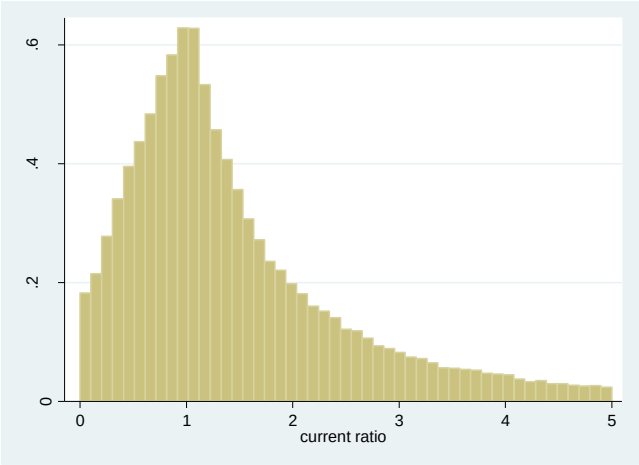
The table shows the dominance of permanent exporters in every year. The table suggests the important difference between the companies in their annual income.

Liquidity

Several different approaches can be found to measure liquidity, which differ in their definition of liquid assets and only some of them are included in my analysis. Some variables only include cash and its equivalents (meaning that these has to cover the firms' short-term loans), while others measure the broader category of working capital. The narrower the definition of short-term assets is, the stricter the definition becomes, which should be considered in the interpretation.

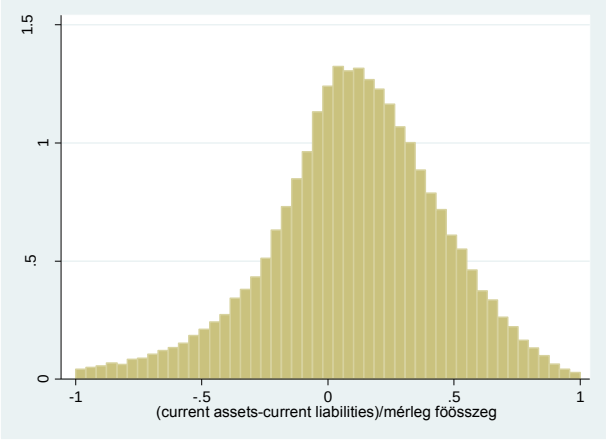
By definition *current ratio* equals to $\frac{current\ assets}{short-term\ debt}$. Unfortunately I did not have any exact data about the value of debt in the companies' balance sheet between 1998 and 2004. Instead I used the level of current liabilities. When information on both were available (1992-1997) I checked their co-movement. The empirical correlation between the two is quite high, around 0.9 for every quartile in the size distribution.[37] Therefore it seems to be a reasonable choice to use current liabilities as a proxy for short-term debt. The line of current assets was empty in the database. I calculated it as the sum of stocked goods, claims, securities and cash, which are its ingredients based on the Hungarian Accounting Law. (2000/C. Act about Accounting) Except from securities all data were available for enough number of observations in the sample. Information about securities in the balance sheet were only available in limited number of cases, mainly to bigger and healthier companies. Excluding them would have led to significant bias in the results. Instead of that I always use restrictions on the calculated variables to avoid outliers and decrease measurement error. By definition the ratio of two positive values must be positive, so in the case of *current ratio* I restricted the range to positive values below 5, which upper bound comes from the empirical distribution of the values. Graph 1 shows the distribution of current ratio.

[37] Although the correlation is high, the category of current liabilities contains other relevant balance sheet information which can modify my results. In this way obligations to suppliers is also included in current liabilities which is by its nature very different from credit. Obligations to suppliers are riskier than bank credit and their coverage is different from debt liabilities.



Graph 1: The distribution of the current ratio for all companies in the sample

Besides current ratio I also used the $\frac{current\ assets - current\ liabilities}{total\ assets}$. The ratio cannot exceed one and cannot be smaller than minus one (as none of the subcategories in total assets can exceed the broader category), which by nature bound the possible values. In my thesis I used two specifications: one of them defined total assets as the sum of all assets, and the other defined it as the sum of fixed and current assets. The second one is a narrower definition and exclude accrued expenses, which is according to my research more important in the Hungarian accounting than in in the previously studied that countries, e.g. UK [in Greenaway et al. (2007)] or Belgium [in Muuls (2008)]. These papers did not question the definition of total assets, however in Hungary it can cause an essential difference if it is included/excluded from total assets. This difference does not affect my results, so I used the one which uses total assets.

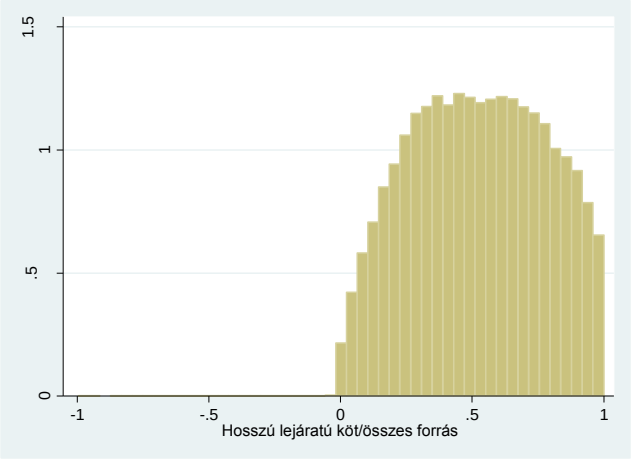


Graph 2: The distribution of Liquidity 2 for all companies in the sample

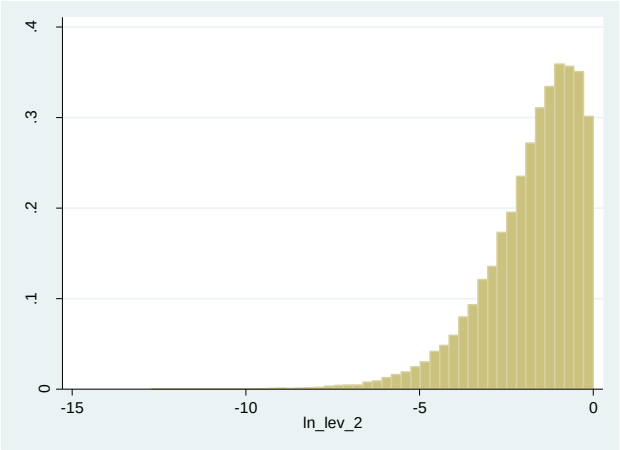
Leverage

The interpretation of leverage ratios causes several difficulties. In the body of the text I claimed that a higher leverage ratio makes firms more risky and a lower level of debt compared to equity is more stable and can be handled on the long-run. However, it is not always the case. As Chen and Zhao (2006) argue, for firms with higher market-to-book values it is more beneficial to apply for credit as it is relatively cheaper for them than raising equity. While on the other hand the opposite is true for firms with lower market-to-book values. This means that the standard interpretation that a higher leverage ratio means constraints is not true for a subset of firms, which can be a result for observed differences.

All the values in the case of leverage ratios must be positive, as they divide two positive numbers taken from the balance sheet. Both calculated variables have power distribution, which is why their logarithms are taken and used later on. Based on their observed distribution, the majority of values for the first measure $\left(\frac{long-term\ liabilities}{long-term\ liabilities\ and\ equity}\right)$ lies below 5 (Graph 3 displays the histogram of the variable), and the upper limit for the second $\left(\frac{short-term\ debts+long-term\ debts}{short-term\ debts+long-term\ debts+equity}\right)$ is around 1 (Graph 4 displays the histogram of the variable). As Bernard and Héricourt (2010) claims it measures the lack of collateral and current demand for borrowing relative to capacity.



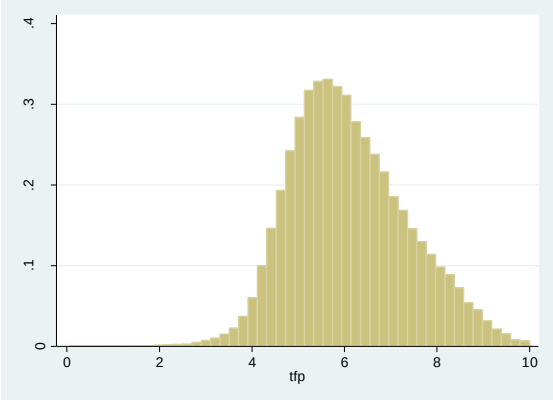
Graph 3: The distribution of Leverage for all companies in the sample



Graph 4: The distribution of Leverage2 (which equals the logarithm of the defined ratio) for all companies in the sample

Productivity

Productivity was calculated with the methodology of Wooldridge (2009). The method uses a GMM estimation to determine the coefficients on the variable inputs and capital inputs. It has the advantage that it can solve the problem of endogeneity caused by the optimally predetermined input variables. For the full sample the estimated values are distributed according to Graph 5.



Graph 5: The distribution of tfp for all companies in the sample

APPENDIX 2- ROBUSTNESS CHECKS

2.1 Further evidence for the difference between exporters and non-exporters

In this section I present further evidence for the differences between exporters and non-exporters.

Yearly comparison for medium firms

Table A 2.1 shows the yearly measured averages for the variables presented in the body of the paper. It suggests that not only the level of variables and but also their growth rates are higher for exporters. The table also highlights the difficulties related to the dataset, as the jumps in some of the variables can be clearly seen (e.g. foreign share in 2005). These jumps are the outcomes of changes in the regulation that I could not clear and correct.

TABLE A 2.1: THE TABLE SHOWS THE AVERAGES OF THE MOST IMPORTANT CHARACTERISTICS FOR EACH EXPORTER TYPES, MEDIUM COMPANIES

Non-exporters

	Revenue	Revenue from exports	Fixed assets	Total assets	Number of employees	Age	Tfp	Average wage	% of foreign owned firms
1996	309769.5	NA	70900.81	155554.4	57.4	2.5	7.1	799.45	0.11
1997	341893.8	NA	208127.2	177162	53.8	3.1	6.9	893.77	0.11
1998	395155.6	NA	94872.28	202843.1	57.4	3.7	7.0	1018.83	0.10
1999	389137.7	NA	94965.52	212762.6	53.8	4.2	6.9	1087.32	0.09
2000	438870.8	NA	102856.2	231403.3	50.8	4.8	6.9	1236.54	0.09
2001	475920.6	NA	108242.2	248149.9	48.8	5.3	6.7	1494.98	0.09
2002	469472.1	NA	105958.9	246846	46.3	5.8	6.6	1563.52	0.07
2003	469017.4	NA	121396.5	270681.8	44.6	6.2	6.6	1611.87	0.06
2004	496798.6	NA	142834	306007.6	47.8	7.1	6.6	1760.76	0.07
2005	489103.8	NA	166932.3	327097.8	46.6	8.1	6.6	1856.01	0.99

Switchers

	Revenue	Revenue from exports	Fixed assets	Total assets	Number of employees	Age	Tfp	Average wage	% of foreign owned firms
1996	307474	29343.9	105448.9	213558.1	63.7	2.5	7.3	936.06	0.25
1997	371730	37924.22	286727.2	247363.5	64.1	3	7.3	1055.23	0.24
1998	445011.3	40473.28	137444.1	284108.9	67.8	3.7	7.3	1153.49	0.20
1999	497242.6	60113.51	176050.5	350993.7	68.1	4.3	7.3	1306.05	0.20
2000	636026	90695.05	197290.3	416447.1	68.1	4.9	7.3	1469.93	0.22
2001	697286	100764.3	311301.7	551138.1	66.7	5.7	7.2	1703.47	0.23
2002	728862.3	118206.5	247652	527426.3	65.0	6.5	7.2	1915.19	0.23
2003	765424.2	153841	280478.9	591991.3	64.1	7.4	7.1	2030.78	0.20
2004	882468.2	159130.7	305119.6	644232.8	64.6	8.2	7.1	2150.52	0.21
2005	950149.1	218165.1	325992.3	699693.5	66.0	9.2	7.1	2281.19	0.98

Permanent exporters

	Revenue	Revenue from exports	Fixed assets	Total assets	Number of employees	Age	Tfp	Average wage	% of foreign owned firms
1996	524830.9	270836	203726.8	424906.8	139.7	2.7	7.9	902.66	0.45
1997	829310.6	514135.1	382968.8	554394.2	140.4	3.4	7.9	1065.09	0.44
1998	1044927	697126.1	295954.6	681469.9	141.7	4.0	7.9	1227.37	0.44
1999	1291737	916995.1	348812.4	823756.6	138.5	4.7	7.9	1367.16	0.44
2000	1448125	1013240	386863	932365.3	133.4	5.2	7.9	1579.15	0.43
2001	1442124	981199.4	445534	1013295	132.7	5.8	7.7	1833.76	0.45
2002	1275551	814027.6	435327.2	974737.8	119.2	6.4	7.6	2025.12	0.44
2003	1232393	741821	484382.5	1030700	109.6	7.1	7.6	2168.04	0.43
2004	1262235	708858.6	516421.7	1058945	108.0	8.0	7.6	2298.069	0.43
2005	1453317	833842.2	534001.4	1126455	105.6	9.0	7.5	2416.7	0.97

Notes: Each column reports the averages for a given group in medium firms in a given year between 1996 and 2005. The values from the balance sheet are measured in thousand HUF. Standard errors are not displayed, but they are similar in magnitude to the previously showed examples.

Small companies

Table A 2.2 shows quite similar results compared to the observed patterns in the case of medium firms. Small companies strengthen the assumption that exporter firms are larger in several aspects: both domestic and foreign sales, the value of assets, number of employees and total factor productivity. However, in some cases (e.g. fixed) the difference between switchers and continuous exporters is not as apparent as it was for the medium companies. Pooled averages are presented together with standard errors.

TABLE A 2.2: SUMMARY STATISTICS ABOUT DIFFERENT EXPORT TYPES, SMALL FIRMS

	Non-exporters		Switchers		Continuous exporters	
Revenue	70469.17	(109875.1)	259982.3	(1959128)	339161	(4500223)
Revenue from export sales	NA		122273.8	(1822777)	204517.8	(1724981)
Fixed assets	21655.9	(76167.57)	119766.5	(901821.5)	137139.3	(994602.5)
Intangible assets	300.3394	(2884.602)	2780.927	(54340.13)	3160.948	(70674.22)
Total assets	44780.55	(206338.3)	219284.8	(1472539)	251257.5	(1599281)
Number of employees	17.37	(41.796)	29.11	(53.483)	41.59	(82.012)
Age	5.15	(2.950)	5.29	(2.886)	5.25	(2.936)
TFP	5.367	(0.802)	5.97	(0.945)	6.20	(1.024)
Average wage	909.03	(517.508)	1131.52	(826.774)	1243.10	(842.740)
Percentage of foreign owned firms	0.06	(0.186)	0.16	(0.368)	0.38	(0.485)

Notes: Each column reports the averages (total or yearly) with their standard deviation for a given group in small firms. The first five rows are measured in thousand HUF.

Table A 2.3 displays the correlations between total factor productivity and all the financial variables I calculated for small companies. It shows that the predicted relationship is true for this subsample as well. More productive firms on average are more liquid and less leveraged, so their financial structure is more stable and balanced.

TABLE A 2.3: CORRELATION BETWEEN FINANCIAL CONSTRAINTS AND PRODUCTIVITY, SMALL COMPANIES

Dependent variables	Liquidity 2	Current ratio	Leverage2	Leverage	Liquidity 2	Current ratio	Leverage2	Leverage
Log(tfp)	0.0493***	0.298***	-1.586***	-0.188***	0.260***	0.880***	-1.955***	-0.374***
	(0.0138)	(0.0414)	(0.0784)	(0.0120)	(0.0202)	(0.0569)	(0.109)	(0.0185)
Year dummies	included	included	included	included	included	included	included	included
Industry dummies					included	included	included	included
Observations	42,388	38,021	19,651	42,425	42,388	38,021	19,651	42,425
R-squared	0.005	0.005	0.053	0.022	0.026	0.020	0.056	0.046

Notes: Each column reports the results of a firm level OLS regression of dependent variable noted at the top of each column on the covariates noted in the first column. Results for the constants are suppressed. Year dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

TABLE A 2.4: ESTIMATION OF THE BASIC MODEL WITH ADDITIONAL FINANCIAL VARIABLES, MEDIUM COMPANIES

Dependent variables	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Liquidity2_{t-1}$	-0.091***	-0.0788***	-0.0152	0.0311				
	(0.0218)	(0.0222)	(0.0268)	(0.0295)				
$Log(tfp)_{t-1}$	1.012***	0.871***	0.556***	0.611***	0.986***	0.859***	0.586***	0.766***
	(0.0397)	(0.0701)	(0.0806)	(0.0829)	(0.0464)	(0.0786)	(0.0928)	(0.101)
$Log(emp)_{t-1}$		0.0241**	0.0535***	0.0599***		0.0219**	0.0491***	0.0362***
		(0.00964)	(0.0108)	(0.0107)		(0.0107)	(0.0122)	(0.0130)
$Foreign_{t-1}$			0.172***	0.216***			0.135***	0.180***
			(0.0145)	(0.0154)			(0.0168)	(0.0183)
Age_{t-1}			0.00334	0.000690			0.00558*	0.00331
			(0.00252)	(0.00284)			(0.00296)	(0.00336)
$Leverage2_{t-1}$					0.0110***	0.0112***	0.00590	0.000663
					(0.00339)	(0.00338)	(0.00411)	(0.00466)
Year dummies	included	included	included	included	included	included	included	included
Industry dummies	included	included	included		included	included	included	
Observations	16,353	16,353	10,706	10,706	9,721	9,721	6,495	6,495
R-squared	0.307	0.308	0.361	0.185	0.331	0.332	0.384	0.179

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. The subsample I used is medium firms. Results for the constants are suppressed. Year dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

2.2 Robustness checks for the basic model

Table A 2.4 presents the estimation results when different financial variables are used for medium-sized companies. It shows that the results for medium companies are robust for the choice of measurement. Each defined liquidity ratio has a significant negative impact on export decision, which disappears when industry dummies are included. The same holds for positive leverage ratio.

TABLE A 2.5: ESTIMATION OF THE BASIC MODEL, SMALL COMPANIES

Dependent variables	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$
Independent variables	(1)	(2)	(3)	(4)
$Liquidity2_{t-1}$	-0.0363***			
	(0.0131)			
$Log(tfp)_{t-1}$	0.553***	0.530***	0.546***	0.598***
	(0.0385)	(0.0389)	(0.0645)	(0.0426)
Current $ratio_{t-1}$		-0.00652**		
		(0.00303)		
$Leverage2_{t-1}$			0.00549	
			(0.00440)	
$Leverage_{t-1}$				0.0903***
				(0.0168)
$Log(emp)_{t-1}$	0.0437***	0.0456***	0.0639***	0.0381***
	(0.00881)	(0.00882)	(0.0122)	(0.00930)
$Foreign_{t-1}$	0.364***	0.363***	0.337***	0.358***
	(0.0138)	(0.0139)	(0.0171)	(0.0143)
Age_{t-1}	0.000739	0.00133	0.00210	0.00205
	(0.00172)	(0.00176)	(0.00236)	(0.00177)
Year dummies	included	included	included	included
Industry dummies	included	included	included	included
Observations	24,970	22,849	11,459	23,954
R-squared	0.287	0.291	0.318	0.288

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. The subsample I use is small firms. Results for the constants are suppressed. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Table A 2.5 displays the estimation results when the sample of small firms is used. Only the specification with the greatest amount of control variables is presented. It suggests that liquidity affects negatively the export decision, while for leverage ratio it shows an unclear pattern. The results strengthen the importance of productivity in export decision, but shows

that in addition for small firms financial constraints seem to matter. However the sign of the effect is unambiguous.

Table A 2.6 shows the results for the estimations including interaction terms. The financial variables are interacted with the total factor productivity of the company. The estimation suggests that there is no difference in the effect of external constraints as productivity increases for medium-sized companies. Based on that I cannot conclude anything about the relationship between the two types of financial sources.

TABLE A 2.6: ESTIMATION OF THE BASIC MODEL WITH INTERACTION TERMS, MEDIUM COMPANIES

Dependent variables	$Exporter_t$	$Exporter_t$	$Exporter_t$	$Exporter_t$
Independent variables	(1)	(2)	(3)	(4)
$Log(tfp)_{t-1}$	1.000***	1.034***	0.627***	0.475***
	(0.0615)	(0.0895)	(0.0942)	(0.128)
$Current\ ratio_{t-1}$	-0.0279		0.0909	
	(0.0606)		(0.0667)	
$Log(tfp)_{t-1}$ * $Current\ ratio_{t-1}$	0.00567		-0.0465	
	(0.0297)		(0.0329)	
$Leverage_{t-1}$		0.0883		-0.281
		(0.266)		(0.287)
$Log(tfp)_{t-1}$ * $Leverage_{t-1}$		0.000902		0.147
		(0.130)		(0.141)
$Log(emp)_{t-1}$			0.0531***	0.0533***
			(0.0108)	(0.0111)
$Foreign_{t-1}$			0.172***	0.169***
			(0.0147)	(0.0151)
Age_{t-1}			0.00351	0.00357
			(0.00255)	(0.00261)
Observations	15,274	15,987	10,063	10,413
R-squared	0.312	0.306	0.366	0.361

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. Covariates include interaction terms. The subsample I used is medium companies. Results for the constants are suppressed. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

TABLE A 2.7 : ESTIMATION WITH LAGGED FINANCIAL VARIABLES, MEDIUM COMPANIES

Dependent variable	$Exporter_t$	
Independent variables	(1)	(2)
$Exporter_{t-1}$	0.650***	0.658***
	(0.0159)	(0.0155)
$Log(tfp)_{t-1}$	0.211***	0.2***
	(0.0476)	(0.0476)
$Log(employment)_{t-1}$	0.011*	0.013**
	(0.00633)	(0.00613)
$Foreign_{t-1}$	0.065***	0.059***
	(0.00819)	(0.00833)
Age_{t-1}	0.003**	0.003**
	(0.0014)	
$Current\ ratio_{t-1}$	0.003	
	(0.00493)	
$Current\ ratio_{t-2}$	-0.008	
	(0.00495)	
$Leverage_{t-1}$		-0.032
		(0.028)
$Leverage_{t-2}$		0.046*
		(0.0257)
Year dummies	included	included
Industry dummies	included	included
Observations	6719	6988
R^2	0.637	0.638

Notes: Each column reports the results of a firm level OLS regression of the export dummy on the covariates noted in the first column. Covariates include lagged explanatory variables. The subsample I used is noted at the top of each column. Results for the constants are suppressed. Year and industry effects are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Table A 2.7 presents the effect if including more than one lags of financial constraints to understand the adaption mechanism a firm carries out before exporting starts. The results are presented only for medium companies. I included the lagged value of exporter as well to account for the correlation between the lagged values of the dependent variable. The lagged value of export has great and significant contribution which captures a part of the effect of tfp.

The results suggest that firms start to prepare earlier for exporting, however the evidence is significant only at 10%.

2.3 Differences between non-exporters and switcher

The first and fourth column of Table A 2.8 shows the impact of firm-level characteristics on the possibility of being a switcher compare to staying in non-exporter status. This is captured by a linear probability model on switcher dummy controlling for industry, year dummies and firm attributes. The difference can be tracked in every category.

TABLE A 2.8: COMPARING DIFFERENT EXPORTER TYPES, MEDIUM COMPANIES

Dependent variable	Switcher to non-exporter	Continuous exporter to non-exporter	Continuous exporter to switcher	Switcher to non-exporter	Continuous exporter to non-exporter	Continuous exporter to switcher
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
Log(tfp) $_{t-1}$	1.033***	0.597**	0.055	1.095***	0.596***	-0.0161
	(0.144)	(0.1)	(0.134)	(0.154)	(0.105)	(0.137)
Log(employment) $_{t-1}$	-0.0251	0.058***	0.112***	-0.0298	0.0589***	0.118***
	(0.0237)	(0.0138)	(0.0165)	(0.0241)	(0.014)	(0.0166)
Age $_{t-1}$	0.0159***	0.007**	0.001	0.0170***	0.007**	0.000
	(0.00505)	(0.003)	(0.00396)	(0.00509)	(0.0032)	(0.00403)
Foreign $_{t-1}$	0.201***	0.209***	0.173***	0.187***	0.204***	0.177***
	(0.0406)	(0.0198)	(0.0231)	(0.0419)	(0.0201)	(0.0236)
Current ratio $_{t-1}$	-0.0350***	-0.003	0.0238***			
	(0.0106)	(0.0071)	(0.0084)			
Leverage $_{t-1}$				0.120**	-0.003	-0.088**
				(0.0507)	(0.0312)	(0.038)
Year dummies	included	included	included	included	included	included
Industry dummies	included	included	included	included	included	included
Observations	4,984	7853	7934	5,140	8125	7779
R^2	0.293	0.482	0.256	0.291	0.477	0.257

Notes: Each column reports the results of a firm level OLS regression of the type dummy on the covariates noted in the first column. This estimation captures the difference between two types of exporters for medium firms. The subsample I used is noted at the top of each column. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. The values for constant are suppressed. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Not only financial constraints differ for the firms, but starters are also larger in terms of employees, more productive and older. They have on average lower liquidity and are more leveraged. The second and fifth column show the difference between continuous exporters and non-exporters, while the third and sixth reflects on the probability of becoming a continuous exporter compared to being a switcher. The results are only presented for medium firms. Table A 2.8 shows that there is no significant difference between the financial variables of non-exporters and continuous exporters, but the group of switchers is also less liquid and more leveraged than permanent traders. These findings suggest that it is the group of switchers who are less liquid and more leveraged compared to the other two types. The positive significant effect of employment and foreign ownership on being a continuous exporter are also presented, while the effect of productivity is not precisely estimated.

TABLE A 2.9: THE IMPACT OF EXPORTING ON FUTURE FINANCIAL CONSTRAINTS, SMALL COMPANIES

Dependent variables	Current ratio $_{t+1}$	Current ratio $_{t+1}$	Current ratio $_{t+1}$	Leverage $_{t+1}$	Leverage $_{t+1}$	Leverage $_{t+1}$
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
$Exporter_t$	-0.107***	-0.0886***	-0.0732**	0.0241***	0.0425***	0.0441***
	(0.0255)	(0.0255)	(0.0298)	(0.00581)	(0.00573)	(0.00660)
$Log(emp)_t$		-0.213***	-0.223***	-0.00547	0.0702***	0.0737***
		(0.0237)	(0.0264)	(0.00398)	(0.00586)	(0.00659)
$Log(tfp)_t$	0.291***	0.901***	0.897***		-0.486***	-0.479***
	(0.0704)	(0.0994)	(0.110)		(0.0244)	(0.0277)
Age_t			0.0194***			-0.0132***
			(0.00522)			(0.00117)
$Foreign_t$			-0.116**			0.0686***
			(0.0528)			(0.0138)
Year dummies	included	included	included	included	included	included
Industry dummies	included	included	included	included	included	included
Observations	25,283	25,283	18,316	28,849	28,041	20,238
R-squared	0.036	0.043	0.047	0.050	0.093	0.128

Notes: Each column reports the results of a firm level OLS regression of the financial variables on the covariates noted in the first column for medium companies. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Table A 2.9 shows the effect of export on future constraints using the subsample of non-exporters and switchers. The results show that exporting does not immediately develop the financial situation of the small companies. A one year period after exporting exporters are still less liquid and more leveraged.

2.4 Results on intensive margin

The predictions of theory about the effect of financial constraints on the value of trade is unambiguous as it was previously showed. I checked two variables: log foreign sales and the ratio between export sales and domestic sales. The results presented in Table A 2.10 are different from the export decision. For medium companies financial variables play a role even after controlling for productivity in determining the amount of exported goods. On the top of that tfp has no impact on export ratio. This result is consistent with further liquidity requirements for firms to expand.

TABLE A 2.10: THE IMPACT OF FINANCIAL CONSTRAINTS ON EXPORT FLOW, MEDIUM COMPANIES

Dependent variables	Log(export flow) $_t$	Log(export flow) $_t$	Export ratio $_t$	Export ratio $_t$
Independent variables	(1)	(2)	(3)	(4)
Log(tfp) $_{t-1}$	4.561***	4.942***	0.0568	0.109
	(0.534)	(0.544)	(0.0636)	(0.0682)
Log(emp) $_{t-1}$	0.534***	0.503***	0.0779***	0.0737***
	(0.0648)	(0.0660)	(0.00877)	(0.00904)
Foreign $_{t-1}$	1.357***	1.321***	0.295***	0.289***
	(0.0845)	(0.0847)	(0.0158)	(0.0159)
Age $_{t-1}$	-0.0393***	-0.0302**	-0.00187	-0.00155
	(0.0146)	(0.0149)	(0.00203)	(0.00204)
Current ratio $_{t-1}$	-0.0774**		-0.0109**	
	(0.0318)		(0.00449)	
Leverage $_{t-1}$		0.763***		0.0584***
		(0.137)		(0.0198)
Year dummies	included	included	included	included
Industry dummies	included	included	included	included
Observations	6,874	7,121	10,061	10,409
R-squared	0.480	0.482	0.472	0.469

Notes: Each column reports the results of a firm level regression of the export flow (measured in absolute value or ratio) on the covariates noted in the first column for medium companies. Results for the constants are suppressed. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

2.5 Financial constraints and investment

My thesis investigates the general effect of financial background on export, which is one form of expansion that requires initial sunk costs. Here I briefly describe and empirically test another important field: investment decision. I use this estimation to verify the general behavior of constrained firms. An investment decision is similar to export activity, as it also requires an initial cost e.g. to settle up equipment or build new infrastructure, but the profit generated by the assets is realized only later.

For mature well-operating firms the perfect substitutability between internal and external credit sources is likely to hold, but for small firms the lack of external credit can be an important

constraint especially in the short-run. (Fazzari et al., 1988) Analogously to the example of exporters, there are firms who do not generate enough cash flow to use only internal finance for their investments, but cannot receive external sources due to its high costs. As it has been shown in Chaney (2013) a possible liquidity windfall can help to overcome the barriers, but without that the firms won't be able to invest and remain constrained. (Bond and Meghir, 1994)

Without listing all the relevant studies in the field, I name only one which studies investment accumulation in the Czech Republic. The institutions of the country were quite similar to the Hungarian after the transition and this was the only country where the question was studied in the neighborhood of Hungary. Lízal and Svejnar (2002) argue that because of the fragility of bank sector during the 1992-1998 period the smaller, newly formed and domestic companies are tend to be more constrained than their larger counterparts. Once controlling for productivity level differences they find that companies who did not have access to external finance could not grow further.

I defined *investment ratio* as the yearly percentage change in the amount of tangible assets hold by the company.[38]

I estimated a pooled OLS model on the investment ratio using lagged explanatory variables with time and industry dummies. The results are presented in Table A 2.11.

[38] A better comparison would need a dummy outcome variable. However I could only measure the change in fixed assets, which I could not transform to a 0-1 variable, as it would hide the difference between different types of investment (real and additional expansion to cope with amortization).

TABLE A 2.11: THE IMPACT OF FINANCIAL CONSTRAINTS ON EXPORT FLOW, MEDIUM COMPANIES

Dependent variables Independent variables	Investment ratio $_t$ (1)	Investment ratio $_t$ (2)
Log(tfp) $_{t-1}$	0.0876 (0.0566)	0.105* (0.0546)
Log(emp) $_{t-1}$	-0.0213*** (0.00726)	-0.0209*** (0.00701)
Foreign $_{t-1}$	-0.0129 (0.00917)	-0.0169* (0.00883)
Age $_{t-1}$	-0.00729*** (0.00170)	-0.00653*** (0.00167)
Current ratio $_{t-1}$	0.00640* (0.00369)	
Leverage $_{t-1}$		0.0363** (0.0159)
Observations	6,597	6,904
R-squared	0.056	0.055

Notes: Each column reports the results of a firm level OLS regression of the percentage change in investment on the covariates noted in the first column. The sample contains all medium firms. Results for the constants are suppressed. Year and industry dummies are always included. Standard errors in brackets are robust and allowing for clustering by firm. Standard errors are noted below each coefficient. *, ** and *** represent statistical significance at the 10, 5 and 1 percent level, respectively.

Current ratio has a small positive and slightly significant (the coefficient is only significant at 10%) effect on investment ratio, while the effect of leverage is significant at 5%, but economically still negligible on investment ratio. Compared to export decision I found borderline significant relationship between financial constraints and investment decision, but the impact is economically unimportant. It strengthens the result about the minor role of external financial constraints on expansion decision. Although no effect for productivity was found