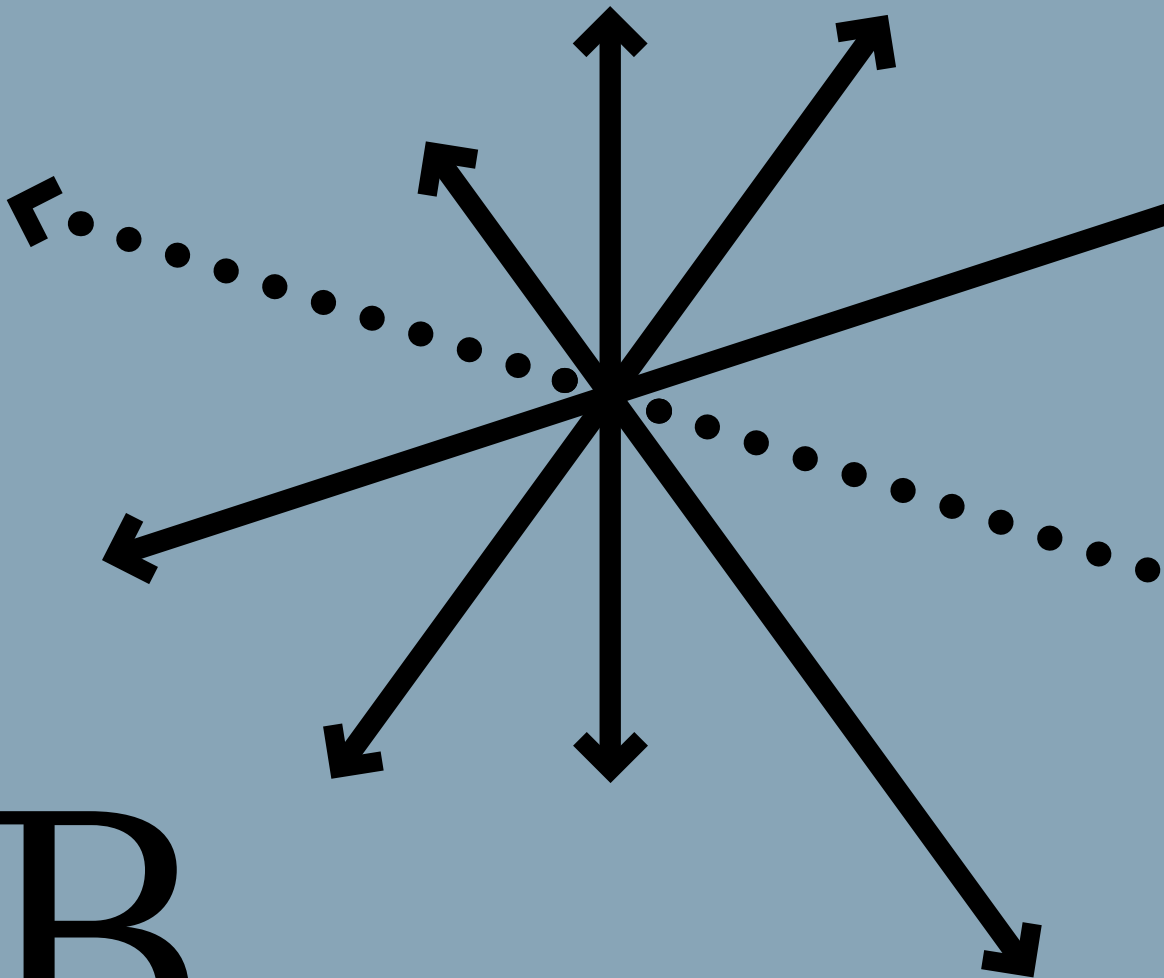# Competitiveness of Latvian enterprises
in external markets

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Scientific editors:
Marija Krūmiņa, *MSc*
Anna Zasova, *PhD*

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In memory of Alf Vanags (1942–2016), the founder and longtime director of BICEPS, our friend and colleague

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CONTENTS

Latvia's continued and sustainable well-being depends on its ability to retain its position of a successful exporter in the world markets. Thus, Latvia has to build on its successful export performance since the recession (see Vanags, 2013). Factors characterising Latvia's competitiveness during this period have included vigorous growth in both the quantity of products exported and the number of export markets (see Benkovskis, 2012). Benkovskis has also pointed out the hitherto unrecognised importance of non-price competitiveness factors. A study by Putniņš (2013) offered a first characterisation of exporting firms in Latvia in terms of size, productivity, ownership, etc.

This monograph aims to expand and build on these studies in order to better understand the factors that promote exporting, as well as the barriers that firms may face in entering export markets.

Analysis of exports and exporters, especially at the enterprise level is very data intensive. Within the State Research Programme SUSTINNO project, Baltic International Centre for Economic Policy Studies (BICEPS) conducted a specifically commissioned survey of small businesses in 2015. The target group of the survey was medium-sized economically active enterprises registered in Latvia. Following Putniņš T. J. (2013), BICEPS constructed a random sample of enterprises registered in Latvia. With the help of data collection company SKDS, BICEPS implemented telephone survey of the defined sample of companies and collected a total of 800 responses. The questionnaire contained six sections: (1) company characteristics; (2) exporting; (3) productivity; (4) financing; (5) innovations; and (6) taxes and attitudes. Four papers grouped in the first part of the monograph are based on this survey of medium-sized Latvian companies and their economic performance in 2015.

Most of the economic literature agrees that exporting and non-exporting enterprises differ in the various measures of performance. Identification of the export barriers and the determination of the differences of exporters and non-exporters can help to develop policies that would encourage non-exporting enterprises to embark upon successful exporting. Anna Pluta, research fellow at BICEPS, in her paper "Comparison of exporting and non-exporting enterprises in Latvia" (2017) explores the differences between exporting and non-exporting enterprises from several aspects, i.e., export opportunities; productivity; fundraising opportunities and innovativeness. A mean-comparison test is used to find a statistically significant difference between the mean values of various characteristics pertaining to exporting and non-exporting enterprises. The analysis shows that exporters differ from non-exporters in several ways: on average, exporters have a higher turnover, employ more people, pay better salaries, show higher productivity, and experience both higher growth of number of employees and

higher wage growth. In addition, managers of exporting enterprises mostly are better educated. Exporting enterprises tend to be more innovative. Every third exporter invests considerable resources in research and development of new products, while only 14% of non-exporters do this. Finding the cost-effective production method is a motivation for investing in research and development indicated by 30% of exporters and 14% of non-exporters.

For enterprises not considering exporting as an option, the main reason for not doing so is the unsuitability of their goods or services for export. The major barrier to exporting for already exporting enterprises is the fierce price competition in the foreign market. It is also one of the major barriers along with the initial cost of exporting and the difficulties in finding information on the foreign markets faced by enterprises not engaged in exports, but considering starting exporting. Those enterprises that have stopped exporting, have done so mainly due to the pressure of the competition as well as because of legal or customs problems. According to the survey results, 43% of exporters and 20% of non-exporters have attracted funds to develop their business in the last 3 years. The results also show that exporting enterprises tend to raise larger funding from sources other than the enterprise's profits. On average, more than a half of the attracted funds were raised from bank overdrafts, loans or credits. The EU programs provided the second largest contribution to the overall amount of funding.

The next paper by graduates of SSE Riga, REINIS BEĶERIS and VENTS VĪKSNA "EUROPEAN FUNDING: DOES IT INDUCE EXPORTING?" (2017) further examines the impact of European Structural and Investment Funds (ESIF) on Latvian companies' tendency to export. The authors prove a positive relation between receiving EU funding and the exporting decision. The authors show that one euro invested by the ESIF program will yield 17.9 EUR of export turnover over a five-year period for the median company of the studied dataset. The authors disaggregate the effect between small and large enterprises, experienced and inexperienced management, and between ESIF funds (European Regional Development Fund (ERDF) and European Agricultural Fund for Rural Development (EAFRD)). They conclude that small companies would experience a greater effect from this influx of capital; more experienced management used the money more efficiently; and the agricultural investment fund had a more pronounced impact on the exporting decision than the regional development one. ESIF financing is indeed a boon to the Latvian economy and its competitiveness. The findings may yield the government some insight into more efficient ways to allocate the delegated capital.

Recent economic literature pays considerable attention to the effect that trade has on economy-wide growth and productivity in the presence of firms' heterogeneity. Seminal paper by Melitz (2003) establishes

microeconomic foundation of the intra-industry productivity growth due to reallocations of resources, e.g., labour, from less productive firms to more productive ones because of export market entry and subsequent expansion of firms' scale. The main transmission channel for the impact of trade on aggregate productivity is self-selection of more productive firms into exporting ones, because exporting yields higher returns to more productive firms. A stronger competition for the input resources forces less productive firms to exit. Such aggregate industry productivity growth generated by the reallocations also contributes to a welfare gain. One potential implication of such dependency is an ability of exporting firms to incur higher production costs while remaining profitable. Abidance by legal rules and tax legislation might be less problematic from a firm's profitability point of view, if the firm is more productive than its competitors. Thus, exporting firms, which survive both domestic and foreign competition, potentially might be less prone to tax evasion and bribing than the non-exporting firms. SERGEJS GUBINS (2015), BICEPS research associate puts forward a hypothesis that the exporting firms might be involved in shadow economic activities, such as corruption and tax evasion, to a lesser extent than non-exporting firms. Aiming to shed light on the association between export and shadow economy in Latvia at the level of firms, he performs an initial data mining exercise. It turns out that exporting and non-exporting firms are not statistically different with regard to law obedience. However, there are statistically significant differences within exporting firms, which provide a weak support to the hypothesis. The most interesting result shows that firms, which export in large volumes, have more positive view regarding general law obedience. In particular, the author finds statistically significant negative correlation coefficients for questions on corruption in Latvia and tax evasion in the industry, besides some suggestive results brought by the questions on undeclared workers' wages in the industry.

NINO KOKASHVILI, KETEVANI KAPANADZE, IRAKLI BARBAKADZE further develop this topic and examine the relationship between Latvian firms' growth and their involvement in the shadow economy in 2015. Examining the relationship between participation in the shadow economy and firms' growth shows that the firms involved in shadow economic activity up to 10% of the firms' overall economic activity experience higher growth. The study shows that participation in the shadow economy has a growth-enhancing effect only in case of firms, which have non-positive growth. These firms are more flexible in crises. At the same time, 10% of shadow economy participation rate does not exclude them from the financial market. In addition, these firms also take advantage of public goods and services. This result corresponds with the idea that for poorly performing firms, the shadow economy represents a means of survival. This paper also concludes that there is

a positive correlation between perceptions of corruption and the shadow economy participation rate.

The next part of the monograph is based on research implemented by a group of SSE Riga graduates. The topic is further explored using various data of World Bank, IMF, and Eurostat databases. Information on performance, ownership and management of all active Baltic companies from the *Orbis* database of Bureau van Dijk (BvD); the data on Latvia's bilateral export and import flows from the Central Statistical Bureau of Latvia; the data on inward and outward FDI stocks provided by the Bank of Latvia, and WIOD (World Input Output Database) data.

As concluded in the first part of the monograph, managers of exporting enterprises on average are more educated, besides, more experienced management uses the EU funding more efficiently. GODA GAUŠAITĖ and ARNAS VEDECKIS in their paper "IMPACT OF MANAGERIAL OWNERSHIP ON ENTERPRISE RERFORMANCE IN THE BALTIC STATES" (2016) explore this further and look at the corporate governance of Baltic companies and analyses, inquiring how managerial ownership (MO) affects private enterprise performance, measured as return on assets (ROA), return on equity and profit before tax margin. At low and high levels of MO, a firm's performance measured by ROA improves, while it declines at an intermediary one. The authors conclude that employment of professional management and a motivation system, when managers hold up to one fifth of equity, can benefit Baltic entrepreneurs most, especially when a company grows.

Despite solid theoretical background stating that FDI substitutes international trade, empirical research often finds a complementary effect generated between them. DIANA KARHU and ALESIA NIKALAICHYK in their paper "FOREIGN DIRECT INVESTMENT: BOOST OR HINDRANCE TO LATVIAN INTERNATIONAL TRADE" (2016) follow the idea of Türkcan (2006) and try to explain the FDI-trade relationship (FDI-trade puzzle) for the case of Latvia by assuming different FDI effect on trade of final and intermediate goods. The idea is based on the presence of different FDI motives — horizontal and vertical FDI expansion (Türkcan, 2006). The authors find that both inward and outward FDI complement total exports, as well as exports of final and intermediate goods separately. They find a partial support of Türkcan's (2006) findings that outward FDI complements trade in intermediate goods, but they fail to establish evidence that outward FDI substitute trade in final goods. Overall, the authors find that a 1% increase in outward FDI stock as % of GDP goes in line with a 0.10% increase in exports (as % of GDP), and that similar increase in inward FDI stock may lead to a 0.13% increase in exports (as % of GDP). Therefore, it may be beneficial for Latvia to encourage FDI flows even further. It takes about five quarters for both types of FDI to have a positive effect on Latvian trade.

EDGARS KOKINS and VALENTĪNS LAVRINOVIČS, in their paper "LATVIA: CATCHING UP WITH THE WORLD PRODUCTION FRONTIER. AN INDUSTRY-LEVEL ANALYSIS" (2016) explore, which industries of Latvia have been catching up with the world production frontier during the past two decades, i. e., which industries of Latvia are more efficient, and which factors could foster this convergence in the future. Authors analyse the efficiency determinants of the main private sector industries in Latvia — agriculture, construction, accommodations and hospitality, manufacturing, trade and transportation — during the period from 1995 to 2014, i. e., including the post-crisis period. The analysis covers the following factors: spending on Research and Development (R&D), the trade openness of a country, the amount of FDI as well as various indicators from the Economic Freedom Index and Global Competitiveness Index. They apply the Stochastic Frontier Analysis True Fixed Effects model with time-varying technical progress to the World Input-Output Database that is widely used for Total Factor Productivity (TFP) growth decomposition. The results show that (given the amount of capital stock and labour) output of the agriculture, hospitality, trade and transportation industries in Latvia still substantially lags behind its peers. Over the last 20 years, construction and private sector services such as trade, transportation and hospitality experienced substantial efficiency gains, spurring TFP growth well above average in the studied sample. In turn, manufacturing and agriculture failed to increase efficiency and thus has experienced rather low TFP growth. For all industries in Latvia, technical change was positive and larger than efficiency change. This finding lets the authors to state: technical rather than efficiency change is the main driver of TFP growth in analysed industries in Latvia. The authors find that R&D spending and trade openness are significant efficiency determinants for all industries, while foreign direct investments are not. Furthermore, they document the positive association between efficiency and several variables of The Economic Freedom Index and Global Competitiveness Report. Thus, business-friendly institutional reforms such as fighting corruption and judicial system improvements can raise labour productivity not only by promoting capital accumulation, but also through TFP gains.

The authors of the collective monograph thank everyone who contributed to the creation of this work.

Scientific editors of the collective monograph
Marija Krūmiņa, *MSc*, Anna Zasova, *PhD*

Determinants of competitiveness and propensity to export

1

Comparison of exporting and non-exporting enterprises in Latvia

Anna Pļuta

Most of the economic literature agree that exporting and non-exporting enterprises differ according to various indicators of performance. Identification of the export barriers and the determination of the differences between exporters and non-exporters can help to develop policies that would encourage non-exporting enterprises to embark upon successful exporting. This research is aimed at exploring the differences between exporting and non-exporting enterprises in Latvia from several aspects, i. e., export opportunities; productivity; opportunities of fundraising; innovativeness. The research is based on SKDS survey data concerning a random sample of 800 medium-sized Latvian enterprises and their economic performance in 2015.

A mean-comparison test is used to find a statistically significant difference in the mean values of various characteristics of exporting and non-exporting enterprises. The analysis shows that directly exporting enterprises differ from the non-exporting enterprises in several characteristics: directly exporting enterprises on average have a higher turnover, employ a greater number of employees, pay better salaries, and display higher productivity, experience higher growth of number of employees and wage growth. In addition, exporting enterprises are managed by the leaders with a higher education level. Exporting enterprises tend to be more innovative.

The major barrier to exporting turned to be the fierce price competition in the foreign market. The major barriers preventing start of exporting were the fierce price competition in the foreign market, the initial cost of exporting and the difficulties in finding information on the foreign markets.

Introduction

Most of the economic literature agree that exporting and non-exporting enterprises differ according to various indicators of performance, e. g. exporting enterprises, on average, display a higher labour productivity, engage more employees and pay higher taxes than non-exporters. Identification of the export barriers and determining the differences between exporters and non-exporters can help to develop policies that would encourage non-exporting enterprises to start successfully exporting.

There is a large number of empirical studies on exporting and non-exporting enterprises in European countries and US demonstrating that exporting enterprises usually are more productive than the otherwise identical enterprises which do not export. Wagner (2007) states that exporting enterprises achieve a greater productivity not specifically because of the benefits derived from exporting, but instead being more productive allows them to overcome the fixed costs of entering foreign markets (known as the

self-selection hypothesis). The second possibility is that productivity of an enterprise improves as a result of its exporting activity, e. g., remaining competitive in a strong competitive environment, that results from "learning by exporting" and recouping of investments over a larger sales volume (Love & Roper, 2015). Girma, Greenaway and Kneller (2004) demonstrate that exporting may boost productivity when increasing the share of exporting.

The exporting enterprises tend to pay higher wages than the non-exporting enterprises due to self-selection of more productive enterprises into export markets; thereby, higher wages are not caused by export activities (Schank, Schnabel & Wagner, 2010).

There are contrasting results about the link between financial factors and exporting of enterprises. Bellone, Musso, Nesta, Schiavo (2009) demonstrate that enterprises enjoying better financial health are more likely to become exporters and state that financial constraints are the barrier to export participation. Other empirical literature (e. g., Greenaway et al., 2007) found evidence that export participation improves the financial health of enterprises, but not that enterprises which start exporting display any ex-ante financial advantage.

Eurostat (2015) article compares exporting and non-exporting enterprises in eight European countries including Latvia and provides the insights into economic performance and characteristics of exporters in 2008 and 2012, presenting the analysis of developments since the beginning of economic crisis. They found that the non-exporters to a greater extent were exposed to the effect of the financial crisis than the exporters. In the majority of countries, within the period from 2008 to 2012, non-exporters lost more employees than exporters. In most countries, exporters have increased their productivity more than non-exporters. Foreign-controlled traders generate a relatively larger share of exports and more exports per employee than domestically controlled traders do.

Putniņš (2013) aims to describe the export activity of Latvian companies and provides the insights for potential exporters as to what business processes are associated with export success. According to Putniņš (2013), exporting companies tend to be larger, younger and faster growing than their non-exporting counterparts. They pay higher wages, consistent with the notion that they on average have a higher labour productivity or utilise more skilled labour.

This research is aimed at exploring the differences between exporting and non-exporting enterprises in Latvia from several aspects, i. e., export opportunities, productivity, fundraising and innovativeness. The research covers a later period than the previously conducted studies, comparing the economic performance of enterprises in 2010 and 2015. The research is intended to answer the following questions: (1) What are the characteristics

of exporting enterprises in Latvia? (2) What are the major barriers in Latvia for exporting? (3) What are the major barriers in Latvia to start exporting? (4) Is there a difference between the factors expected to affect the productivity? (5) Are there any differences in a way of fundraising? (6) Are the exporting enterprises more innovative?

The research is based on Marketing and Public Opinion Research Centre SKDS survey data of 2015 regarding 800 Latvian enterprises. The target group of the survey includes medium-sized economically active enterprises registered in Latvia. Following Putniņš (2013), a random sample of enterprises registered in Latvia is constructed, that (1) have annual turnover between EUR 500 thousand and EUR 50 million; (2) were registered in 2007 and earlier; and (3) do not belong to real estate or financial sectors. Respondents are business owners, managers and leading specialists. The survey method is Computer assisted telephone interviews. To our knowledge, the number of responses collected during the survey is currently the largest comparing with the other surveys that allow analysing the export activities of Latvian enterprises. A mean-comparison test is used to find a statistically significant difference in the mean values of various characteristics of exporting and non-exporting enterprises.

Research results and discussion

This section gives an insight into the types of enterprises that are the most export-oriented in Latvia. The enterprises are distinguished according to the types of exporting; by sector, type of control (domestic and foreign ownership), the turnover, the profit, the number of employees and several other characteristics.

PORTRAIT OF A TYPICAL LATVIAN EXPORTER   Enterprises can sell their goods and services in the domestic market, directly export to another country or export indirectly by selling them to a domestic third party that exports the goods and services afterwards. Figure 1 reports the breakdown of the sampled enterprises by the types of exporting. Out of 800 sampled enterprises, 249 enterprises or 31.1% are the exporters and the majority of enterprises, i. e., 551 enterprise or 68.9%, sell their goods or services only in the domestic market. 22% of enterprises are direct exporters, 7% are indirect exporters and 2% export both directly and indirectly. Figure 2 shows that the service sector makes the largest part of the surveyed enterprises (51.5%), followed by the wholesale sector represented by the 3.7 times smaller number of enterprises (making up 14.0% of all the surveyed enterprises).

Table 1 contains the breakdown of enterprises operating in each sector by the type of exporting. The highest export activity has been observed

Figure 1. Breakdown of sampled enterprises by types of exporting, %

Indirect exporters 7%
Export both directly and indirectly 2%
Direct exporter 22%
Non-exporters 69%
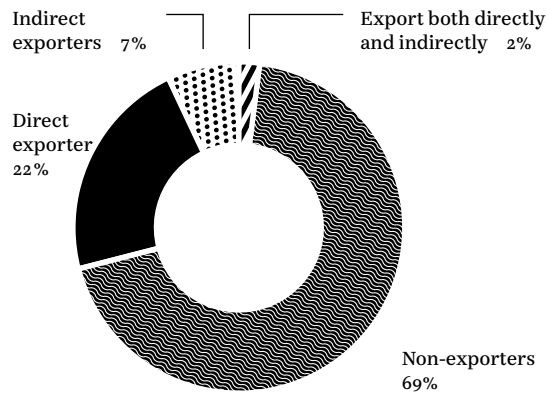
Base is all enterprises, $n = 800$. (Author's calculations based on SKDS survey data)

Figure 2. Breakdown of full sample of enterprises and exporting enterprises by sector

(a) Breakdown of sampled enterprises by sector, %

Other 5.7%
Manufacture 10.9%
Construction 4.4%
Wholesale 14%
Services 51.5%
Retail 13.5%

(b) Breakdown of exporting enterprises by sector, %

Other 6.8%
Manufacture 22.1%
Construction 1.6%
Wholesale 25.3%
Services 37.8%
Retail 6.4%

Base is (a) all enterprises, $n = 800$ (b) exporting enterprises, $n = 249$.
(Author's calculations based on SKDS survey data)

Table 1. Breakdown of enterprises operating in each sector according to type of export, %

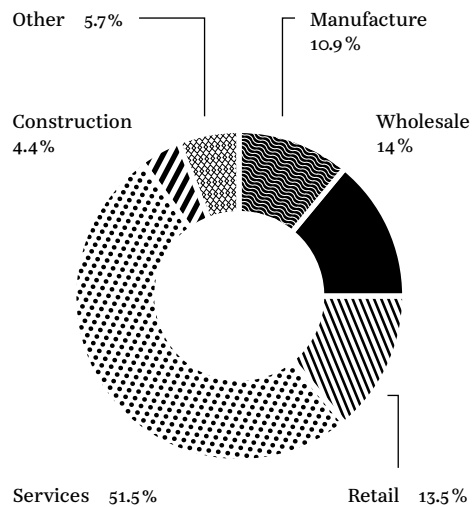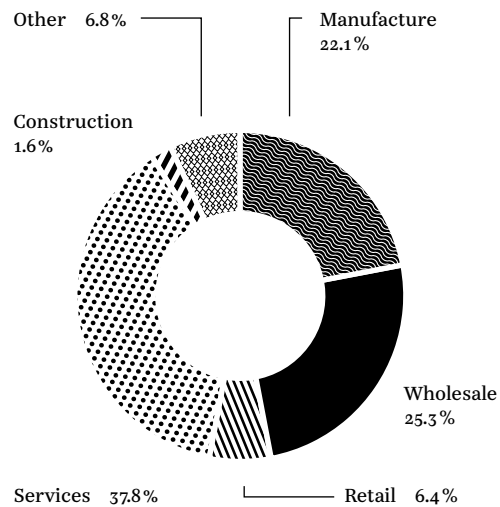|	Non-exporters	Exporters	Direct exporters	Indirect exporters	Both direct and indirect
Manufacture	36.8	63.2	49.4	6.9	6.9
Wholesale	43.8	56.2	33.9	19.6	2.7
Retail	85.2	14.8	12.0	1.9	0.9
Services	77.2	22.8	16.7	4.6	1.5
Construction	88.6	11.4	5.7	2.9	2.9
Other	63.0	37.0	23.9	8.7	4.3

Base is enterprises operating in (1) manufacturing sector, $n = 87$; (2) wholesale sector, $n = 112$; (3) retail sector, $n = 108$, (4) services, $n = 412$, (5) construction sector, $n = 35$, (6) other sectors, $n = 46$. *base is all enterprises, $n = 800$; ** base is all sampled exporting enterprises, $n = 249$. (Author's calculations based on SKDS survey data)

in manufacturing sector with the total share of exporters equal to 63.2 %, consisting of 49.4 % of direct exporters, 6.9 % of indirect exporters and 6.9 % exporting both directly and indirectly. Wholesale sector is the second most involved in exporting with 56.2 % of exporters, while the least share of exporting enterprises is in the retail and construction sectors with 14.8 % and 11.4 %, respectively.

According to the survey data, foreign-controlled enterprises (hereafter defined as enterprises, where foreign enterprises, individuals and organisations own 50 % or more of the enterprise's shares) are to a greater extent export oriented than the locally owned enterprises. Exporting enterprises make up 54.0 % of 76 foreign-controlled enterprises, and 29.0 % of 717 domestically owned enterprises. Since the considerably larger share of all the sampled enterprises are domestically owned (717 enterprises or 89.6 %), the most exporting enterprises, i. e., 208 enterprises or 83.5 %, are also owned by the local owners. On average, the direct and indirect export made up 39 % and 12 % of the exporting enterprises' turnover in 2015, while the domestic trade made up roughly the half (49 %) of the turnover (see Figure 3). In 2010, the average contribution of export to the turnover of exporting enterprises accounted for 45 %, comparing with 51 % in 2015.

Figure 3. Contribution of domestic trade, direct and indirect export to turnover of exporting enterprise in 2010 and 2015, %

2015	**A** 39	**B** 12	**C** 49
2010	36	9	55

A Direct export | **B** Indirect export | **C** Domestic trade

Base for 2015: exporting enterprises, $n = 249$. Base for 2010: exporting enterprises, whose representatives answered the corresponding question, $n = 236$. Question formulation in questionnaire: "Please, give a rough assessment of the contribution of domestic trade, direct and indirect export to the turnover of the enterprise now and 5 years ago".
(Author's calculations based on SKDS survey data)

Figure 4. Export destinations of Latvian direct exporters, % of direct exporters

Lithuania or Estonia	**A** 65	**B** 35	**C** 0
Scandinavia (NO, FI, SE, DK)	48	52	0
Germany	42	57	1
Russia	33	67	0
Belarus	18	82	0
Other EU countries	48	52	0
Other non-EU countries	31	68	1

A Yes | **B** No | **C** Hard to say
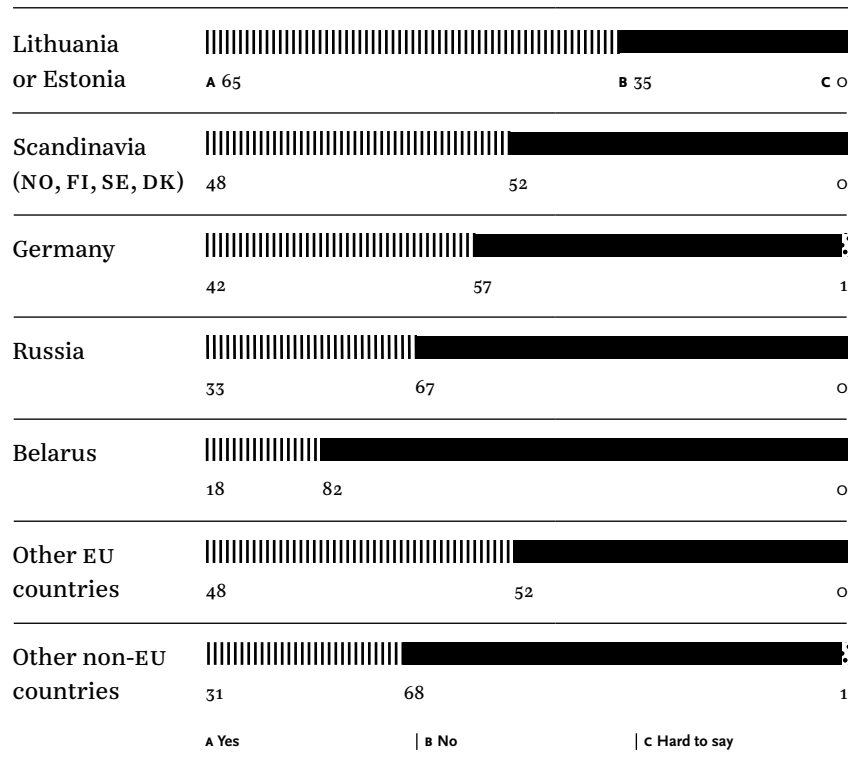
Base is the enterprises engaged in direct exporting, $n = 195$. Question formulation in questionnaire: "Is your enterprise exporting to any of the following countries?"

Figure 5. Non-exporters' intentions regarding export, %

A 78	**B** 16	**C** 6

A Enterprise has never exported, but is not willing to export | **B** Enterprise has never exported, but is willing to export | **C** Enterprise exported in the past, but now is not exporting
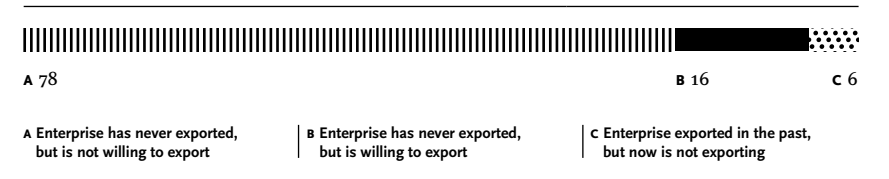
Base is enterprises not engaged in export, $n = 551$. Question formulation in questionnaire: "Which of the following statements describes the situation of your enterprise?"
(Author's calculations based on SKDS survey data)

Figure 6. The reasons for unwillingness to export, %

Good or service is not suitable for export	62%
Sufficient demand for goods or services in the local market	23%
Great competition in the potential export market	5%
Legal/customs problem	3%
The lack of contacts/information in the foreign market	2%
Other reason	5%
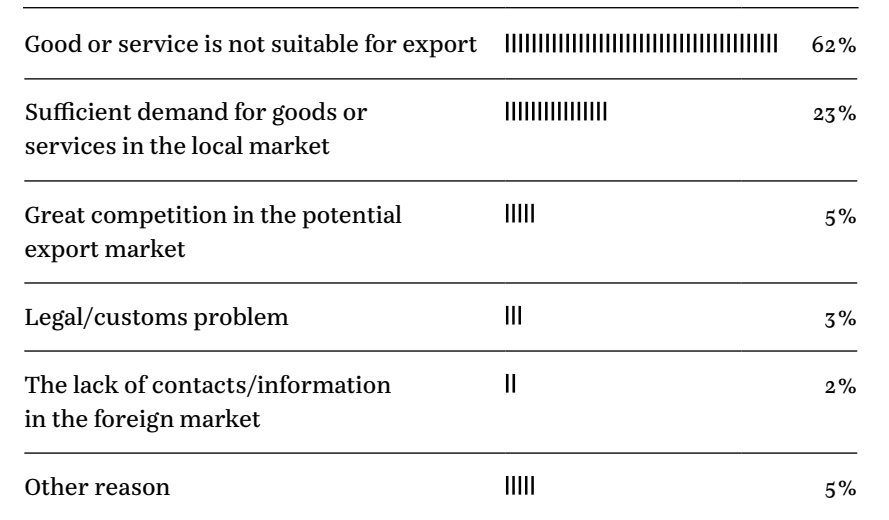
Base is enterprises not engaged in exports and not considering to export, $n = 430$. Question formulation in the questionnaire: "What is the main reason for not willingness to export?"

Latvian entrepreneurs are exporting to the neighboring countries and the Scandinavian countries, as well as to other European Union Member States and to the rest of the world (see Figure 4). The most popular export destinations of Latvian direct exporters are Lithuania and Estonia with 65% of all the surveyed direct exporters exporting to these countries. Almost a half (48%) of the direct exporters are exporting to at least one of the Scandinavian countries and the same share, i.e. 48% of direct exporter

Figure 7. The reasons for stopping exporting, %

Competition from other enterprises in the foreign market	|||||||||||||||||||||||||||	26%
Legal/customs problem	|||||||||||||||||||	18%
Growing production costs (e. g. wages in Latvia)	|||||||||||||||	15%
Competition from other exporters	|||||||||||||||	15%
The lack of contacts/information in the foreign market	|||	3%
Other reason	|||||||||||||||||||||||	23%
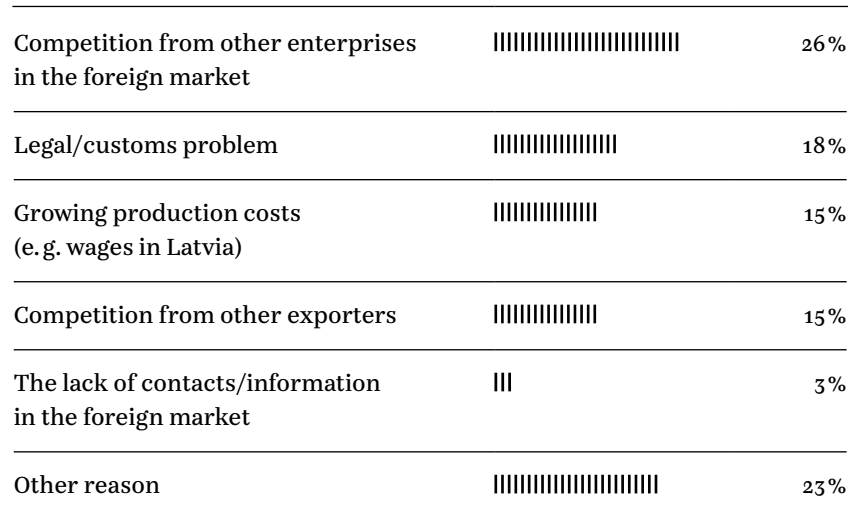
Base is enterprises not engaged in export, but having exported their goods or services in the past, *n* = 34. Question formulation in questionnaire: "What was the main reason for stopping exporting?"

are exporting to other EU countries (except Germany, export to which was treated separately with 42% of direct exporters exporting to this country).

Figure 5 shows that the majority of enterprises currently not engaged in exports have never exported and are not willing to export (78%). 6% have ceased exporting, but 16% have not previously exported but are considering it in the future.

The main reason for unwillingness to export mentioned by 62% of the representatives of those enterprises not engaged in exports and not considering to export, is the unsuitability of their goods or services for export (see Figure 6). Those enterprises that stopped exporting, did so mainly due to the pressure of the competition (26%), as well as legal or customs problems (18%) (see Figure 7).
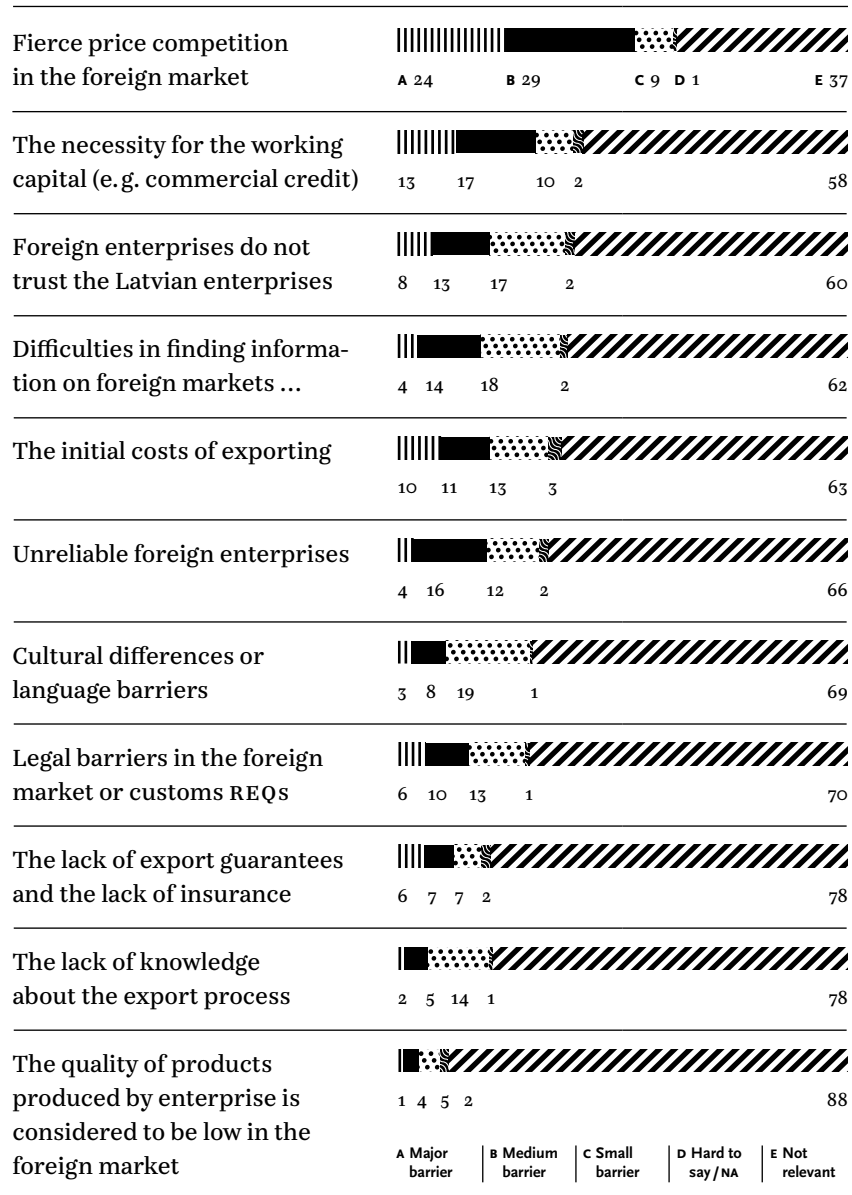
A mean-comparison test is used to find a statistically significant difference of the mean values of various characteristics pertaining to exporting and non-exporting enterprises (see Table 2). The analysis reflects that the directly exporting enterprises differ from the non-exporting enterprises according to several characteristics: directly exporting enterprises on average have a higher turnover, employ a greater number of employees, pay higher salaries, and display higher productivity (as measured with thousands EUR of turnover per employee), experience higher growth of number of

Table 2. Means and the difference in means of characteristics of exporting and non-exporting enterprises

	Means				The difference in means				
	Non-exporters (1)	Exporters (2)	Direct exporters (3)	Indirect exporters (4)	Direct and indirect (5)	(2–1)	(3–1)	(4–1)	(5–1)
Years of operation	14.6	15.2	15.1	16.3	13.9	0.6	0.5	1.7	–0.7
Turnover	1.1	5.2	4.6	1.1	22.6	4.1***	3.5***	0.00	21.5***
Turnover growth	13.2	21	28.1	2.4	1.3	7.8	14.9	–10.8	–12.0
Profit	0.3	0.2	0.2	0.1	0.6	–0.1	–0.1	–0.2	0.3
Profit growth	1.5	0.1	–0.5	2.8	0.4	–1.5	–2.1	1.3	–1.1
Number of employees	20.8	35.1	40.5	12.3	51.1	14.4**	19.7***	–8.5	30.3
Growth of the number of employees	1.1	1.7	1.6	1.8	2.0	0.6***	0.5***	0.7***	0.9***
Average monthly wage, EUR	469.5	642.5	672.7	542.7	596.2	173.0***	203.2***	73.2	126.7*
Wage growth	1.1	1.4	1.3	1.6	2.2	0.3***	0.2***	0.5***	1.1***
Productivity	57.4	128.6	133.7	82.6	212.3	71.2***	76.3***	25.2	155.0***
Productivity growth	8.2	16.1	21.7	1.3	1.0	7.9	13.4	–7.0	–7.2
Management experience	15.6	15.1	14.8	16.2	14.5	0.5	0.8	0.6	1.1
Manager's education level	3.1	3.3	3.4	3.1	3.3	0.3***	0.4***	0.0	0.2

Profit and turnover is measured in EUR million per annum. Average monthly wage corresponds to the full time staff equivalent. Turnover, profit and wage growth, as well as growth of the number of employees and productivity correspond to the 5-year growth 2010–2015. Productivity is measured in thousands EUR of turnover per employee. Management experience corresponds to the experience in business management of the enterprise's manager measured in number of years. Manager's education level has 4 values: 1 for basic and secondary education, 2 for professional secondary; 3 for bachelor's degree or its equivalent; 4 for master's and doctoral degree. Source: author's calculations based on SKDS survey data.
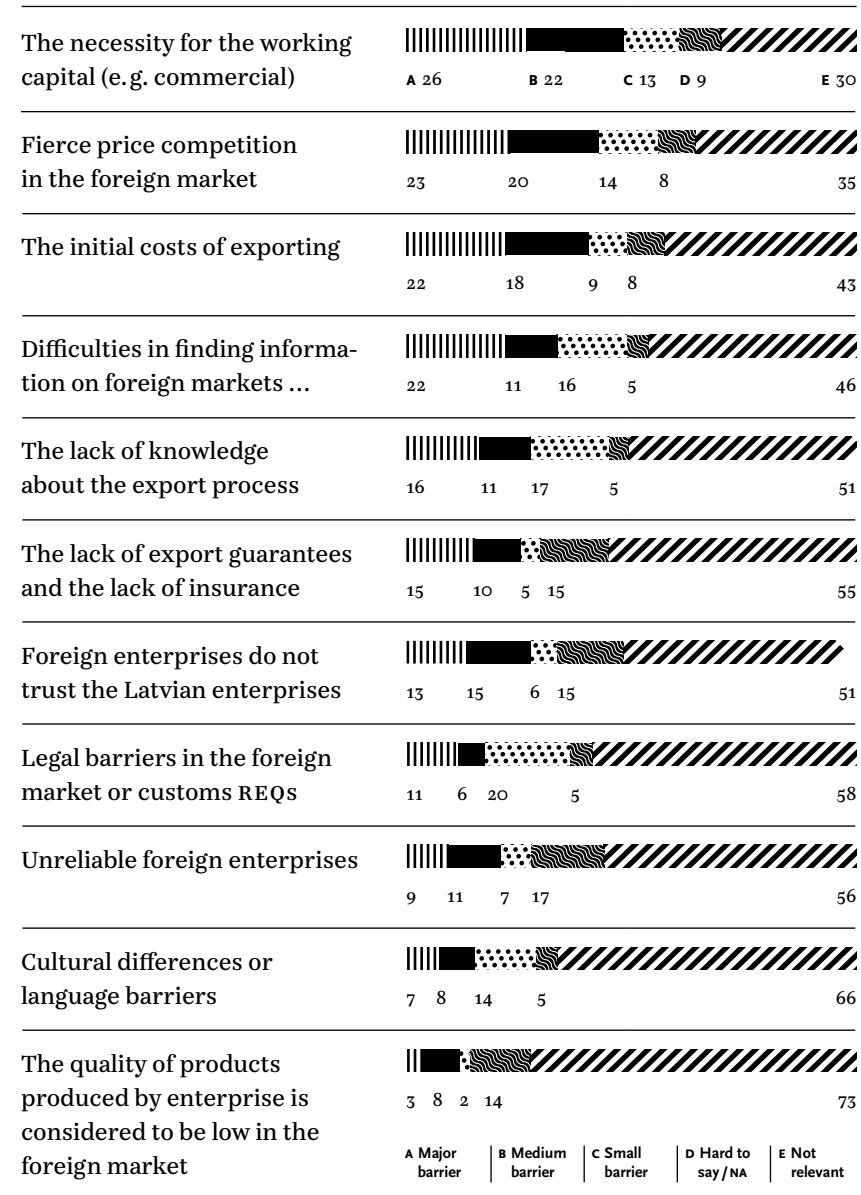
Figure 8. Barriers to export, exporters

	A Major barrier	B Medium barrier	C Small barrier	D Hard to say/NA	E Not relevant
Fierce price competition in the foreign market	24	29	9	1	37
The necessity for the working capital (e.g. commercial credit)	13	17	10	2	58
Foreign enterprises do not trust the Latvian enterprises	8	13	17	2	60
Difficulties in finding information on foreign markets ...	4	14	18	2	62
The initial costs of exporting	10	11	13	3	63
Unreliable foreign enterprises	4	16	12	2	66
Cultural differences or language barriers	3	8	19	1	69
Legal barriers in the foreign market or customs REQs	6	10	13	1	70
The lack of export guarantees and the lack of insurance	6	7	7	2	78
The lack of knowledge about the export process	2	5	14	1	78
The quality of products produced by enterprise is considered to be low in the foreign market	1	4	5	2	88

Base is enterprises engaged in direct export, $n = 195$. Question formulation in questionnaire: "For each of the factors, please, assess, whether it is a large, medium, small barrier or has not been a relevant barrier to export."

Figure 9. Barriers to export, non-exporters

	A Major barrier	B Medium barrier	C Small barrier	D Hard to say/NA	E Not relevant
The necessity for the working capital (e.g. commercial)	26	22	13	9	30
Fierce price competition in the foreign market	23	20	14	8	35
The initial costs of exporting	22	18	9	8	43
Difficulties in finding information on foreign markets ...	22	11	16	5	46
The lack of knowledge about the export process	16	11	17	5	51
The lack of export guarantees and the lack of insurance	15	10	5	15	55
Foreign enterprises do not trust the Latvian enterprises	13	15	6	15	51
Legal barriers in the foreign market or customs REQs	11	6	20	5	58
Unreliable foreign enterprises	9	11	7	17	56
Cultural differences or language barriers	7	8	14	5	66
The quality of products produced by enterprise is considered to be low in the foreign market	3	8	2	14	73

Base is enterprises not engaged in exports, but considering to start exporting, $n = 87$. Question formulation in questionnaire: "To what extent these factors are a barrier for enterprises to start exporting?"

employees and wages. In addition, exporting enterprises are managed by the leaders with a higher education level. However, if we distinguish exporters according to the type of export, namely, direct exporters, indirect exporters

and enterprises exporting both directly and indirectly, indirect exporters statistically significantly differ from non-exporting enterprises only with the mean values of the growth of the number of employees and the wage growth.

This fact could indicate that the indirect exporting does not require much additional capacity of enterprises compared with domestic sales.

BARRIERS TO EXPORT   Figure 8 displays the assessment of the importance of the barriers to export for the enterprises engaged in direct export. The most frequently mentioned barrier to exporting is the fierce price competition in the foreign market (53 % of direct exporters see it as a major or medium-impact barrier). The study revealed that necessity for working capital, distrust of the foreign enterprises in Latvian enterprises, difficulties in finding information on foreign markets and the initial costs of exporting are considered the significant barriers to export (more than 20 % of direct exporters see them as a major or medium barrier).
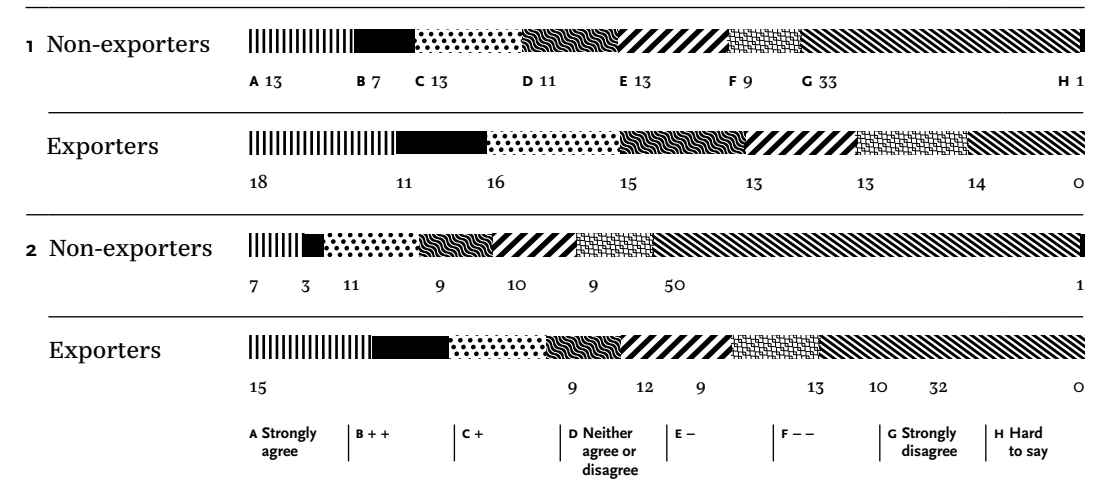
When the respondents were asked to name another important barrier from their individual experience, 5 % of direct exporters most frequently indicated Latvian tax policy as an important barrier. Only 29 % of the enterprises that engaged in direct exports ($n = 195$) named another specific barrier to export, 3 % believe there are no other barriers, 3 % believe there are no barriers to export at all, but 66 % of direct exporters found it was difficult to say.

Figure 9 shows the assessment of the importance of the barriers to starting export by the enterprises not engaged in export but considering to embark upon exporting. The major obstacles to beginning exporting for enterprises that would like to export include necessity for working capital, fierce price competition in the foreign market, initial cost of exporting and difficulties in finding information on the foreign markets. 40 % of enterprises that would like to start exporting ($n = 87$) also mentioned other barriers preventing start exporting, 3 % indicated that there were no other barriers, 1 % believed that there were no barriers to start exporting at all, 55 % found it was difficult to say. The most popular of the indicated obstacles are Latvian tax policy, insufficient funding and lack of specialists (all three barriers were mentioned by 6 % of those willing to begin exporting).

PRODUCTIVITY   *Staff training and skills improvement.* Exporters find staff training and their skills' improvement more important than non-exporters (see Figure 10). 36 % of exporters are investing in training new employees (agreed with the statements, rating them 7, 6 or 5) and 45 % of exporters are significantly investing in training and education of the existing staff to enhance their capacity in carrying out their tasks (agreed with the statements, rating them 7, 6 or 5). To compare with non-exporters — the corresponding shares equal to 22 % and 33 % respectively.
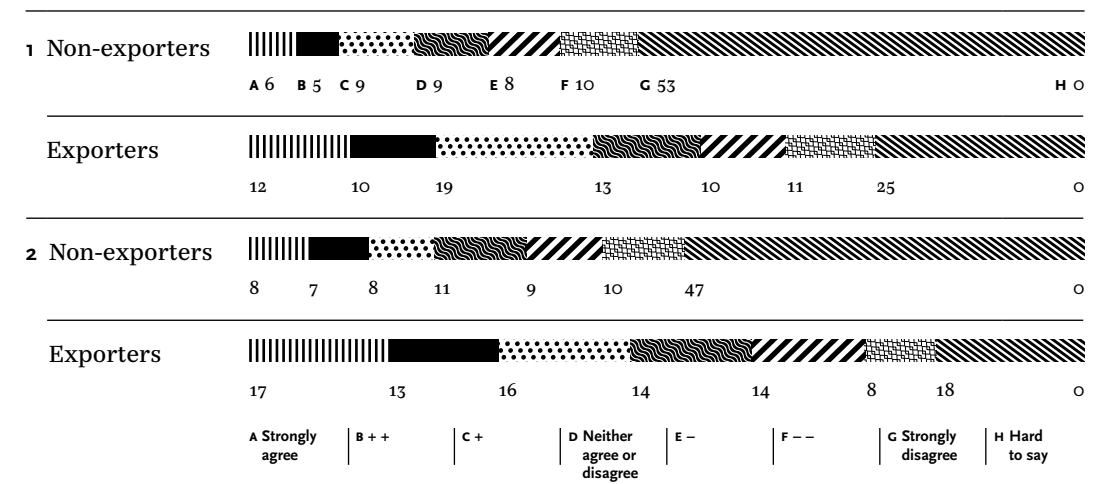
Bonuses and remuneration, incentive schemes. Figure 11 shows that almost a half of the surveyed exporters (46 %) and roughly each fifth (22 %) of

Figure 10. Rating attitude to statements: (1) "The enterprise is making significant investments in training new employees" (2) "the enterprise is making significant investments in training / education of the existing staff to enhance their capacity in carrying out their tasks", %
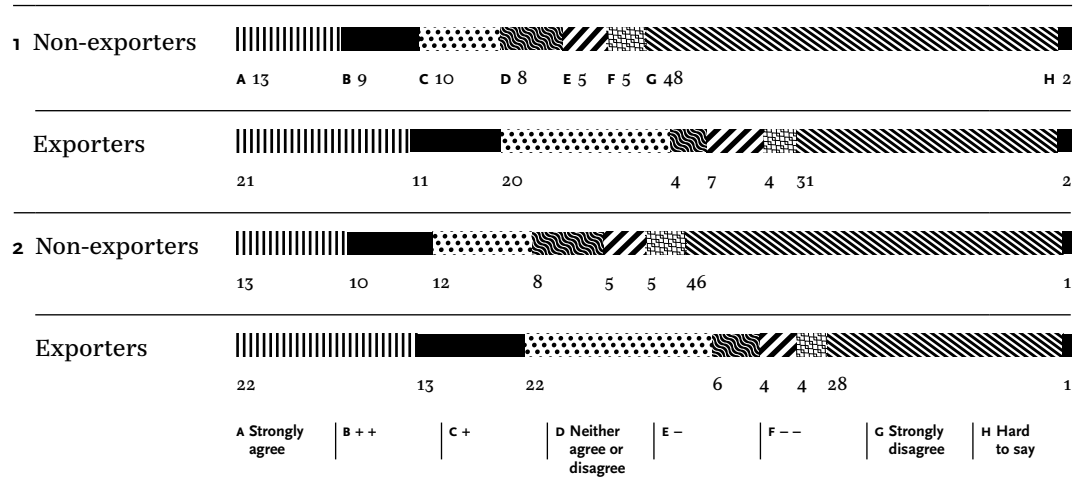

	A	B	C	D	E	F	G	H
1 Non-exporters	13	7	13	11	13	9	33	1
Exporters	18	11	16	15	13	13	14	0
2 Non-exporters	7	3	11	9	10	9	50	1
Exporters	15	9	12	9	13	10	32	0

A Strongly agree | B + + | C + | D Neither agree or disagree | E – | F – – | G Strongly disagree | H Hard to say

Base is all enterprises, $n = 800$. (Author's calculations based on SKDS survey data)

Figure 11. Rating attitude to statements: (1) "The enterprise is widely using the financial bonuses and the increase in the remuneration to reward employees' good performance" (2) "The enterprise is widely using the non-financial incentives to motivate employees", %
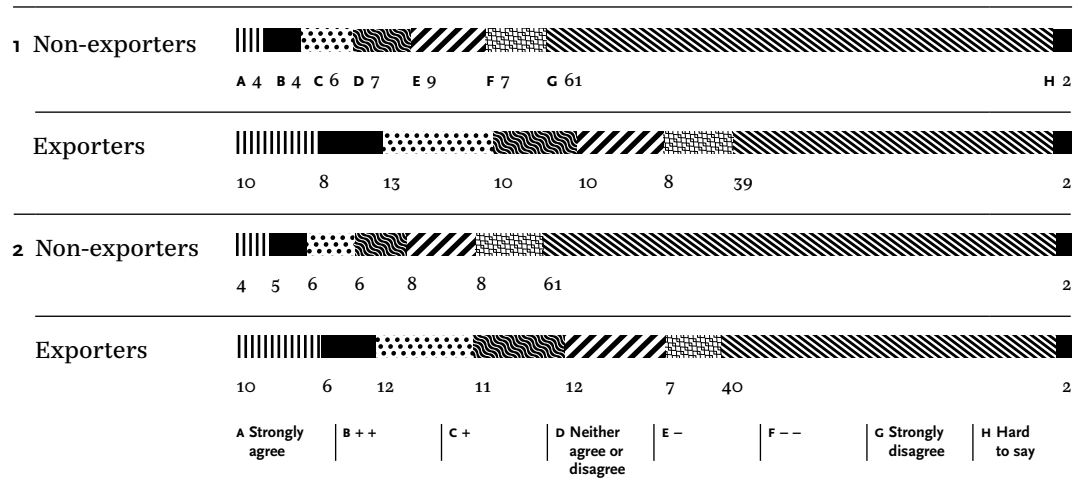

	A	B	C	D	E	F	G	H
1 Non-exporters	6	5	9	9	8	10	53	0
Exporters	12	10	19	13	10	11	25	0
2 Non-exporters	8	7	8	11	9	10	47	0
Exporters	17	13	16	14	14	8	18	0

A Strongly agree | B + + | C + | D Neither agree or disagree | E – | F – – | G Strongly disagree | H Hard to say

Base is all enterprises, $n = 800$. (Author's calculations based on SKDS survey data)

Figure 12. Rating of attitude to statements: (1) "The enterprise is trying to introduce the latest equipment in the production process" (2) "In order to reduce production costs, the enterprise has actively invested in installation of machinery and equipment", %
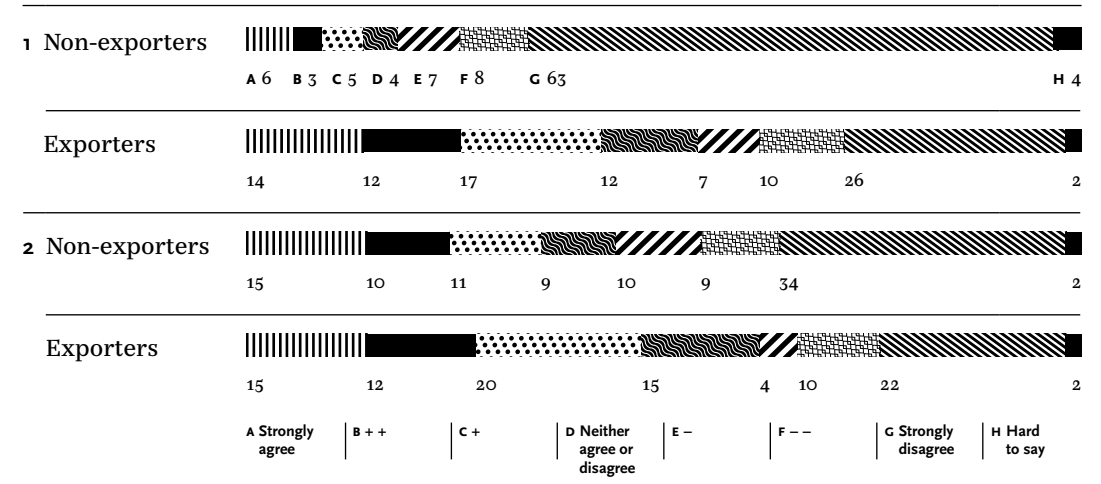
1 Non-exporters								
A 13	B 9	C 10	D 8	E 5	F 5	G 48		H 2

Exporters								
21	11	20		4	7	4	31	2

2 Non-exporters							
13	10	12	8	5	5	46	1

Exporters							
22	13	22	6	4	4	28	1

| A Strongly agree | B + + | C + | D Neither agree or disagree | E – | F – – | G Strongly disagree | H Hard to say |

Base is all enterprises, n = 800. (Author's calculations based on SKDS survey data)

Figure 13. Rating of attitude to statements: (1) "The enterprise invests considerable resources in research and development of new products" (2) "The enterprise invests significant resources in research and development in order to find the cost effective production methods", %

1 Non-exporters						
A 4	B 4	C 6	D 7	E 9	F 7	G 61	H 2

Exporters							
10	8	13	10	10	8	39	2

2 Non-exporters						
4	5	6	6	8	8	61	2

Exporters							
10	6	12	11	12	7	40	2

| A Strongly agree | B + + | C + | D Neither agree or disagree | E – | F – – | G Strongly disagree | H Hard to say |

Base is all enterprises, n = 800. (Author's calculations based on SKDS survey data)

Figure 14. Rating of attitude to the statements: (1) "Increasing competition between local enterprises has encouraged my enterprise to find a way to cut costs" (2) "Increasing competition caused by foreign enterprises has encouraged my enterprise to find a way to cut costs", %

1 Non-exporters						
A 6	B 3	C 5	D 4	E 7	F 8	G 63	H 4

Exporters							
14	12	17	12	7	10	26	2

2 Non-exporters						
15	10	11	9	10	9	34	2

Exporters						
15	12	20	15	4	10	22	2

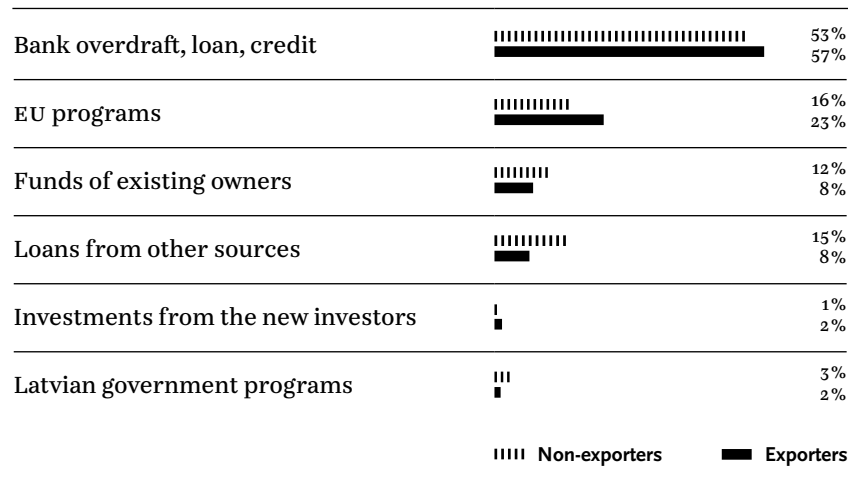| A Strongly agree | B + + | C + | D Neither agree or disagree | E – | F – – | G Strongly disagree | H Hard to say |

Base is all enterprises, n = 800. (Author's calculations based on SKDS survey data)

non-exporter extensively use financial bonuses and increase remuneration to reward employees' good performance (agreed with the statements, rating them 7, 6 or 5). Granting the non-financial bonuses is a common practice in 41 % exporting and 20 % non-exporting enterprises (agreed with the statements, rating them 7, 6 or 5).

The use of machinery & equipment. The share of exporters introducing the latest equipment and investing in installation of machinery and equipment (agreed with the statements, rating them 7, 6 or 5) is larger than the corresponding share of non-exporters (see Figure 12). In order to reduce production costs, a half of the exporters (52 %) and every third non-exporter (32 %) have actively invested in installation of machinery and equipment (agreed with the statements, rating them 7, 6 or 5). More than a half of the surveyed exporters (57 %) and 36 % of non-exporters are trying to introduce the latest equipment in the production process.
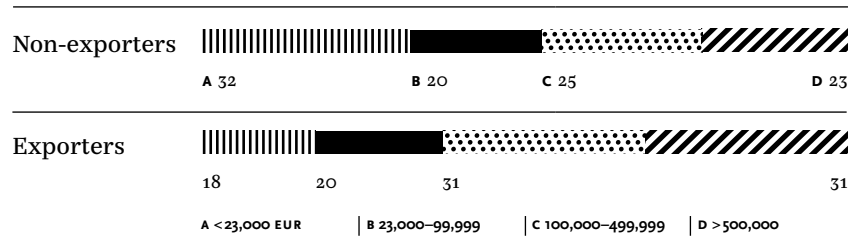
Research and development and the desire to bring innovations: Exporters tend to be more innovative than non-exporters (see Figure 13). 29 % or every third exporter invests considerable resources in research and development of new products (agreed with the statements, rating them 7, 6 or 5), while only 14 % of non-exporters do this. Finding the cost effective production method is a motivation for investing in research and development in

Figure 15. Average proportion of funding by type of funding source, %

Bank overdraft, loan, credit		53% 57%
EU programs		16% 23%
Funds of existing owners		12% 8%
Loans from other sources		15% 8%
Investments from the new investors		1% 2%
Latvian government programs		3% 2%

‖‖‖‖ **Non-exporters**   ▬▬ **Exporters**

Base is respondents, which attracted funds in the last 3 years, *n* = 218. Question formulation in questionnaire: "What is the source of funding attracted in the last 3 years? Please, rate the percentage of each source in the total fundraising."

Figure 16. Breakdown of the enterprises by the amount of the attracted funding, %

Non-exporters

A 32   B 20   C 25   D 23

Exporters

18   20   31   31

A < 23,000 EUR | B 23,000–99,999 | C 100,000–499,999 | D > 500,000

Base is respondents, who in the past 3 years have attracted funds to engage in new projects, to invest or to develop business, and replies to the answer; Exporters: *n* = 97. Non-exporters: *n* = 93. Question formulation in questionnaire: "Approximately how much funding did the enterprise raise from sources other than the enterprise's profits in the last 3 years?"

case of 30% exporters and 14% non-exporters (agreed with the statements, rating them 7, 6 or 5).

Increasing Competition. Increasing competition encourages exporters to find a way to cut costs to a greater extent than non-exporters (see Figure 14). Exporters are greatly affected by the competition between local enterprises (47% of exporters) and by competition caused by foreign enterprises

(43%) (agreed with the statements, rating them 7, 6 or 5). 35% of non-exporters are affected by local enterprises, while foreign enterprises force to reduce costs only in case of 14% of non-exporters (agreed with the statements, rating them 7, 6 or 5).

FUNDRAISING   There is an evidence of a greater share of exporting enterprises, than non-exporting enterprises, which have been attracting funds to develop their business within the last 3 years. According to the survey results, 43% of exporters and 20% of non-exporters have attracted funds to develop their business in the last 3 years. More than 60 percent of these enterprises obtained the additional funds from the banking services.

Figure 15 displays the average proportion of funding by type of funding source. On average, more than a half of the attracted funds (53% of non-exporters' funds and 57% of exporters' funds) were acquired from a banking service, such as bank overdraft, loan or credit. The second largest contribution to the overall amount of funding was provided by the European Union's programs: non-exporters and exporters attracted 16% and 23% of their total funds, respectively, from EU programs. Other less important sources are funds from existing owners and loans from other sources.
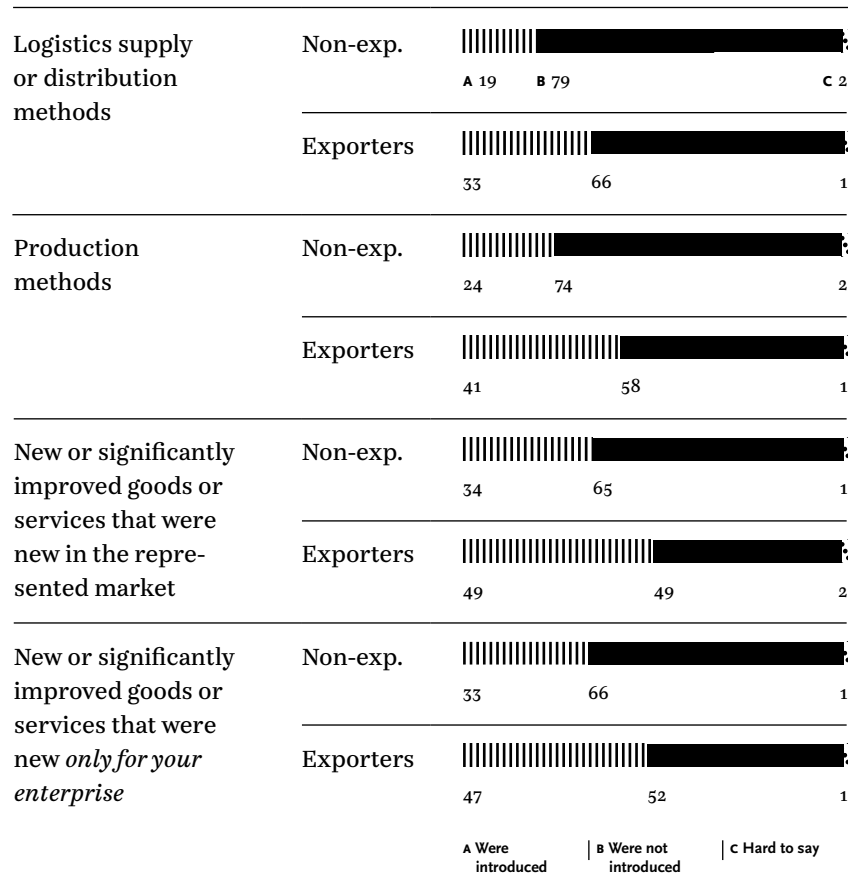
Exporting enterprises tended to raise larger funding from sources other than the enterprise's profits (see Figure 16). Large funding above EUR 500,000 was attracted by 31% of exporters and 23% of non-exporters. Funding above EUR 100,000 was attracted by 62% of exporters and 48% of non-exporters.

24% of exporters and 29% of non-exporters, which had attracted funds in the last 3 years, pointed out that the received funding was insufficient to fund new projects or development of the enterprise but they were not able to raise more funding. 61% of exporters and 52% of non-exporters that found the attracted funding insufficient, were provided only with the part of the claimed finding by the bank. 30% of exporters and 36% of non-exporters that found the attracted funding insufficient received refusal to grant any funding.

INNOVATIONS   The survey revealed that exporters are more innovative in relative terms, and the most common type of innovation is "a new or significant improved good or service that is novel in the represented market" (see Figure 17). According to the survey data, 47% of exporters and 33% of non-exporters had introduced new or significantly improved goods that were new only for their enterprises. 49% of exporters and 34% of non-exporters had introduced new or significantly improved goods or services that were new in the represented market.

41% of exporters and 24% of non-exporters have introduced new or significantly new production methods. 33% of exporters and 19% of

Figure 17. Proportion of exporting and non-exporting enterprises, which introduced different types of innovations, %

Logistics supply or distribution methods	Non-exp.	A 19	B 79	C 2
	Exporters	33	66	1
Production methods	Non-exp.	24	74	2
	Exporters	41	58	1
New or significantly improved goods or services that were new in the represented market	Non-exp.	34	65	1
	Exporters	49	49	2
New or significantly improved goods or services that were new *only for your enterprise*	Non-exp.	33	66	1
	Exporters	47	52	1

A Were introduced | B Were not introduced | C Hard to say

Base: all respondents, *n* = 800. Question formulation in questionnaire: "In the last 3 years, has your company introduced new or significant improved goods or services?"

non-exporters have introduced new or significantly improved the logistics supply or distribution methods. In general, those enterprises that have introduced the innovations note that they experience return of investments and increased profit.

The exporters on average experience a comparatively larger contribution of the product and process innovations introduced in the last 3 years to the current profit. 18.7% of non-exporters and 23.1% of exporters believe that the product innovations introduced in the last 3 years contribute to at least 20% of the current profit of the enterprise. 11.8% of non-exporters and 22.6% of exporters believe that the process innovations introduced in the last 3 years contribute to at least 20% of the current profit of the enterprise.

Conclusions

Directly exporting enterprises differ from the non-exporting enterprises in several characteristics: directly exporting enterprises on average have a higher turnover, employ a greater number of employees, pay higher salaries, and display better productivity, experience higher growth of number of employees and wages. In addition, exporting enterprises are managed by better educated leaders.

The main reason for unwillingness to export indicated by the representatives of the enterprises not engaged in exports and not considering to export, is the unsuitability of goods or services for export. The major barrier to exporting for enterprises already exporting turned to be fierce price competition in the foreign market. The major barriers on the path to commence exporting for enterprises not engaged in exports but considering to start exporting, include fierce price competition in the foreign market, initial cost of exporting and difficulties in finding information on foreign markets. Those enterprises that stopped exporting, did so mainly due to the pressure of the competition, as well as legal or customs problems.

On average, exporters display higher productivity (as measured in thousands EUR of turnover per employee). There is an evidence of a larger share of exporters (1) making significant investments in training new employees and the existing staff to enhance their capacity in carrying out their tasks; (2) widely using the financial bonuses and increasing the remuneration to reward employees' good performance, as well as granting the non-financial bonuses; (3) investing in the latest equipment and introducing it in their company's operation, as well as investing in installation of machinery and equipment. Increasing competition encourages the exporters to find a way to cut costs to a greater extent than non-exporters.

According to the survey results, 43% of exporters and 20% of non-exporters have attracted funds to develop their businesses in the last 3 years. On average, more than a half of the attracted funds were obtained from a banking service like bank overdraft, loan or credit. The second largest contribution to the overall amount of funding was provided by the EU programs. Exporting enterprises tend to raise larger funding from sources other than the enterprise's profits.

Exporters tend to be more innovative than non-exporters. 29% or every third exporter invests considerable resources in research and development of new products, while only 14% of non-exporters do this. Finding the cost effective production method is a motivation for investing in research and development of 30% exporters and 14% of non-exporters. The most common type of innovation is "a new or significant improved good or service that is novel in the represented market".

European funding:
Does it induce exporting?

Reinis Beķeris, Vents Vīksna

Judging by the past five years, history seems to be stress-testing the European Union (EU) like a central bank would its banking sector—with the fallout of the crisis of 2008 sparking the European debt crisis, which, in turn, birthed the Greek crisis as well as the looming threat of the Italian debt issue; with the migrant crisis; with Brexit; with Marine Le Pen and Geert Wilders—the odds are stacked against the Union. However, since the European Central Bank's loose monetary policy, there has been an upswing in European competitiveness; therefore, it is reasonable to look to the exporting sector and its growth prospects to find some glimmer of hope for the EU. We examine the impact of European Structural and Investment Fund (ESIF) financing on Latvian companies' tendency to export, disaggregated between large and small companies, "experienced" and "less experienced" management, and between ESIF funds. We use a difference-in-differences methodology, combined with propensity score matching, to eliminate the impact of any factors other than the "treatment" with EU funding and thus prove a positive relation between receiving EU funding and the exporting decision. We find a statistically significant, positive effect on exports' revenues for the funding recipients over those that had not received ESIF financing. What is more, we also find that, as we hypothesized, small companies would experience a greater effect from this influx of capital; more experienced management used the money more efficiently; and the agricultural investment fund had a more pronounced impact on the exporting decision than the regional development one. We conclude that ESIF financing is indeed a boon to the Latvian economy and its competitiveness. We believe that our findings may yield the government some insight into more efficient ways to allocate the delegated capital.

List of abbreviations

ESIF	European Structural and Investment Funds	EMFF	European Maritime and Fisheries Fund
WTO	World Trade Organization	EC	European Commission
MNE	Multi-National Enterprise	SMEs	Support for small and medium enterprises
ERDF	European Regional Development Fund		
ESF	European Social Fund	NNM	Nearest-Neighbor Matching
CF	Cohesion Fund	DID	difference-in-differences
EAFRD	European Agricultural Fund for Rural Development	OLS	Ordinary least squares
		ATT	Average Treatment effects on Treated

Introduction

In recent years, economic growth has become something akin to an "ultimate goal" of modern capitalistic markets in the eyes of both expert economists as well as the general populace. While economists bend over backwards to force their economies to expand, the average Joe simply wants to see his paycheck bigger than it was last year. There are numerous ways to achieve this growth and most involve trade-offs—that is an absolute truth if one assumes an autarky model of an economy, as, in such an economy, any choice to consume or produce one good or service would be, at the same time, a choice not to produce some other. However, the modern world is not at all a group of autarkies with no interaction between them. In a world of open economies, the market allows for transfers of goods, services, capital, and other assets from one state to the other, therefore allowing countries to borrow or take some of the wealth that another economy produces. Exporting is one of the channels that allows for such a transfer of wealth, as it funnels foreign money into "our" economy; given that "our" country is a net exporter, thus creating a net inflow of foreign wealth. Furthermore, international trade allows for exploitation of comparative advantages and specialization, e.g., how US import cheap consumer goods by utilizing trade with China. Therefore, it comes as no surprise that the activity of exporting has garnered an immense amount of research over the years.

Due to exporting being perceived as such a high value-added activity, many countries go out of their way to support their industries or companies that export. A rather simplistic example of this would be an export subsidy, e. g., the tax break on Boeing's 777X model that was recently found illegal by the World Trade Organization (WTO) was proven to be an export subsidy (Julie, Andrea & Ian, 2016). However, export subsidies are no longer an option for governments as all members of WTO have agreed to (excluding agricultural produce and some other exemptions) avoid using export subsidies (World Trade Organization, 2016). Thus, many governments seek to find other means by which to encourage firms to turn to exporting. A viable path to indirectly advocate exporting is investing in high-productivity companies (we outline the strong linkages between productivity and exporting later in our paper, however, to shortly note—it is argued that export markets are highly competitive due to the high number of available suppliers, therefore, it takes a productive company to enter and remain within the international markets). In the case of the European Union (EU), the European Structural and Investment Funds (ESIF) are used as a tool for exactly such investment (Institutional details section below elaborates on this).

Contrary the prior example of export subsidizing, the impact of ESIF funding on exporting is not nearly as clear cut. In truth, while there is ample academic research on the impact of financial aid on international trade, one would be hard-pressed to find any studies that examine this relation within the EU. This is then the gap that we fill by conducting our research—we seek to determine whether ESIF programs allocate capital to export promotion and answer our research question:

RESEARCH QUESTION: DOES EUROPEAN STRUCTURAL AND INVESTMENT FUND FINANCING PROMOTE EXPORT ACTIVITY?

While there is no clear indication in the ESIF regulatory documents that their financing is meant to promote exporting, we believe that the funds do so indirectly via, firstly, recipients being able to use the funds to cover sunk costs related to establishing an exporting activity; secondly, receiving ESIF funding may create informational channels that allow for easier access to foreign markets (more regarding within-Europe trade); thirdly, one of ESIF goals is to promote competitiveness and productivity. As export propensity is later shown to be linked to these elements, we therefore assert:

HYPOTHESIS 1: ESIF RECIPIENT COMPANIES ARE MORE PRONE TO EXPORT THAN THOSE THAT HAVE NOT RECEIVED SUCH FINANCING

To answer our research question, we will employ a difference-in-differences analysis methodology with matched control and treatment groups. We believe that, by employing the propensity score matching method to create a control group that is similar to our treatment group, we can single out the effect ESIF funding has on export activity. Our dataset is a survey of over 799 Latvian companies (after cleaning, the dataset has been reduced to 675 companies) that includes all the variables necessary to conduct our research (i. e., whether the specific firm exports, if it has received ESIF funding, as well as various control variables—from company size to the education level of its management).

The remainder of this paper is structured, as follows: section two outlines the current literature on exporting, includes the subsection Institutional details, in which we examine the system of ESIF funding distribution and distinguish between various objectives of ESIF funding; section three explains our research method and describes our dataset; section four shows our empirical results, section six discusses them and adds some government policy implications; and section seven provides the conclusions.

Literature review

To truly prove a causal relation between ESIF finances and export propensity, we

must also justify it with academic literature. To do so, we first ascertain the stronger determinants of exporting and then, from this sample, find such variables that can be either supplemented or increased due to a firm receiving ESIF funding.

EXPORT DETERMINANTS   Das, Tybout, and Roberts (2007) show that sunk costs have a strong impact on whether a company would become an exporter; they argue that, to begin exporting, a company is required to put forward a considerable investment of time and money, concluding that firms that were exporting in the last period, will most likely also export in this period. They test their hypothesis by analyzing three Colombian manufacturing industries—knitted fabrics, basic chemicals, and leather products (in a 2004 revision, knitted fabrics was removed from the dataset, still leaving their conclusions intact). In their model, a firm will choose to become an exporter if their expected profit from exporting outweighs the associated sunk costs (Das et al., 2007). Their results suggest three important findings. Firstly, that sunk costs are a significant deterrent for companies to begin exporting and that per-unit subsidies are much better than lump sum grants to promote exporting due to higher possible profits. Secondly, that large firms can enter international markets with greater ease than small firms, because their size allows to cover the associated costs with less trade-offs. And thirdly, that foreign ownership is associated with a higher probability of exporting, presumably due to reduced costs associated with the creation of informational channels, which are also a significant variable for the exporting decision (Das et al., 2007).

The notion of foreign ownership spillovers is strongly echoed by Aitken, Hanson, and Harrison (1997) as they test for whether Multi-National Enterprises (MNEs) have a positive impact on the indigenous firm's exporting tendencies. Aitken et al. do this by regressing prices, quantities, production costs, and regional exporting activity on the probability to export. Their model allows them to capture regional spillover effects, i.e., they capture the effect that one exporting firm can have on other nearby companies' tendency to export. They argue that this effect should be positive not only for MNEs, but also indigenous exporters as they would create necessary infrastructures or institutions that would assist in exporting or promoting the activity, e.g., roads, organizations, ports. Their results present that (1) MNEs are, on average, twice as likely to export than domestic firms; (2) MNE concentration significantly increases export likelihood in the region; and (3) there is no significant relation between concentration of exporting activities (without the differentiation between MNEs and domestic firms) and exporting of any firm, i.e., the fact that there are exporters in a region has no effect on other firms' exporting decision (Aitken et al., 1997). The findings of Aitken et

al. tie in well with the previously outlined notion of high sunk costs acting as barriers to exporting. They conclude that MNE partners may alleviate various constraints, such as buyer-seller relations, technology requirements, or superior management practices.

Aitken et al. also show that higher wages have a positive impact on exporting propensity, because, as they argue, the increase in competitiveness that ensues due to exporting will make the companies pay higher wages. This notion is reinforced by Bernard and Jensen (2004) with their research whereby they aim to show the full spectrum of reasons due to which a company may choose to go into exporting as well as the opposite—why one may be deterred from beginning an export-based business. They use multiple regressions combining instrumental variables analysis with lagged variables. They find that size, wage rates, productivity, and labor education are significant determinants of exporting. The authors test their model against a vast US firm dataset including 13,550 plants and 94,902 observations (Bernard & Jensen, 2004). What is more, there is another finding that is rather curious in their paper—they find no evidence that US export-supporting programs are working to improve exporting in general. They do mention that this might be due to sample bias, though, the notion remains that the US might be failing to actually support their exporting industries with policies directly targeted at them. We believe that this adds more weight to our findings, as we find that ESIF funding has positive effects on export propensity, therefore, we outline, perhaps, another research gap—the institutional differences between the American and the European funding distribution systems. Knowing, essentially, what these US institutions did "wrong" may prove to be useful information to some governing facilities.

The findings of Das et al., Aitken et al., and Bernard and Jensen, are further supported by Masso and Vahter (2015), as they prove that productivity is indeed positively linked with exporting. While the main goal of their study is to prove learning-by-exporting, i.e., that companies tend to become more productive after their entry into the international markets, their results also imply strong selection effects, thus indicating that high productivity may be a prerequisite to begin exporting to cover the associated sunk costs.

Of the set of export determinants, we find that firm size and management experience is a path by which EU funding might affect exports. Thus, we also outline two hypotheses regarding both variables. Due to how disproportionately strong the export-deterring impact of sunk costs can be to smaller enterprises, assuming ESIF recipient exporters use their funding to cover these costs, we believe that:

Hypothesis 2: the effect that receiving of eu funding has on exports will be more pronounced for small firms

Regarding management experience we argue that more experienced managers distribute this additional capital much more efficiently than the inexperienced, therefore, we expect that there is:

1 A variable, whose disentanglement will be provided in the data description

HYPOTHESIS 3: A HIGHER EU FUNDING IMPACT ON EXPORTS IF THE COMPANY'S MANAGEMENT IS "EXPERIENCED[1]"

INSTITUTIONAL DETAILS   The European Structural and Investment Fund program was created with two overarching goals: job creation and promoting sustainable economic policies. ESIF consists of five funds: European Regional Development Fund (ERDF), European Social Fund (ESF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), and European Maritime and Fisheries Fund (EMFF). The management of these funds is done jointly by the European Commission (EC) and the national governments through partnership agreements that outline the proposed distribution of funding depending on the specific needs of each country. Budgeting of these funds is made in programming periods, each lasting 7 years (The European Union, 2017). For Latvia, 4.530 billion EUR were distributed in the 2007–2013 programming period, while the current plan is to distribute 4.418 billion EUR in 2014–2020 (Latvian Ministry of Finance, 2016).

The ESIFs fulfilled a vital role in public spending and contributed, on average, 1–2% of annual GDP growth from 2001 to 2016. As mentioned, the goal of the structural funds is improving regional competitiveness, but, at the same time, each of the funds has a specific set of sub-goals that they aim to achieve. In Latvia, the Ministry of Finance manages ERDF, ESF, and CF while the Ministry of Agriculture manages EAFRD and EMFF (Latvian Ministry of Finance, 2016). Due to data availability, it is only necessary to describe in detail the funding distribution practices of ERDF and EAFRD, as we simply do not have enough companies that have received money from other funds. However, this comes as no surprise, because these are the two funds that invest the most into the private sector.

European Regional Development Fund
The main objective of the ERDF program is to minimize regional welfare discrepancies in the European Union. Financing is targeted toward regions that are poorer (by Gross National Income (GNI) per capita) than the EU average and directed specifically into local infrastructure development and fostering entrepreneurial activity in these regions (Latvian Ministry of Finance, 2015). The ERDF directs its funding to what is known as 'thematic concentration' areas:

— Innovation and research;
— The digital agenda;
— Support for small and medium enterprises (SMEs); and
— The low-carbon economy (The European Commission, 2017).

The EC sets out rules regarding minimum funding for policy areas depending on the development level of the specific economy, however, the final decision of funding distribution lies with the managing authority of the fund—the Latvian Ministry of Finance.

European Agricultural Fund for Rural Development
The EAFRD program was created to support the European agricultural industry, as well as develop rural regions that may struggle to adapt to the various challenges of the 21st century. The EC has outlined six priorities regarding EAFRD investments:
— fostering knowledge transfer and innovation in agriculture, forestry and rural areas;
— enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management;
— promoting food chain organization, animal welfare and risk management in agriculture;
— restoring, preserving and enhancing ecosystems related to agriculture and forestry;
— promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors;
— promoting social inclusion, poverty reduction and economic development in rural areas (The European Comission, 2017).

As with ERDF, each Member State is given quite a lot of leeway regarding how they decide to distribute the allocated funding, however, the EC requires that at least 4 of the 6 priorities receive funding. EAFRD investments are linked with European Agricultural Guarantee Fund (EAGF) with EAFRD investments more tending toward infrastructure and such, while EAGF is for payments directly to farmers. Further in the paper, we combine both funds under EAFRD.

IMPORTANT IMPLICATIONS   It is immediately evident that (1) neither of the two funds' goals contain export stimulation as a funding priority, therefore, the effect our research shows is inadvertent and (2) the investment areas differ across the two funds, meaning that it is expected

that the effect each fund has on export propensity is different. The planning documents of ERDF in Latvia show that 10.5 % or (474 million EUR) of its funding was directed toward entrepreneurship and innovation (Latvian Ministry of Finance, 2013). We believe that this is a reason enough to believe that ERDF could be promoting export activity indirectly through, e. g., innovation investments. While, for EAFRD, we find not only rural competitiveness as an investment objective, but also EU agricultural goods' promotion policies meant to advertise European agricultural and maritime produce on the international markets (Latvian Ministry of Agriculture, 2017). In total, rural development and agricultural support financing for the 2007–2013 planning period was 808 million EUR, a value that far outweighs ERDF investments[2] (Rural Support Department, 2013). Hence, we hypothesize that:

Hypothesis 4: eafrd funding recipients will, on average, export more than those that have received erdf support

Furthermore, we find that there are varying requirements for different investment objectives, which leads us to conclude that the distribution of our EU funding variable is non-random (European Structural and Investment Fund, 2016). The binding agreements show that the requirements for application to EU funding are not distinctly quantitative — while there are some requirements for minimum turnover, there are no requirements for management experience, company age, and such company characteristics that one could compile into a dataset. The implications of this are outlined in the methodology section.

Methodology

If we were to run a simple Ordinary Least Squares (OLS) regression, regressing our binary variable for EU funding on exports, our estimators would be highly biased due to, e. g., an abundance of omitted variables. Therefore, to escape the various issues surrounding such a simplistic model, we first and foremost employed a difference-in-differences (DID) method as done by Card and Krueger (1995), where they tested the impact a minimum wage increase had on New Jersey's employment in 1992. The DID method relies on finding a control group that fulfills the parallel trend assumption — an assumption that, without "treatment" (here, a minimum wage increase; for us, receiving EU funding), both the treated and untreated groups would develop similarly. Through observation of historic data, Card and Krueger established

2   Our intention by showing this comparison of investment size is to show a general trend — that EAFRD tends to invest more in agricultural companies than ERDF does in enterprises. By using said data, we do not mean to draw any conclusions regarding effect size.

that New Jersey's economy was highly comparable with that of Pennsylvania. Thus, they could control all the unobserved variables impacting employment changes in either city, such as seasonality, external shocks, etc., by subtracting the differences in employment statistics before and after the minimum wage was increased in New Jersey. Since then, the DID method has been widely used to determine a causal effect of various treatments on the treated group. DID method can be described with the following formula:

$$\delta = (\gamma_{11} - \gamma_{21}) - (\gamma_{12} - \gamma_{22}) \quad ①$$

where δ denotes the treatment effect, γ_{12} and γ_{11} denote the treatment group before and after treatment, and γ_{22} and γ_{21} denote the control group at both observations (Card & Kreuger, 1995). As can be observed from the formula, the DID method requires changes in the dependent variable to function properly. Therefore, to be able to estimate the effect of EU funding on changes in exports, we narrowed the sample to only those companies that export.

Card and Krueger's case was quite specific in the sense that they had found the perfect control group to test their hypothesis. We do not have the luxury of the parallel trend assumption between ESIF recipients and all the other companies in our dataset, as they are highly different from one another. Therefore, we combine the DID method with propensity score matching to create a control group that is highly similar to our treatment group by a set of covariates. A comparison of EU funding recipients against all other Latvian companies would essentially be like comparing professional athletes to hobby runners — we could never know for sure if the funding received truly impacted export propensity of these companies or if they were predisposed to a higher export propensity from the get-go. Hence, to single out the effect of ESIF funding on exports, we compare the companies that received funding to a pool of companies that could have received these funds but did not, while still being similar in all other relevant characteristics to those that did receive funds.

PROPENSITY SCORE MATCHING AND THE ATT   First published by Paul Rosenbaum and Donald Rubin in 1983, the propensity score matching method tries to deal with the endogeneity problem that occurs when researchers study effects of treatment in a non-experimental setting (Rosenbaum & Rubin, 1983). The methodology has been used multiple times afterwards to estimate the effect of various policies and external events on some characteristics and often it is used in conjunction with propensity score matching (e. g., Girma, Greenaway & Kneller, 2004; Girma, Gorg & Strobl, 2007). Most economic treatment effects are non-random, thus, comparing the performance

of a treatment group to the performance of the population leads to strong selection bias. This is also the case given in our study, as we previously outline that ESIF funding is not awarded randomly. The propensity score itself is simply the conditional probability of observed individuals to become treated, which yields:

$$p(X) \equiv \Pr(D = 1|X) = E(D|X) \quad ②$$

where D is the binary treatment variable (for us, $D = 1$, if said company has received EU funding and zero if it has not), and X is a set of covariates, by which our propensity score is formed (for us, these are company characteristics, whereby we form the probability of receiving ESIF funding). We estimate our propensity scores by running a probit regression, regressing our covariates — firm size, foreign ownership, age, labor size, management experience, and whether the firm was an exporter 5 years ago — on our binary ESIF funding variable.

$$EUFunds_i = \beta_{const} + \beta Size_i + \beta Frgn_i + \beta Age_i + \\ \beta Labor_i + \beta Mgmt_i + \beta Exporter_i + \varepsilon_i \quad ③$$

where, *EUFunds* is a binary variable for whether the company has received ESIF funding, *Size* is the company revenue, *Frgn* is a binary variable that is one if the company is foreign-owned and zero if it is not, *Age* shows company age in years, *Labor* is the number of workers the company employs, *Mgmt* is the years of work experience that the management has accumulated, *Exporter* is revenue received from exports five years ago, and β_{const} and ε_i are the intersection and error terms respectively.

In a perfect world, we would have a dataset from which we could create a control group whose $p(X)$ of the treated would be equal to the $p(X)$ of untreated for every firm. However, as this is not possible, instead, we use the Nearest-Neighbor Matching (NNM) method, which dictates that each treated observation is matched with an observation from the control group with the nearest propensity score. NNM is also used by Masso and Vahter (2015) (and, e.g., Kangahsharju, 2005). They use very similar microeconomic data and find NNM to be the best way to deal with treated and untreated group differences after obtaining propensity scores, therefore, we feel inclined to follow in their path. In our study, we intend to match firms with one and two nearest neighbors to show robustness of our results. Another note on our matching method is that, due to the size limitations of our dataset, we have chosen to match with replacement, meaning that multiple treated firms may be matched with one control firm. Furthermore, as we outline in the Institutional details section, there are no clear determinants

of EU funding receipt, therefore, we simply test for statistical significance among available company characteristics and use those as predictors. We find the most significance in company turnover in 2010, foreign ownership, labor size, company age, management experience, and whether the company was an exporter in 2010.

After matching our samples by NNM, we estimate the Average Treatment effects on Treated (ATT) with a simple OLS regression by following Becker and Ichino (2002) guidelines on implementing Rosenbaum and Rubin (1983) model:

$$\tau = E\{Y_{1i} - Y_{0i}|D_i = 1\} \\ = E[E\{Y_{1i} - Y_{0i}|D = 1, p(X_i)\}] \\ = E[E\{Y_{1i}|D_i = 1, p(X_i)\} - E\{Y_{0i}|D_i = 0, p(X_i)\}|D_i = 1] \quad ④$$

where τ is the ATT, $p(X_i)$ is the propensity score, and Y_{1i} and Y_{0i} are the two possible outcomes dependent on treatment (D). From equation (4), we can explain ATT as the difference in the dependent variable between treated and untreated groups, conditional on the propensity score, given that treatment is equal to one, or more intuitively, we match two companies — one that is treated and another that is not — by their propensity scores and take the difference in their dependent variable. As previously mentioned, we will use the DID method, therefore, our dependent variable (exports) will be a difference, meaning that we will study ESIF financing impact on export growth (or decrease). Thus, as we perform the same analysis as before — take the difference in dependent variables, given that we have matched our companies by their propensity score and that one firm receives EU funds — we arrive at a difference in the differences of export revenues achieved through a matched sample.

DATASET DESCRIPTION   Our dataset is a survey designed by our supervisor and Professor Tālis Putniņš that consists of 799 Latvian companies. The survey covers both quantitative as well as qualitative questions regarding firm characteristics. Regarding the quantitative description of companies, the survey has three time points: (1) variables such as turnover, export percent of turnover, employee number, management experience are reported five years ago (2010), (2) the same variables but in present day (2015), (3) and what is the composition of necessary funding sources in the last three years. It is immediately visible that the survey has been crafted in such a manner as to allow for use of DID methodologies to study relations between variables as one of the prerequisites of DID is that treatment is received within the studied timeframe. Of all the available data, we have used the following elements in our model:

— Firm size measured by annual turnover in EUR;
— Number of employees (full-time equivalent), including management;
— Domestic sales (% of turnover), i. e., inverse of proportion exported;
— Year the company was established (used to calculate company age);
— Years of managerial experience of the top management;
— Whether the controlling owner is local or foreign.

During the initial stage of our research, we found that we required more reliable sources of information regarding a multitude of these variables, as we could see from a brief descriptive statistics analysis that there were numerous overestimates, underestimates, or simply missing values. The variable that aroused our suspicion the most was turnover in EUR, for which most of the values were rounded and sometimes very approximate or indicated as unchanged from period to period, and, in some instances, missing. We solved this by manually obtaining company data from the *Orbis* database and overwriting the survey. In many cases, the database held multiple companies with the same name, therefore, for further studies of this kind we suggest that a company registration code is obtained as a supplement to ensure that there is no ambiguity in case the company has a name that can be linked to multiple companies. Such an addition to the survey would have sped up our research significantly.

Many companies indicate whether they have received European funding or not, however, we find responses to this question to be very unreliable. Firstly, when surveyed, the management often indicated that they had received funding in the last three years, while, in truth, the funding had been received six or more years ago. Secondly, the company might have participated in performing a project that was financed by ESIF funding, but when surveyed, they indicated that they had received funding directly. Worse yet, several companies failed to indicate that they had received any funds. We argue that this may be due to the person representing the company not being aware of the relevant fact. To account for all these issues, we ran the company names through publicly available lists of ESIF recipients to make sure that we did not overstate or understate the ATT. We used the list of recipients available at Rural Support Department's homepage to cross-check EAFRD financing (Rural Support Department, 2017). Much in the same manner, we resorted to the Latvian ESIFs' freely available record of recipients to perform the same check for ERDF (Latvian Ministry of Finance, 2017).

After acquiring the necessary information, we consolidated the data into a single file and cleaned it. For cases, in which all key variables were

missing, the observations were dropped. For cases of *Orbis* supplying faulty values, the observation was changed to the self-reported survey value. We purposely remove all government-held companies, as they do not operate according to free market constraints and, therefore, yield no valuable information regarding ESIF funding and its impact on the exporting decision.

Finally, the dataset is trimmed of observations that are below the 1st and above the 99th percentile (and, as a robustness check, 2nd and 98th percentile, as well) before the analysis is conducted. After these actions, our dataset now consists of 675 companies, where most of the necessary data are present to perform our research. We find that, for a multitude of companies, we are still missing values regarding many control variables, e.g., labor size, management experience, etc. This somewhat narrows the scope of our research, as we are therefore limited in the factors we can control in the model.

DISAGGREGATION OF SUBGROUPS   To test our hypotheses with a difference-in-differences analysis, we must divide our sample into appropriate subgroups. In terms of our primary research question—whether ESIF funding promotes exporting—this would simply be the treatment and control groups. Our dataset contains 93 companies that have received EU funding, thus, if we were to assume random assignment for ESIF funding, our control group would consist of 582 companies, however, as we have concluded that EU funding is non-random, we must form a viable control group.

Amongst the companies in our two sub-groups, we are specifically interested in the performance of companies that either were exporting but seized to do so, started exporting in the last five-year period or exported beforehand and still export now; we denote this group as exporters. Once divided so, our treated sample is 47 ESIF recipients-exporters and 184 untreated exporters.

As outlined in the literature review, we hypothesize that ESIF funding has a more pronounced effect on small enterprises than on big firms. Similarly, we also wish to test the different effects of management experience can have on export growth, conditional on receipt of funding. As our sample is fairly small, we cannot afford to choose arbitrary thresholds for when a company is large or when a manager is "experienced". To overcome this, we have chosen to work with values relative to our dataset: the company is labeled as large if its size is greater than that of the mean treated company; while the converse is true regarding small enterprises. Managers are "experienced" if they have more years of experience than the average manager of a recipient firm; while the contrary is true for inexperienced managers. By employing this kind of logic, we find that, in our sample, a "large" company is one with turnover above 1.1 million EUR and "experienced" managers have upwards

Table 1. Summary statistics for three groups of samples — all non-recipient exporters, the propensity score-matched non-recipient exporters, and recipient exporters

Parameter of interest	Non-recipient exporters				Matched sample				Recipient exporters			
	Mean	St.dev	Min	Max	Mean	St.dev	Min	Max	Mean	St.dev	Min	Max
Percent of turnover exported (2010)	44.59%	38.60%	0%	100%	60.56%	36.35%	0%	100%	49.53%	38.48%	0%	100%
Percent of turnover exported (2015)	43.06%	37.00%	0%	100%	47.36%	39.58%	0%	100%	61.13%	32.59%	0%	100%
Number of employees	24.79	41.97	1	360	25.93	48.82	1	36	71.71	131.78	1	700
Turnover, million EUR (2010)	2.67	6.91	0.001	7.33	4.42 EUR	7.42	0.007	26.4	7.35	23.	0.010	14.3
Turnover, million EUR (2015)	3.42	11.2	0.008	133	4.60 EUR	8.33	0.001	29.8	8.81 EUR	4.90	0.022	22.8
Management experience	15.16	8.73	2	50	14.83	8.06	2	40	18.42	7.31	3	35
Age	15.10	8.06	5	70	17.58	8.73	5	70	19.46	10.39	6	76
Number of observations	177				46				44			

of 20 years of managerial experience. Table 1 examines summary statistics of our data for the various groups.

In Table 1 we can observe how the subgroups differ in the characteristics most relevant to us. The dataset is not homogenous and the observed variance in all of variables is quite large, there are no clear and useful conclusions that could be drawn without regression analysis.

LIMITATIONS   As previously mentioned, our sample size is relatively small, 799 companies before dataset cleaning; this issue becomes significantly more prominent as we clean out the dataset and check for missing or false values. Once the dataset narrows down to ~ 40–45 observations for some specific groups, the issue of missing values becomes an insurmountable obstacle as we cannot, for instance, test for industry-specific effects, because the observation count for some industries is too low to gain significant results.

Propensity score matching is a very popular method for distinguishing a comparable sample in a non-random treatment setting, however, it makes our results rather sensitive to the matching principles we choose. The results can vary widely between propensity score matching methods, and we show this variation in our robustness check section.

Another concern is that the covariates that we use for propensity score matching may not explain a significant share of probability associated with EU funding allocation. Our method was to find best variables from those that we have in our dataset, but we encourage the search for better ones in case there is a reason to believe that it is possible to obtain them. Many of the variables we believe to be relevant are plagued by a dataset-wide omission, i.e., the information has been missing for a sizable amount of observations. We still believe that the questionnaire has potential, but the missing values prevent us from using it to its full potential.

Analysis of results   The first stage of our research determines the conditional probability that a company received EU funding. The variables and their predicting capabilities are shown in Table 2. As this is a probit regression, nothing more than the direction and significance of each of the variables' impact is discernible. We may observe that only the age of the company is insignificant at any level, meaning that we have good predictors of EU funding allocation.

We believe that there is a great potential for improvement of this stage of research by finding a better array of covariates, however, as outlined in the Institutional details section, it is a difficult task. These were the most statistically significant explanatory variables available to us from our survey. Additionally, they also have some logic behind them, as discussed previously.

Table 2. Probit regression results. Determining the probability of EU funding allocation

Covariate	Unadjusted		Trimmed at 1%		Winsorized at 1%	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Turnover (2010)	0.000000195	0.080	0.000000197	0.077	0.000000195	0.080
Foreign ownership	−0.4422162	0.086	−0.4445407	0.084	−0.4422162	0.086
Age	0.0107568	0.114	0.0090787	0.189	0.0107568	0.114
Number of employees	0.0019365	0.085	0.0020417	0.070	0.0019365	0.085
Management experience	0.0164145	0.030	0.0155266	0.043	0.0164145	0.030
Percent of turnover exported (2010)	0.468405	0.014	0.4574942	0.017	0.468405	0.014
Constant	−1.673751	0.000	−1.633635	0.000	−1.673751	0.000

Table 3. ATT estimation for various constructions of the dataset

	Full sample ATT	ATT with 1NN	ATT with 2NN
DID estimate (Trimmed @1%)	0.1303107***	0.246956523***	0.193804349***
(Trimmed @2%)	0.0557318 **	0.103488371***	0.08116279**
(Winsorized @1%)	0.1153793***	0.208936171***	0.178510638***
(Winsorized @2%)	0.1121103***	0.206808512***	0.174255317***
Untrimmed/ Without Winsorizing	0.1151619***	0.208936171***	0.178510638***

The difference-in-differences estimate for the treatment group in the sample trimmed at the 1st and 99th percentiles, after applying nearest neighbor matching or, simply, the ATT, is 24.7% at a 99% significance level. This means that, when comparing companies that received EU funding to those that did not, we can reliably say that EU funding has had a positive effect on export propensity. In Table 3, this would be the first row of the second column. It is important to note regarding our ATT estimations, that they are significant at the 1% threshold for all but two configurations of our dataset. This further reinforces our compelling conclusions that EU funding does indeed promote exporting and proves our hypothesis (Hypothesis 1) true — European Structural and Investment Fund finances do promote export activity.

The first column shows the ATT without matched samples, i. e., the effect of EU funding on export propensity of all firms, the second column shows the base case of ATT with matched samples and NNM with 1NN, and the third column expands with NNM with 2NN.

As stated previously, we expand our analysis by disentangling the effect for various sub-groups. Our estimation of the effects of EU funding, differentiated between small and big companies (see Table 4), indicates that the ATT for small companies is 31.55% at 99% significance level, which is 7.54% larger than difference-in-differences estimate for large companies. We then test whether the difference in means is statistically different from zero. The test indicates that the difference between these estimates is insignificant and we cannot reject the null hypothesis that the EU funding impacts exporting

Table 4. ATT estimation for a dataset disaggregated between small and large companies

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
DID for small companies	0.2416667**	0.3154857***	0.1371212**
DID for large companies	0.2250408***	0.2401339***	0.0874808**
Difference in means	0.0166259	0.0753518	0.0496404
Prob > chi²	0.8876	0.5828	0.5208

Table 5. Difference in ATT when the sample is divided among experienced and inexperienced management

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
DID, if experience < 20 years	0.121806*	0.137795*	0.0457273
DID, if experience > 20 years	0.3036905 ***	0.3893478***	0.1578468***
Difference in means	0.1818845	0.2515528	0.1121195
Prob > chi²	0.0659	0.0421	0.0590

Table 6. Difference in ATT estimations for funding received from EAFRD vs. ERDF

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
ERDF	0.1766768***	0.2002273***	0.0745412**
EAFRD	0.2462222***	0.2765909***	0.1157317***
Difference in means	0.0695454	0.0763636	0.0411905
Prob > chi²	0.3378	0.3046	0.3760

tendency for small and large companies equally, meaning that we must conclude that there may be no effect differences between small and big companies, thus proving our hypothesis (Hypothesis 2) false — we cannot say with certainty whether EU funding impacts small and big companies differently.

As seen in Table 5, the ATT estimate for companies with more experienced management is 38.93% at the 99% significance level, which is 25.15% larger than the estimate for companies with less experienced management. Here, the statistical test for whether the difference in means is non-zero, indicates that we have enough evidence to reject the null hypothesis at the 5% significance threshold, which states that the companies with more experienced management will not be affected by EU funds to the same extent as those with less experienced management. The data brings conclusion that more experienced management increase their revenue share of exports more than inexperienced management, which proves our hypothesis (Hypothesis 3) true — more experienced management will use the funding received from ESIFs to increase their exports more frequently than the less experienced managers.

And lastly, Table 6 disaggregates between companies that receive EAFRD and ERDF funding. The ATT estimates for companies that receive EAFRD funding is 27.66% at the 99% significance level, which is by 7.64% larger than the estimate for companies receiving ERDF funding. The statistical test of mean difference concludes that we cannot say with certainty that the effect is different between funds, therefore proving our hypothesis (Hypothesis 4) false — there is no difference between the effects of EAFRD and ERDF funding regarding export propensity.

ROBUSTNESS ANALYSIS   To bolster the robustness of our findings, we repeat our study in multiple constructions. We employ the methodology and change one or more characteristics, e. g., instead of trimming (which is removal of extreme values), we winsorize our dataset (which means changing extreme values to the next, non-extreme values).

For all constructions of our method, the data presents the same picture — EU funding positively affects export propensity; small companies' estimators are higher than those of larger enterprises, however, the difference in means is statistically insignificant; "experienced" managers use the additional funding for more export-oriented means and the difference in means of effects on the two groups is statistically significant; and EAFRD has a more pronounced effect on export propensity, however, it is statistically insignificantly different from zero. Magnitude, however, varies widely depending on the chosen construction — a notion that reinforces our prior concern that our results are more indicative than predictive. However, this unity of direction and significance reinforces our results and invigorates our support for the chosen methodology, as it shows that, whatever configuration of our dataset or model, we will arrive at the same results.

All robustness tests may be observed in Annex B and its sub-sections.

Discussion of results | The study was performed to find whether EU funding has a positive impact on Latvian companies' tendency to export. For this purpose, propensity score matching and difference-in-difference methodology was applied to a dataset obtained by combining survey data, publicly available company data, and publicly available records of ESIF funded projects.

While conducting our research, we came across several companies, whose primary focus for the EU money was buying equipment to produce higher quality goods (we will examine one such case later) or participation in international conferences, which is essentially development of informational channels. This, in addition to the wild fluctuations in the beta coefficient for EU funding, caused by changes in matching principles or the lack thereof, signifies that applying the DID methodology without propensity score matching creates a substantial bias in our estimators, which further strengthens our commitment and confidence in our methodology and results.

The results have answered our research question and proven our first hypothesis (Hypothesis 1) true — there is a positive relation between receipt of EU funding and growth in share of turnover exported over a five-year time-span. All robustness checks indicate a strong, statistically significant effect ranging from 5.57% to 24.69% at varying confidence intervals, that never breach the 95% level. We believe that this is a very positive

Figure 1. The figure shows the ATT of EU funding
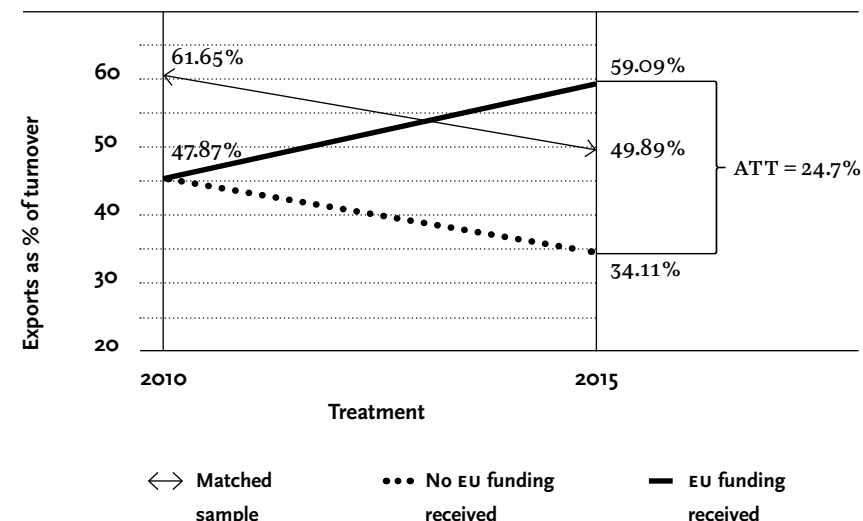
Due to the parallel trend assumption, we assume that the non-recipient and recipient companies would develop similarly over the treatment period, given that neither group receives treatment (hence the dotted line). However, the treated group had their turnover exported increased over the matched sample by 24.7%. As our methodology outlines, we attribute this increase to the receipt of EU funding.

finding regarding EU funding, as we have previously outlined the beneficial effects of export activity. We visualize our base case of 24.69% effect in Figure 1.

As outlined in the Methodology section, in absence of treatment, DID method assumes a parallel trend in the development of both groups (see dotted line in Figure 1). In other words, if the companies did not receive the funding, their share of turnover exported would have decreased from 47.87% to 34.11%, but as they did, their share grew to 59.09%. However, a closer look at the robustness checks reveal that slight changes in the method yield quite a wide range of results. In our opinion, the estimator serves more as an approximation tool than a predictor, a value that could be compared to evidence in other countries or over time. The small sample also could cause our results to be somewhat biased and the actual difference could be much smaller. Even if we suggest not taking this number at face value, we do believe that the results are significant enough to say that the EU funding does impact Latvian company export participation in a positive way. Further, we offer a deeper analysis of the effects of EU funding by disaggregating the effect between various groups.

Table 7. ATT estimation for a dataset disaggregated between small and large companies

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
DID for small companies	0.2416667**	0.3154857***	0.1371212**
DID for large companies	0.2250408***	0.2401339***	0.0874808**
Difference in means	0.0166259	0.0753518	0.0496404
Prob > chi²	0.8876	0.5828	0.5208

Table 8. Difference in ATT when the sample is divided among experienced and inexperienced management

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
DID, if experience < 20 years	0.121806*	0.137795*	0.0457273
DID, if experience > 20 years	0.3036905 ***	0.3893478***	0.1578468***
Difference in means	0.1818845	0.2515528	0.1121195
Prob > chi²	0.0659	0.0421	0.0590

SMALL VS. BIG   We expect the effect on smaller companies to be more pronounced due to our determination that sunk costs, the upfront costs of establishing an international business, is a significantly higher issue for smaller enterprises than it is for larger ones strictly by logic; a large enterprise will be able to cover these costs with ease due to their proportionately higher revenues. The data shows a minor inclination toward this notion — while the estimator is marginally higher for smaller companies than it is for larger enterprises, the statistical significance of it is non-existent, therefore, we cannot conclude that there is any difference between these effects. From Table 7, we can see that, for our base case (see, trimmed at 1%), the estimators for both small, as well as large companies are significant, demonstrating the strength of the coefficients as standalone predictors. However, once we perform a test for whether these estimators are statistically different from one another (done by testing if their subtraction is equal to zero), we cannot reject the hypothesis that they are not.

While this does not prove our hypothesis (Hypothesis 2) true, we believe that the result still somewhat adds to our notion. The effect is more pronounced for smaller companies than it is for larger ones for all variations of the method. We contend that, despite the insignificance of their difference, we can still draw some value from the test.

MANAGERIAL EXPERIENCE   We argue that more experienced managers will recognize the benefits of going into export markets and do so with more persistence than those managers that have not spent as much time in the field. The data proves our expectation true — we find that more experienced managers do, in fact, use the additional capital to either enter the international markets more efficiently, as seen in Table 8. We find that the estimator for inexperienced managers is weakly significant and simply low in absolute terms, while the estimator for experienced managers is significant at every level and considerably higher. Again, we feel the need to emphasize the fact that we believe these values to be more indicative than predicting, as the function of this effect would most definitely not be binary — crossing the 20-year experience mark will not make a manager suddenly three times more likely to go into exporting. The true curve is likely non-linear, however, we do not predict and could not predict its form with the size of our dataset, since, if we were to divide our sample in more age groups, in many cases, we fall below 10 observation points, creating immense biases in our estimators.

The data reveals that the difference in estimators is statistically significantly non-zero at the 5% confidence level, giving us clear indication that our hypothesis regarding managers (Hypothesis 3) cannot be rejected — more managerial experience translates into more of EU funding

Table 9. Difference in ATT estimations for funding received from EAFRD vs. ERDF

	ATT with 1NN		
Estimate	Untrimmed	Trimmed at 1%	Trimmed at 2%
ERDF	0.1766768***	0.2002273***	0.0745412**
EAFRD	0.2462222***	0.2765909***	0.1157317***
Difference in means	0.0695454	0.0763636	0.0411905
Prob > chi²	0.3378	0.3046	0.3760

being awarded to export activity promotion, development, and anything that increases its revenues.

FUND-SPECIFIC EFFECTS   We argue that the effect for EAFRD would be more pronounced than that of ERDF due to the specifics of their investment objectives as well as the size of them. EAFRD invests more into the private sector than ERDF does, therefore, we expect it to have a greater impact on export propensity. We find that the effect of EAFRD is in fact stronger than that of ERDF, however, the statistical test proves that the estimators are not significantly different from one another (see Table 9, Prob > chi²). Still, as with the company size, we feel that it is rather indicative that the effect of EAFRD is, for all variations of our model, stronger than that of ERDF.

While we cannot reject the hypothesis that these fund-specific effects are the same, and thus prove our hypothesis (Hypothesis 4) false—we believe that there is some value in the specific estimator sizes for our Government policy implications section.

Overall, results of our study are satisfactory and two of four hypotheses are confirmed:

Hypothesis 1: EU funding does promote Latvian companies' tendency to export more.

Hypothesis 3: More experienced managers funnel a higher proportion of EU funding into exporting.

ANECDOTAL EVIDENCE   To illustrate our data in a more comprehensive way, we chose a specific pair out of our matched samples as anecdotal evidence. "Vit Būve" received funding through ERDF and increased its export from 0% to 85% of turnover. The company produces wooden panels used to set up modular houses. Sales of such houses skyrocketed during the pre-crisis period and they can be found all over western Europe, even as far as the Corsica island ("Vit Būve", 2017). In the first step of our method, we calculated the propensity score for this company to be 0.1381721. The nearest two neighbors to this score in our dataset were 0.13879994 and 0.13979219, which corresponded to companies "Hronoss AZ" and "Amserv Motors" respectively. In terms of turnover, management experience, and other covariates outlined previously, our model estimates that they have a very similar probability of receiving EU funding to that of the recipient company. The 1st nearest neighbor, "Hronoss AZ" provides woodcutting services and is based in the same city as "Vit Būve". This is an astoundingly close match, as not only do both companies work in the same industry, they also operate in one city. For this specific case, our methodology has allowed us to evaluate the performance of "Vit Būve" against a company that is astonishingly more comparable to it than the pool of all other Latvian companies. The second nearest neighbor, "Amserv Motors" is already not as impressive a match—an automobile retailer in Riga, which points to our greatest limitation—the small sample size. We argue that, with such a small sample, two nearest neighbor matching could be pushing the limits of the dataset and forcing the matching method to accept companies that are much less similar, as a company can match well on revenues, but poorly on, for instance, exporting. Even with this limitation, the two nearest neighbor matching method combined with DID shows statistically significant result supporting our hypotheses.

The example of "Vit Būve" and "Hronoss AZ" is excellent, since it shows the power of our methodology, but we do not use this as more than indicative. Rather, these separate cases can guide us towards improvements for further research. For example, we do believe that Das, Tybout, and Roberts (2007) enhance the accuracy of their results by comparing companies only within their industry. By following their example, our model would not compare a wooden house manufacturer to a car retailer, and the conclusions would be vastly more valuable to a government body that decides on funding allocation. With a larger dataset, we could provide an insight for each industry separately.

ILLUSTRATIVE EFFECTS   In this section, we roughly estimate the effect of EU funding on export propensity, however, we wish to point out that these calculations are distinctly illustrative and should not be assumed to have any predictive capacity.

The mean amount of EU funding received in our treatment sample is 120,566 EUR and mean turnover of these companies is 7,521,944, growing by 2.8% annually (an approximate growth rate of our treated sample), from which in a 5-year treatment period, the company, on average, will increase exports by 25% due to receipt of EU funding. That means that a euro in EU funding over 5-year period could be responsible for directing 17.9 EUR of turnover towards exports in the 5th year. Even if we took the lowest DID estimate of 5.6%, it would mean that a single euro in funding was responsible for directing 3.6 EUR of turnover towards exports in the 5th year. As we can see, this estimate varies quite extensively, however, there is no doubt that EU funding has positively impacted Latvian company performance by directing a great part of their turnover towards international markets.

We show that management experience has a significant impact on how the recipient companies managed their exports performance. Indeed, one can see that the difference is positive and companies, whose management has over 20 years of experience, have shifted towards exporting more than those, where management has less than 20 years of experience. This difference also varies greatly and even exceeds 20%. By purely speculating, we could argue that the more experienced management has a greater amount of contacts across the borders or understands the importance of diversifying income streams to secure company performance during domestic shocks, but that remains merely a speculation. Another argument could be that the success of projects financed by EU funds can be partially explained by management experience and the less experienced management teams simply fail to break into the international markets with their newly developed products or supposed competitive advantage. If this interpretation reflects the true causal effect, then one u of European funding will help more experienced management to direct 27.9 EUR of turnover towards international markets, while the same amount used by less experienced management will help directing only 10 EUR.

Since the sample did not involve the companies that completely declined exporting, i.e. had zero exports in 2010 and 2015 — we could not generalize the results to the entire EU funding amount distributed in Latvia, rather, we analyzed a specific part of it.

GOVERNMENT POLICY IMPLICATIONS   The previous sections lead us to believe that Latvian government could improve the efficiency of allocated funding by considering management experience and size as their allocation criteria. The rough estimate shows that the gain from such a move could be upward of 17.9 EUR in exports for each euro of allocated capital. Additionally, even though there are minimum requirements to apply for financing, the impact could also be improved by specifically targeting companies with

turnover below 1 million. While we cannot be certain about the extent of the added benefit, we suggest to study the segment more and determine it.

The importance of this research lies in the possibility of improving the efficiency of allocating EU funding in Latvia. That said, we believe that this research has allowed us to take a glimpse at the necessary prerequisites for successfully evaluating EU programs and improving them could add value not only to the system of allocation, but also to the real economy. For instance, the databases holding EU funding recipient information do not possess the company-specific registry numbers (VAT IDS). Furthermore, when there are many companies with the same name, the dataset requires manual intervention, which does not always solve the problem — often, we simply dropped the observations and moved on, further reducing our sample size. By merely adding the registry number to the databases or funding agreements, the government agencies would allow future researchers to obtain a higher level of precision and solve the cases when companies have changed their names. It may seem like this is irrelevant, however, at a rough estimate, a 5% of our dataset has been affected by this problem and we believe that to be sufficiently large to note.

Conclusions

We set out to test the effect of EU funding on the Latvian exporting sector — do the programs expand it? Do they limit it? We find that the ESIF financing system is, in fact, a boon to the Latvian economy and it is proven that it increases recipient companies' tendency to export by approximately 25%. We feel that the significance, as well as the magnitude of this estimator is immensely valuable to the government institutions responsible for implementation of the program. We further showed (*note: the same disclaimer applies*) that a euro invested by the ESIF program will yield 17.9 EUR of export turnover over a five-year period for the median company of our dataset.

Furthermore, we disaggregate the effect between small and large enterprises, experienced and inexperienced management, and ERDF and EAFRD funding effects. We find that, while small companies do have a higher estimator, the difference between the two estimators is insignificant, therefore, we cannot say with confidence that smaller companies are more prone to use the funding for exports. We find that experienced management does, in fact, invest more of the received funding into export activity, and the difference between the estimators is significantly non-zero. We argue that this may be due to the managers having better contacts or business prowess, however, the channels through which experienced managers increase their exports will remain unknown until qualitative studies are conducted on their characteristics. We expected EAFRD to have a more pronounced effect

on export propensity, an expectation that was partially affirmed — while the fund did have a higher beta coefficient, the difference between the two funds' estimators was insignificantly non-zero, therefore, we cannot say with full confidence that either fund impacted export propensity more.

As we outline in the final sections of our paper, we believe that the results of our research can be used to form more effective funding allocation systems. That is, if exporting and the characteristics of the activity are included in the fund's investment objectives. As we have shown, there are none that target exporting directly, however, regional development and some of its sub-goals align with the effects of export activity quite well.

1 European Regional Development Fund

2 European Fisheries Fund

3 European Maritime and Fisheries Fund

4 European Agricultural Fund for Rural Development

5 European Agricultural Guarantee Fund

6 Cohesion Fund

Appendices. Appendix A. Summary of subgroups

Table 1. Disaggregation between groups

Parameter of interest	# Received EU funding	# Did not receive funding
Total	93	582
Export participant	47	184
Large (>1.1 million EUR turnover in 2010)	48	134
Small (<1.1 million EUR turnover in 2010)	45	448
Experienced management (>20 years)	41	382
Less exp. management (<20 years)	47	188
Foreign owned	5	60
ERDF[1]	58	—
EFF[2] or EMFF[3]	1	—
EAFRD[4] or EAGF[5]	55	—
CF[6]	1	—

* Some observations are missing; thus, the total is often not the sum of two subsets

Appendix B. Estimation results

Table B.1. Robustness analysis of DID estimate.

DID estimate	Full sample ATT	ATT with 1NN	ATT with 2NN
(Trimmed @1%)	0.1303107***	0.246956523***	0.193804349***
(Trimmed @2%)	0.0557318 **	0.103488371***	0.08116279**
(Winsorized @1%)	0.1153793***	0.208936171***	0.178510638***
(Winsorized @2%)	0.1121103***	0.206808512***	0.174255317***
Untrimmed/Without Winsorizing	0.1151619***	0.208936171***	0.178510638***

*** denotes significance at 1 % level, ** at the 5 % level and * at 10 % level

Table B.2. Effects of European funding on small and large company tendency to export (with Winsored samples)

Estimate	Full sample ATT			ATT with 1NN			ATT with 2NN		
	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%
DID for small companies	0.194322 **	0.194661**	0.1862147**	0.2416667**	0.2416667**	0.235**	0.2381633***	0.2381633***	0.227415***
DID for large companies	0.0889867**	0.0889867	0.0889867***	0.2250408***	0.2250408***	0.2250408***	0.1677847**	0.1677847***	0.1677847***
Difference in means	0.1053353	0.1056743	0.097228	0.0166259	0.0166259	0.0099592	0.0703786	0.0703786	0.0596303
Prob > chi²	0.2928	0.2911	0.3123	0.8876	0.8876	0.9309	0.4150	0.4150	0.4759

Table B.3. Effects of European funding on company tendency to export, depending on the level of management experience (with Winsored samples)

Estimate	Full sample ATT			ATT with 1NN			ATT with 2NN		
	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%
DID, if experience <20 years	0.0535384	0.053701	0.048784	0.121806*	0.121806*	0.1174582*	0.0954635**	0.0954635**	0.0873421**
DID, if experience >20 years	0.1897951**	0.1901229**	0.1878279***	0.3036905 ***	0.3036905***	0.3036905***	0.2701829***	0.2701829***	0.2701829***
Difference in means	0.1362567	0.1364219	0.1390439	0.1818845	0.1818845	0.1862323	0.1747194	0.1747194	0.1828408
Prob > chi²	0.0986	0.0978	0.0753	0.0659	0.0659	0.0556	0.0181	0.0181	0.0111

Table B.4. Effects of European funding on company tendency to export — comparison between funding programs (with Winsorized samples)

Estimate	Full sample ATT			ATT with 1NN			ATT with 2NN		
	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%	Not Winsorized	Winsorized at 1%	Winsorized at 2%
ERDF	0.0661067	0.0663	0.0657686	0.1766768***	0.1766768***	0.1766768***	0.1382323***	0.1382323***	0.1360101***
EAFRD	0.1437379**	0.143932**	0.1385648***	0.2462222***	0.2462222***	0.2418744***	0.2077778***	0.2077778***	0.2012077***
Difference in means	0.0776312	0.077632	0.0727962	0.0695454	0.0695454	0.0651976	0.0695455	0.0695455	0.0651976
Prob > chi²	0.3337	0.3337	0.3511	0.3378	0.3378	0.3553	0.1740	0.1740	0.1899

Note on exporting firms and shadow economy in Latvia: data mining investigation

Sergejs Gubins

Economic literature suggests that exporting firms tend to be more productive than non-exporting ones in the long-run. We put forward a complementary hypothesis that the exporting firms might be involved in shadow economic activities, such as corruption and tax evasion, to a lesser extent than non-exporting firms. We performed an initial data mining investigation to assess this hypothesis, using recent SKDS survey data of 800 Latvian firms. The survey includes five questions about shadow economy conditions either in the whole country or in specific industries. The results show that there are largely insignificant differences between exporting and non-exporting firms with regard to the perception of shadow economy in Latvia. However, there are statistically significant differences *within* exporting firms, which provide weak support to the hypothesis. The most interesting result shows that firms which export in large volumes have more positive view on general law obedience. To establish a causal empirical relationship between exporting and law obedience a more rigorous econometric analysis is needed.

Introduction   Recent economic literature pays considerable attention to the effect that trade has on economy-wide growth and productivity in the presence of firms' heterogeneity. Seminal paper by Melitz (2003) establishes microeconomic foundation of the intra-industry productivity growth due to reallocations of resources, e. g., labor, from less productive firms to more productive ones as a result of export market entry and subsequent expansion of firms' scale. The main transmission channel for the impact of trade on aggregate productivity is self-selection of more productive firms into exporting ones, because exporting yields higher returns to more productive firms. Stronger competition for the input resources forces less productive firms to exit. Such aggregate industry productivity growth generated by the reallocations also contributes to a welfare gain. Bernard et al. (2011) present an overview of the empirical findings on firm heterogeneity and trade.

One potential implication of such dependency is an ability of exporting firms to incur higher production costs while remaining profitable. Obeying legal rules and tax legislation might be less problematic from a firm's profitability point of view, if the firm is more productive than competitors. Thus, exporting firms, which survive both domestic and foreign competition, potentially might be less prone to tax evasion and bribing than non-exporting firms. It is also conceivable that the relationship might have an opposite effect — firms that bribe and avoid taxes more often than competitors, might have preferential treatment from the authorities and, as a result, have lower costs and higher chances to succeed in exporting. Thus, the more firm

export the more it might be prone to tax evasion and hiring undeclared workers. Relationship between shadow economy and exporting is thus an empirical question.

This data mining exercise aims to shed light on the association between export and shadow economy in Latvia at the level of firms. One should note that the causal relationship between exporting and law obedience is difficult to identify empirically, as one would probably need to use instrumental variable or exogenous shocks to disentangle causal effect from omitted variable bias (Angrist & Pischke, 2008). One of the main difficulties is establishing direction of the causality, which is essential for the practical policy making. In case of the positive relationship between exporting and law obedience, it is possible that firms that follow tax rules and other legal restrictions are more likely to export, as exporting firms usually face relatively many administrative checks (at the border and abroad). Thus, from the policy point of view a more stringent law regulation and enforcement might lead to more export, everything else constant. On the other hand, stronger exposure to foreign and domestic competition leads to survival of the most productive firms, which have less trouble in following legal regulation and paying taxes. Such causal relationship would imply that export enhancing policies reduce corporate illegal activities, *ceteris paribus*. It is not straightforward to come up with the practical identification strategy, thus, more research is needed to establish causality. However, to provide an essential first step for the analysis we perform initial data investigation.

1   According to the definition of World Bank (2015), re-export is the export of imported goods without appreciable added value. Re-export is mostly used for goods, which are transported through another country before reaching their final destination.

Data and methodology

This note is based on SKDS survey data of 800 Latvian firms in 2015. Out of these, 249 firms or 31% are either direct exporters (176 firms / 22%), indirect exporters (54 firms / 7%) or both (19 firms / 2%). Moreover, out of 249 exporting firms, there are 49 ones that are engaged in re-export.[1] Each exporting and re-exporting firm indicates the extent of the export, both direct and indirect, in terms of the percentage from its overall turnover. Moreover, exporting firms also specify the percentage of turnover they have exported in 2010 and countries of destination they export to.

The survey includes five questions about shadow economy conditions in either the whole country or in specific industries. The first two questions about shadow economy are the question Q34 and Q35, which are:

To what extent do you agree that tax evasion is a widespread practice in Latvia?

To what extent do you agree that bribing is a widespread practice in Latvia?

The firm can choose one out of six answers: "completely disagree", "disagree", "neither agree nor disagree", "agree", "completely agree" and "hard to say / no answer". The answers are coded from 1 to 6, thus the lower the number the more optimistic is the view of a firm on the conditions of shadow economy in Latvia.

The other three questions — Q36, Q37 and Q38 — are structured differently. Answering these questions, a firm has to indicate the percentage of, respectively, firm's profit, firm's number of workers and firm's workers wage bill is undeclared. A firm might choose a number between 0 and 100, or abstain from the answer. Similar to the first two questions, lower numbers indicate a more positive view that shadow economy is a rare phenomenon in Latvia. One might interpret the answer to the shadow economy questions as either a proxy indicator of an actual firm's behavior with regard to tax evasion and corruption, or a behavior of a similar type of firms (firm's peers). There is little incentive for responders to report strategic answers as the survey is anonymous and it is conducted by a private firm, which is not affiliated to governmental organizations, such as revenue service or police.

The most straightforward way to identify association between answers to the questions and export activities is to compare distribution of answers for exporting and non-exporting firms. Kolmogorov-Smirnov test is a statistical tool to establish whether the similarity is statistically significant or not. Besides, we use a set of correlation statistics to identify relevant patterns in the data. Below we report the most interesting and informative results of the data mining investigation.

Tax evasion in Latvia (Q34)

There are no statistically significant differences between exporting (defined as firms with a positive percent of the exported turnover, either directly or indirectly) and non-exporting firms regarding this question. Figure 1 shows original distribution of answers to the question Q34 by exporting and non-export firms, and its continuous approximation using kernel density functions. Inclusion of firms that do not provide an answer does not affect the results. Kolmogorov-Smirnov test rejects hypothesis that these distributions are different. It is instructive to explore heterogeneity within exporting firms only. In some firms, only a small fraction of the turnover accounts for export, while in others, export forms almost 100 percent. Figure 2 shows distribution of the export scale across exporting firms. There is a great degree of firms' heterogeneity.

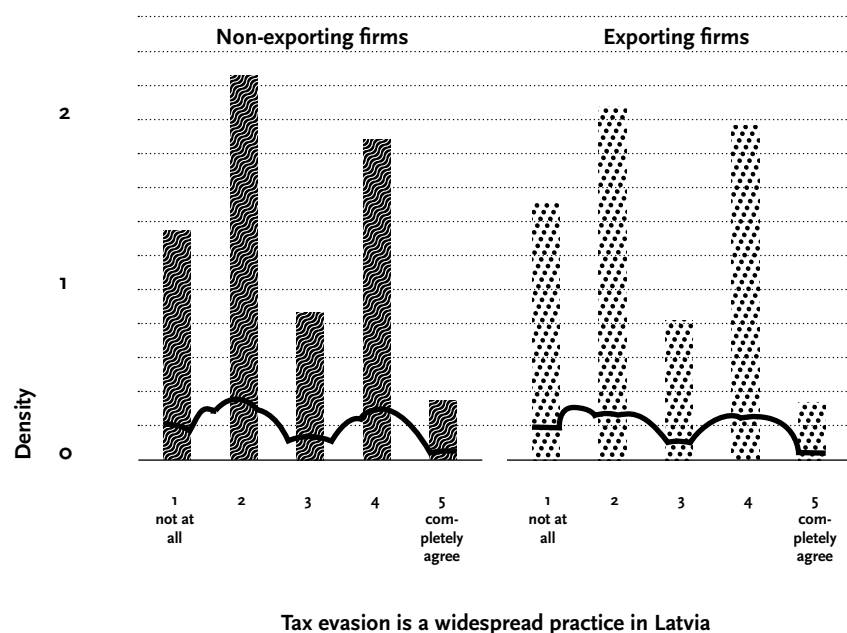**Figure 1. Histograms and density functions of answers to the question Q34**

Tax evasion is a widespread practice in Latvia

Figure 2. Histograms of firms' export-related turnover

Share of export in a turnover of exporting firms
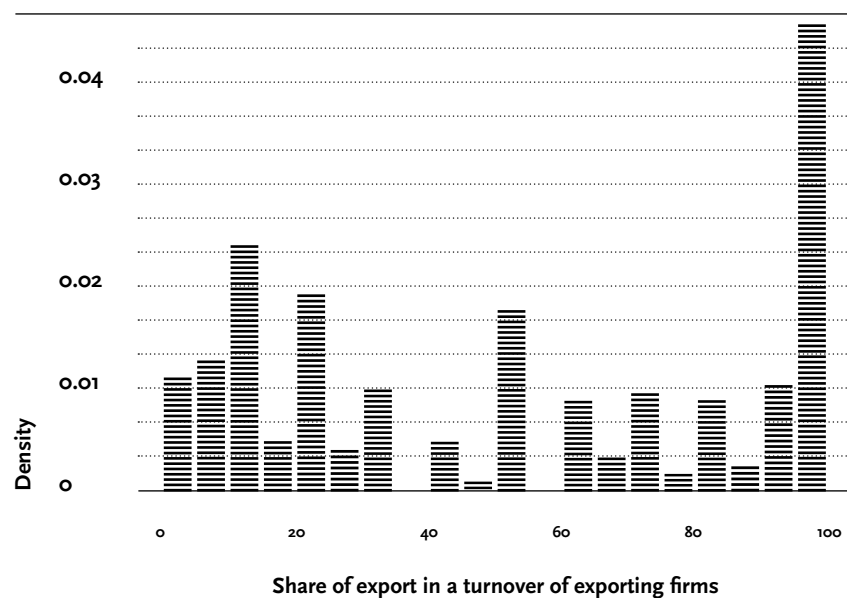
Table 1. Correlation coefficients (significance) between answers to the question Q34 and...

...percent of turnover exported directly and indirectly	−0.0063	(0.9228)
...percent of turnover exported directly	0.0772	(0.2344)
...percent of turnover exported indirectly	−0.0567	(0.3826)
...percent of turnover exported directly 5 years ago	0.0016	(0.9810)
...percent of turnover exported indirectly 5 years ago	0.0537	(0.4208)
...percent of turnover from re-exporting	−0.1043	(0.1457)

Table 2. Correlation coefficients (significance) between answers to the question Q35 and...

...percent of turnover exported directly and indirectly	−0.0888	(0.1804)
...percent of turnover exported directly	−0.1179	(0.0750)
...percent of turnover exported indirectly	0.0499	(0.4520)
...percent of turnover exported directly 5 years ago	−0.0521	(0.4452)
...percent of turnover exported indirectly 5 years ago	0.0474	(0.4876)
...percent of turnover from re-exporting	−0.1092	(0.1370)

Table 1 shows that associations between the scale of export and perception of shadow economy turn out to be very weak (usually below 5 percent in absolute values) for most firms. Negative values indicate that the larger the scale of export the better the view towards law obedience.

A noticeable exception was a correlation coefficient characterising firms that exported in 2015 but did not export in 2010. Correlation between scale of export and tax evasion perception was −0.27 (significance level is 0.103, number of observations is 36). Consequently, the more firm exports,

Table 3. Correlation coefficients (significance) between answers to the question Q36 and...

...percent of turnover exported directly and indirectly	−0.1709	(0.0547)
...percent of turnover exported directly	−0.0685	(0.4443)
...percent of turnover exported indirectly	−0.1455	(0.1026)
...percent of turnover exported directly 5 years ago	−0.0615	(0.5045)
...percent of turnover exported indirectly 5 years ago	−0.1183	(0.1981)
...percent of turnover from re-exporting	0.0505	(0.6028)

the more negative its perceived view on the shadow economy is. There is no association between answers to the question Q34 and geographical extent of export. Firms that export only within the Baltic states are similar to the firms that export further away, as well. All correlation coefficients are insignificant.

Corruption in Latvia (Q35) | Similarly to the previous question, exporting and non-exporting firms exhibit no difference with respect to perception of corruption. Table 2 shows correlation coefficients between the extent of exporting and answers to the question Q35. The most interesting result is a negative correlation between the scale of direct export and corruption. Moreover, firms that exported 5 years ago (either directly or indirectly) and still export now have statistically significant, at 10 percent level, correlation coefficient of **−0.1336** (0.0633). Hence, the larger these firms are, the more positive their view toward law obedience. Geographic extent of export has no correlation with the answers to the question Q35.

The two statistically significant results provide weak support to the hypothesis that exporting firms are better at following legal restrictions than non-exporting ones. Negative correlations between export intensity and corruption variable are quite insightful, as they show that the larger the scale of export, the less tolerated is the perception of corruption. This result is consistent with the literature on trade and firm productivity.

Figure 3. Histograms and density functions of answers for question Q36

What is the percentage of tax evasion in your industry?
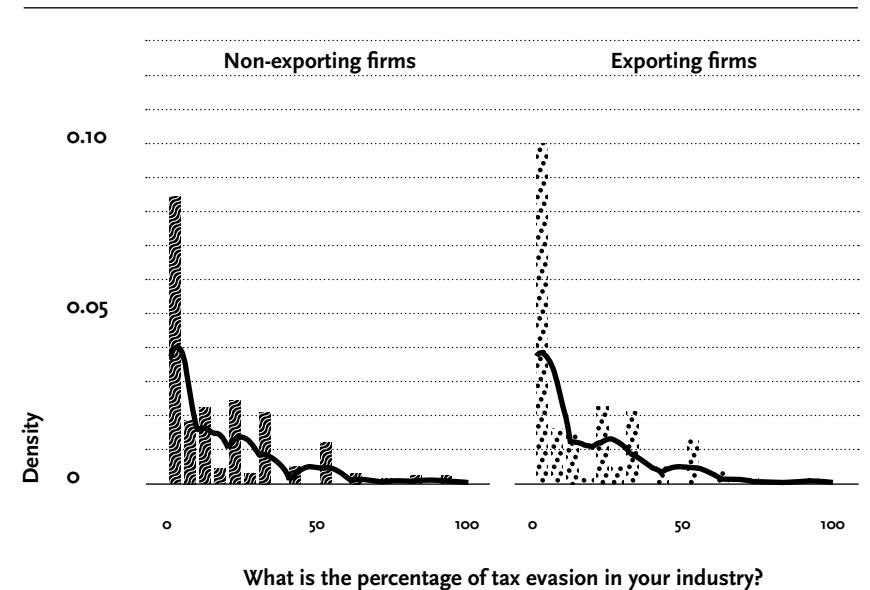
Tax evasion in the industry (Q36) | There are no statistically significant differences between exporting and non-exporting firms with regard to this question. Figure 2 shows the original distribution of answers to the question Q36 supplied by exporting and non-export firms and its continuous approximation using kernel density functions. Kolmogorov-Smirnov test rejects hypothesis that these distributions are different.

Table 3 shows that associations between the scale of export and perception of shadow economy turns out to be weak for most firms. Nevertheless, a single statistically significant correlation coefficient is in line with the results of the previous question. Negative value indicates that the larger the scale of export, the more favourable the view towards law obedience.

Unregistered workers in the industry (Q37) | Kolmogorov-Smirnov test rejects hypothesis that distribution of answers to the question Q37 is different for exporting and non-exporting firms. Table 4 shows only statistically insignificant correlation coefficients. Geographical extent and the history of exporting do not lead to significant results.

Table 4. Correlation coefficients (significance) between answers to the question Q37 and...

...percent of turnover exported directly and indirectly	−0.0360	(0.6725)
...percent of turnover exported directly	−0.0074	(0.9310)
...percent of turnover exported indirectly	−0.0457	(0.5919)
...percent of turnover exported directly 5 years ago	0.0084	(0.9239)
...percent of turnover exported indirectly 5 years ago	−0.0712	(0.4154)
...percent of turnover from re-exporting	0.1206	(0.1859)

Table 5. Correlation coefficients (significance) between answers to the question Q38 and...

...percent of turnover exported directly and indirectly	−0.1423	(0.1049)
...percent of turnover exported directly	−0.1229	(0.1619)
...percent of turnover exported indirectly	−0.0271	(0.7589)
...percent of turnover exported directly 5 years ago	−0.1031	(0.2546)
...percent of turnover exported indirectly 5 years ago	−0.0569	(0.5303)
...percent of turnover from re-exporting	0.0768	(0.4186)

Undeclared wages of workers in the industry (Q38)

Kolmogorov-Smirnov test again rejects hypothesis that distribution of answers to the question Q38 is different in case of exporting and non-exporting firms. Interestingly, correlation between the total extent of exporting (directly and indirectly) and the answers to the question Q38 is negative: −0.1423 (0.1049). This value becomes statistically significant, when accounting for the history of exporting: **−0.1685** (0.0745) and geographical extent of export: **−0.2064** (0.0580).

Conclusion

Economic literature has established that industries on average are more productive, when its firms are able to export. We formulate a related hypothesis that exporting firms might be associated with a stricter law obedience, potentially due to the productivity mechanism. Based on the recent survey conducted at the level of firms, we find some support to this idea. It turns out that exporting and non-exporting firms are not statistically different with regard to law obedience. However, there are statistically significant differences *within* exporting firms, which provide weak support to the hypothesis. The most interesting result shows that firms, which export in large volumes, have a more positive view on general law obedience. In particular, we find statistically significant negative correlation coefficients for questions on corruption in Latvia and tax evasion in the industry, besides, there are some suggestive results regarding the questions about undeclared workers' wages in the industry. It seems worth to undertake a more thorough empirical investigation in this direction.

Appendix. Survey questions used in the note

Q34 To what extent do you agree that tax evasion is a widespread practice in Latvia?
Completely disagree
Disagree
Neither agree nor disagree
Agree
Completely agree

Q35 To what extent fo you agree that bribing is a widespread practice in Latvia?
Completely disagree
Disagree
Neither agree nor disagree
Agree
Completely agree

Q36 Please estimate the extent of underreporting business income by firms in your industry in 2014:
Firms underreported business income by approximately ___% in 2014.

Q37 Please estimate the extent of underreporting number of employees by firms in your industry in 2014 (percentage of unregistered employees):
Firms underreported approximately ___% of the actual number of employees in 2014.

Q38 Please estimate the extent of underreporting salaries paid to employees by companies in your industry in 2014 (for instance, if in reality an employee receives EUR 400, but the reported salary is EUR 100, then underreporting is 75%; if EUR 400 and EUR 200, then underreporting is 50%):
Firms underreported actual salaries by approximately ___% in 2014.

How does participating in shadow economy affect the growth of Latvian firms?

**Nino Kokashvili, Ketevani Kapanadze,
Irakli Barbakadze**

This paper examines the relationship between Latvian firms' growth and their involvement in the shadow economy in 2015. When up to 10% of firms' overall economic activity takes place in the shadow economy, it had a growth-enhancing effect on the firms, which recorded non-positive growth during the last five years. Using the perceptions of corruption and interview languages as instruments of measuring the shadow economy participation rate, the authors conclude that there is a positive relationship between perceptions of corruption and shadow economy participation rate.

Introduction

Informal firms hamper countries' economic performance in two main ways. Firstly, informal firms are small and unproductive. Secondly, they compete with productive formal firms for their share of the market (Gomory, 1994). This paper elaborates on the first, and how participation in the shadow economy affects firms' growth in Latvia.

The Baltic region is a good location, in which to study the reasons for, and consequences of, the shadow economy. Among the Baltic states, the shadow economy is the most substantial in Latvia. In this region, Latvian firms are the most dissatisfied with their national tax system and government (Sauka & Putniņš, 2011). This could explain why the size of the shadow economy is significantly larger in Latvia (21.3%) than in Estonia (14.9%) and Lithuania (15.0%) (Putniņš & Sauka, 2015).

The impact of shadow economy participation on firms' performance is a topic requiring investigation. The novelty of this research lies in its effort to study this relationship based on firm-level data by using the survey data [the survey is conducted by the Baltic International Centre of Policy Study (BICEPS)] of company managers in Latvia in 2015. A survey of company managers provides information not only about misreported business income, but also misreported wages and the number of employees. In order to calculate firms' shadow economy participation rate, this paper uses the methodology provided by Putniņš and Sauka (2015).

The reasoning behind a decision to participate in the shadow economy is not exogenously given and depends on various political, economic, social and institutional factors. This paper uses interview languages and perceptions of corruption as the instruments of measuring shadow economy participation rate to address the problem of possible endogeneity. Hypothetically, high corruption encourages firms to operate in the shadow economy (Johnson et al., 1998).

In addition to political, economic, social and institutional factors, Tanzi (1982) highlights the attitudes of company managers, as well as the

basic religious and cultural characteristics. The data do not provide information about the nationality of company managers. However, the interview language, which is an appropriate proxy for socialization, is used instead. Theoretically, in business operations foreign managers behave differently than their local counterparts.

Examining the relationship between participation in the shadow economy and firms' growth shows that the firms, which are involved in shadow economic activity to 10% of the firms' overall economic activity experience higher growth. The study shows that participation in the shadow economy has a growth-enhancing effect only for firms, which have non-positive growth. These firms are more flexible in crises. At the same time, 10% of shadow economy participation rate does not exclude them from the financial market. In addition, these firms also take advantage of public goods and services. This result corresponds with the idea that for poorly performing firms, the shadow economy represents a means of survival. This paper also concludes that there is a positive correlation between perceptions of corruption and the shadow economy participation rate.

The rest of the paper is structured, as follows. The next section reviews the existing literature about the possible implications of the shadow economy. Thereafter, the following section introduces the measurement of the shadow economy participation rate. The fourth section presents the data and the methodology. The fifth section discusses the empirical results and the robustness of the estimates and the last section provides a conclusion.

Literature review

The shadow economy is all about human behavior, driven by incentives and disincentives. The majority of previous studies concentrated more on the public policy aspects of the shadow economy. However, the role of informal firms in economic development is an area, which requires more investigation. On the one hand, some studies focus on the similarities between formal and informal firms but, on the other hand, there are arguments that these two types of firms are very different. So far, no universally accepted conclusion has been found on the effect of shadow economy participation on firms' performance.

The romantic view, based on the work of De Soto (1989, 2000), states that unofficial firms have similar characteristics to those of official firms. Hypothetically, informal firms are productive and without significant transformation costs these informal firms might benefit from all the advantages of the market. Using a sample of 399 private business owners in Lithuania, Aidis and Praag (2004) concluded that illegal entrepreneurship experience (IEE) signals positive benefits for a legal business, as well as economic

development. Indeed, there need to be additional incentives to shift such illegal activities to the official market. Schneider (1998) shows that more than 50% of earnings in the shadow economy are distributed across official sectors, which supports economic growth. Similarly, Bhattacharyya (1999) highlights that the informal sector, due to cheap prices, allows for the consumption of more non-durable and durable goods in the United Kingdom.

In contrast to the romantic view, the parasite view considers informal firms as harmful to the economy. Informal firms gain more by avoiding taxes and regulations, which offset their small scale and lower productivity (Farrell, 2004). If informal firms have a more advantageous position than formal firms, the latter will be forced out of the market. As a result, informal firms hurt countries' economic performance in two ways. Firstly, they are of a small scale and are unproductive, and, secondly, they compete with the productive formal firms and take away their market shares (Gomory, 1994). Moreover, countries with a large shadow economy face the problem of over-taxation (Muller et al., 2013). Such over-taxation hampers investment and, therefore, is a key impediment to economic growth. Another way that the shadow economy affects a country's economic performance is through public services. Loayza (1996) argues that an increase in the size of the shadow economy negatively affects economic growth, because it leads to a significant reduction in the quality of public services.

In contrast to the romantic and parasite views, the dual view considers unofficial firms to be significantly different from official firms. This view is the continuum of the earliest framework of the unofficial economy by Rauch (1991), which concludes that less productive workers are employed by informal firms and, accordingly, they receive lower wages. Amaral and Quintin (2006) reach the same conclusion that formal and informal workers differ systematically, even though labor markets are perfectly competitive. Using data from developing countries, La Porta and Shleifer (2008) analyzed the size and productivity of formal and informal firms. They found that informal firms are much smaller and less productive than formal firms.

The inefficiency of informal firms is not exogenously determined. Firstly, in case of formal firms, productivity increases in line with a firm's size (Hsieh & Olken, 2014). Size is not the only reason, why the formal firms are more productive than the informal firms. La Porta and Shleifer (2014) show that there is a sharp difference in productivity between informal and formal firms of the same size. Another indicator of low productivity in the informal sector is low wages. Using cross-country data, La Porta and Shleifer (2008) found that wages in small informal firms are a half of those of small formal firms. The wage gap increases according to the firms' size. Furthermore, Gennaioli et al. (2013) document that managers' education has a crucial role in the productivity gap between formal and informal firms. Also,

La Porta and Shleifer (2008) conclude that formal and informal firms are different in terms of human capital only at managerial level.

Based on the previous studies, there is no clear evidence about the reasons for, or the consequences of, the shadow economy. The reasons behind the existence of the shadow economy vary from country to country. This paper mostly concentrates on the consequences of shadow economy participation, and particularly explores, how firms' participation in the shadow economy affects their own performance.

Measure of shadow economy

In the last two decades, the number of studies investigating the informal economy has significantly increased. There are three common methods to measure the size of the shadow economy, namely, direct approaches, indirect approaches and model estimates (Schneider & Enste, 2000).

Indirect approaches are mostly macroeconomic and these provide information about the dynamics of the shadow economy over time. Indirect approaches measure the following: discrepancy between national expenditure and income statistics (Franz, 1985; Smith, 1985); discrepancy between official and actual labor force (Contini, 1981; Boca, 1981); transaction approach (Feige, 1990); currency demand approach (Cagan, 1958; Tanzi, 1982); and electricity consumption method.

A more structural model assumes that the effects of the shadow economy show up simultaneously in production, labor, and money markets. In the case of the Multiple Indicators Multiple Causes (MIMIC) approach, to ascertain the actual size of a shadow economy, the relevant measure should be calibrated, using estimates from the currency demand approach (Feld & Schneider, 2010). The main advantage of this method is the flexibility it allows to include any causes and indicators of the shadow economy. However, such flexibility can have a negative side, because different causes and indicators give us different estimates and it can be problematic to choose the optimal estimate. An additional disadvantage of the model is that estimates are sensitive to the calibration method.

To sum up, the main advantage of the macro-based approaches is that they are relatively easy to estimate. The basic macro indicators are calculated by national statistics offices and there is no need to conduct an additional survey. Another positive aspect of these approaches is that they give us the opportunity to make a comparison among countries. On the other hand, the main limitation here is that all of these macro models are based on strict and sensitive assumptions, changing of which alters the results dramatically.

[1] The sum of gross remuneration of employees and gross operating income of the firms.

[2] Question #36 — "Please, estimate the extent of underreporting business income by firms in your industry in 2014".

While indirect models are based on macroeconomic indicators, direct approaches use income audits (Clotfelter, 1983; Feige, 1986; Feinstein, 1991) or survey data (Zienkowski, 1996). The main advantage of these methods is the detailed information they can provide about the structure of the shadow economy. However, the results of the survey are sensitive and mostly depend on the formulation of the questionnaire and the respondents' willingness to cooperate.

This paper uses the direct approach and the survey data of company managers. Survey data is different from other data in the following ways. Firstly, all survey-based approaches face the risk of underestimating the total size of the shadow economy. The problem here is that respondents try to avoid questions about tax evasion or provide untruthful answers. For this data, this risk is minimized by using different kinds of survey techniques, such as gradually introducing the most sensitive questions after asking the less sensitive questions. Secondly, the salient point of the dataset is that it is a survey of managers, people who have information about all possible sources of the shadow economy. These sources include personal income and profit taxation. With this in mind, the authors use the techniques provided by Putniņš and Sauka (2015).

This index is based on the income approach of GDP calculation[1] and contains the following steps.

STEP 1.

The first step aims to find underreported employee remuneration ($UR_{remuneration}$) and underreported corporate income ($UR_{OperationIncome}$). Underreported employee remuneration consists of two elements: underreported salary and underreported employees. Thus, firm i's total underreported employee remuneration is calculated by equation ①.

$$UR_{remuneration,i} = 1 - (1 - UR_{salary,i}) \times (1 - UR_{employee,i}) \quad ①$$

In the case of $UR_{OperationIncome,i}$ this indicator is directly estimated from the survey question.[2]

STEP 2.

The second step calculates the shadow economy participation rate of the firm. This is a weighted average of $UR_{remuneration}$ and UR_{profit}, where weights are in accordance with the structure of the country's GDP.

$$ShadowParticipation_i = \alpha_c \times UR_{remuneration,i} + (1 - \alpha_c) \times UR_{OperationIncome,i} \quad ②$$

Where a_c is the ratio of employees' remuneration to the sum of employees' remuneration and gross operation income of the company.[3]

3   In the case of Latvia, a_c is around 0.45 in 2015.

Direct and indirect methods have several limitations. Method selection mostly depends on the aim of the study. For studies, which concentrate more on the structure of the shadow economy, a direct method is much more appropriate to use.

Data and methodology

DATA   This paper uses survey data of company managers in Latvia in 2015. The survey was conducted by the Baltic International Centre for Economic Policy Study (BICEPS). The questionnaire contained six sections: (1) company characteristics; (2) exporting; (3) productivity; (4) financing; (5) innovations; and (6) taxes and attitudes. This paper mostly concentrates on the section of taxes and attitudes, which covers information about underreported business income, number of underreported employees and underreported salaries paid to employees.

In order to increase the number of respondents and to ensure the truthfulness of data, the questionnaire begins with non-sensitive questions about levels of satisfaction with the government and tax policy. Thus, respondents were asked for their opinions on the government's tax policy and business legislation. The questions used a five-point Likert scale, ranging from 1 (very unsatisfied) to 5 (very satisfied). This survey used an indirect approach to obtain information about underreported salaries and business income. The indirect and gradual approach is recommended by methodological studies (Kazemier et al., 1992; Gerxhani, 2007).

The first section of the questionnaire includes information about company characteristics. Data was obtained from firms from six different industries. The largest number of observations are from the service industry (49.0%) and the smallest share was made up of the construction industry (5.2%) (Table 4 in Annex 2). The majority of surveyed firms are limited liability companies (85.7%). The distribution of size of firms shows that the vast majority (about 73.6%) of firms are small, with less than 20 employees (Table 5 in Annex 2).

The first section of the questionnaire provides information about companies' financial condition in 2015 and 2010, which is used to calculate the growth of each company over a five-year period. This paper concentrates on firms' growth measured by volume of sales. According to the data, 11.5% of firms experienced no growth in the last five years. Conversely, 53.3% of firms experienced positive growth while 35.2% of firms recorded negative growth. The highest average growth was recorded in wholesale (4.9%) and the lowest

4   To estimate the two stage IV model, authors use cmp ("conditional mixed process") in STATA 14.0.

growth (−0.2%) was recorded in retail. It is worth mentioning that foreign-owned firms experienced a greater growth (11.7%) than locally-owned firms (1.9%). Descriptive statistics show that a firm's growth correlates with several firm characteristics, but the main concern of this paper is to establish how firms' participation in the shadow economy affects their own growth.

MODEL   In this section, the relationship between firms' growth and participation in the shadow economy is modeled. In order to avoid the possible problem of endogeneity, the authors used an instrumental variable technique. The main model has the following specification:

$$Growth_i = \alpha + \beta ShadowParticipation_i + \gamma \sum Control_i + \varepsilon_i \quad ③$$

$$ShadowParticipation_i = \theta + \delta \sum Instruments_i + \mu \sum Control_i + \epsilon_i \quad ④$$

Where in the first equation $Growth_i$ is a dependent variable for the i-th observation, $Control$ is a vector of exogenous control variables. α, β and γ are the parameters to estimate. In the first stage, shadow economy participation is regressed on the $Control$ and $Instruments$ (equation ④), ε_i and ϵ_i are zero-mean error terms, and the correlations between them are presumably non-zero.

In the model, shadow economy participation rate is measured by equation ② as a weighted average of underreported wage/number of employees and underreported business income. The main limitation when measuring shadow economy participation with survey data is that the results are inclined to be downward biased. In order to address this problem, the scale of the data is reduced and a categorical variable is created instead of a continuous variable. Thus, there are the following categories of shadow economy participation rate: 0%; 0–10%; 10–30%; 30–50%; and above 50%. As a result, the first stage of the model is the ordered probit model.[4]

Growth is measured by the change of turnover over a five-year period (from 2010 to 2014). The self-reported information of the company managers does not reveal the turnover. If this turnover covers declared sales without informal activities, there exists a naïve relationship between turnover and shadow economy participation rate. Higher shadow economy participation is associated with lower turnover and the correlation should be negative and significant. However, this study is based on data, where the correlation between underreported business income and turnover is low (−0.097), thus, the data does not have the limitations mentioned above.

Control variables are divided into firms' attributes, firms' decisions and firms' resources. The classical attributes of a firm are its age and size.

The topic of how a firm's size and age determines its growth has its origins in Gibrat's law. According to this law, a firm's size and age are neutral in the case of firms' growth. However, empirical studies have not provided supporting evidence (Becchetti & Trovato, 2002). The negative effect of age on a firm's growth is robust among countries and industries (Robson & Bennett, 2000; Reichstein & Dahl, 2004). The relationship between a firm's size and growth is also negative and significant in most cases (Dunne & Hughes, 1994; McPherson, 1996; Goddard et al., 2002). However, other studies find that Gibrat's law holds for above a certain size threshold. Bigsten and Gebreeyesus (2007) show that this threshold is over 400 employees. In terms of measuring a firm's size, this study uses the number of employees (full-time equivalent), including managers.

"Learning by exporting" is a key aspect of how a firm can achieve market gains through knowledge transfer with their exporting activities (Love & Ganotakis, 2013). Golovko and Valentini (2011) also conclude that there is a strong positive relationship between exporting and growth. Besides, there is a positive relationship between foreign ownership and a firm's growth. Based on the panel data of Indonesian firms, Lipsey et al. (2010) found that employment growth is relatively high in foreign-owned firms rather compared to locally-owned firms.

Human and financial resources are positively correlated to firms' growth (Sexton & Bowman-Upton, 1991; Bamford et al., 1997; Queiro, 2015). In the case of human resources, authors use managers' education, which is a categorical variable ranging between primary or secondary education (= 1) and postgraduate degree (= 4). In order to control for firms' access to financial resources, this study uses a dummy variable.[5] The EU fund dummy is also used to control the other sources of finance.

The decision to participate in the shadow economy is made by company managers. Thus, factors which affect managers' decisions simultaneously determine the rate of shadow economy participation. This study places a greater emphasis on managers' perceptions. Interview language is used as a proxy for managers' socialization. There is no clear conclusion about the relationship between the size of a shadow economy and corruption. Hypothetically, corruption and the shadow economy can either be complements (Johnson et al., 1998; Hindriks et al., 1999; Hibbs & Piculescu, 2005) or substitutes (Schneider & Enste, 2000; Dreher et al., 2008). The relationship depends on the country's heterogeneity. Dreher and Schneider (2010) concluded that the size of the shadow economy and corruption are complements in low-income countries, but there are no robust results in high-income countries. On the other hand, Virta (2007) concluded that

5   = 1, if the company wanted to raise the money for the project during the last three years, but was unable to get sufficient financial resources, = 0 otherwise.

the type of corruption was of importance. In particular, higher corruption leads to a greater informal economy, when bribes are paid to obtain licenses.

The novelty of this study is in the circumstance that it is based on information gathered from company managers instead of employees. However, it is not possible to ascertain the nationalities of all the company managers, although the interview language is used as a proxy of managers' socialization. Managers, who are interviewed in a non-Latvian language, are considered foreigners. Theoretically, foreign managers differ from local managers in terms of participation in the shadow economy. This study uses a two-stage instrumental variable model. Perceptions of corruption and socialization in local society are used as instruments of measuring participation in the shadow economy. The results of the model are presented in the next section.

Empirical results

Results from the Ordinary Least Square (OLS) and Instrumental Variable (IV) models are presented in Table 1. The first column shows that participation in the shadow economy up to 10 % of firms' overall economic activity has a significant positive effect on informal firms' growth compared to formal firms (0 % of shadow economy participation). Firms, which are engaged in shadow economic activity up to 10 %, recorded higher growth by 0.1 percentage points.

According to the first stage of regression, the perceptions of corruption have a positive significant effect on shadow economy participation rate in Table 1. Firms, which perceive corruption as an impediment to growth, are more likely to have a higher shadow economy participation rate. However, interview language has no significant explanatory power with regard to shadow economy participation.

The results yielded by the second stage of the instrumental variable model confirm that foreign-owned firms in Latvia are associated with higher growth. Exporting firms are more likely to experience higher growth than local firms. It is worth mentioning that the firms funded by the EU are associated with higher growth, while financial constraints, in general, do not have a significant effect on growth. Moreover, managers' education neither enhances nor deters firms' growth. The effect of a firm's size on its growth is consistent across specifications. A similar result is captured with regard to a firm's age. Thus, large and old firms are associated with high growth rates.

Table 1. Regression results of the main model

| | Part I | Part II | | Part III | |
| | Growth rate | Shadow economy participation rate | Growth rate | Shadow economy participation rate | Growth rate |
	OLS	I stage	II stage	I stage	II stage
Shadow economy participation rate (base = 0) 0–10	0.094** (0.045)		0.107* (0.060)		0.127** (0.062)
10–30	0.029 (0.039)		0.052 (0.076)		0.078 (0.080)
30–50	0.017 (0.043)		0.044 (0.102)		0.085 (0.107)
50 and above	0.054 (0.045)		0.102 (0.144)		0.154 (0.152)
Foreign owned	0.128** (0.060)	−0.008 (0.276)	0.124*** (0.045)	−0.076 (0.289)	0.126*** (0.046)
Exporter	0.078** (0.032)	−0.038 (0.185)	0.076*** (0.029)	−0.072 (0.196)	0.078*** (0.031)
Management education	−0.021 (0.015)	−0.066 (0.092)	−0.014 (0.015)	−0.059 (0.095)	−0.018 (0.016)
Size of firm (Log)	0.028** (0.013)	−0.091 (0.068)	0.027** (0.011)	−0.084 (0.071)	0.029** (0.012)
Age of firm (Log)	−0.059 (0.042)	−0.059 (0.192)	−0.059* (0.031)	−0.044 (0.194)	−0.055* (0.031)
EU funds	0.085* (0.046)	−0.219 (0.298)	0.080* (0.046)	−0.241 (0.313)	0.083* (0.047)
Financially constrained	−0.041 (0.032)	0.086 (0.200)	−0.041 (0.032)	0.081 (0.201)	−0.044 (0.033)
Corruption					
Minor problem		0.333 (0.330)		0.433 (0.322)	
Moderate problem		0.768*** (0.257)		0.732*** (0.265)	
Major problem		0.693*** (0.188)		0.727*** (0.188)	
Interview language		−0.102 (0.335)		−0.086 (0.325)	
Constant	0.144 (0.126)	0.085 (0.124)	0.085 (0.124)	0.094 (0.125)	0.094 (0.125)
Industry dummies	YES	NO	NO	YES	YES
Observations	209	209	209	209	209

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Breakdown analysis   The dataset covers firms with positive, zero, and negative growth rates. Table 2 in Annex 3 presents the relationship between shadow economy participation rate and firms' growth in two different groups. The first group of firms has non-positive growth and the second group has positive growth. The results of firms, which have recorded non-positive growth correspond to the main findings, thus, participation in the shadow economy up to 10% of firms' overall economic activity has a growth-enhancing effect.

The dataset covers firms from five different industries. On average, firms in the construction industry have the highest shadow economy participation rate (21.6%). In order to check the robustness of results, the authors excluded the construction industry. By excluding the construction industry, the relationship between shadow economy participation rate and firms' growth remains unchanged. Thus, the construction industry does not significantly affect the overall results (Table 3 in Annex 3). A similar analysis is carried out in case of the service industry, which covers around 50% of the sample. In qualitative terms, the results are the same. It is worth mentioning that in the service industry, participation in the shadow economy up to 10% of firms' overall economic activity is associated with higher growth by 0.20 percentage points, while the same indicator in the non-service industry is only 0.13 percentage points (Table 3 in Annex 3).

Table 4 in Annex 3 shows the results of the regression for different sub-groups. The results are robust in the cases of local, non-exporting, and non-financially constrained firms. Participation in the shadow economy up to 10% of firms' overall economic activity is associated with higher growth than in the formal economy.

There are different reasons behind the shadow economy participation rate, which mostly correspond to a country's economic development. Gërxhani (1999) summarizes the possible factors determining a firm's decision whether to operate in the shadow economy activity or not. Our findings correspond to two possible factors, namely, autonomy/flexibility and survival. Many informal firms, mostly in developed countries, decide to participate in the informal sector because they feel there is a greater autonomy and flexibility in this sector than in the formal environment (Gershuny, 1979; Harding & Jenkins, 1989; Renooy, 1990). Hence, participation in the shadow economy up to 10% of firms' overall economic activity gives firms the chance to grow faster as this level of shadow economic activity makes firms more flexible and gives them greater access to financial markets.

There is a positive significant relationship between perceptions of corruption and participation in shadow economic activity. Johnson et al. (1998) state that the high level of corruption explains the high level of informal activities in Latin America. A similar conclusion is reached by Friedman et al. (2000) observing that bribery and corruption increase the share of the unofficial economy in the GDP. Over-regulation and corruption discourage official sector production. Therefore, countries in this region have relatively extensive shadow economies. On the other hand, interview language is used as the second instrument of measuring shadow economy participation decision but this is significant only in the case of some sub-groups. Thus, interview language as a proxy of managers' socialization in society does not have a significant effect on shadow economy participation.

Conclusion   The shadow economy is a topic worthy of discussion, especially in transition countries. To participate in the shadow economy is a decision made by risk-averse managers. This means that all pros and cons are taken into account before arriving at the decision. The shadow economy participation rate is associated with a lower tax burden and fewer regulations. On the other hand, it deters firms from attracting highly qualified workers and they have lesser access to financial markets. There is no universally accepted conclusion as to how shadow economy participation rate affects firms' growth.

This paper empirically answers the research question regarding the case of Latvia. The authors use survey data of company managers, and reach the conclusion that participation in the shadow economy up to 10% of firms' overall economic activity has a growth-enhancing effect. This result corresponds with the idea that participation in the shadow economy gives firms the opportunity to be more flexible. On the other hand, having 10% of its activities in the shadow economy, rather than the formal economy, does not exclude a firm from accessing financial markets and public services. This paper also concludes that participation in the shadow economy is beneficial only for firms, which have either negative or no growth. This result is in line with the idea that, for most firms, participation in the shadow economy is a way to survive. Future studies should focus on the relationship between formal and informal firms. Informal firms compete with formal firms and take over their market share, thus, this connection calls for further investigation.

Annex 1. Literature summary

Table 1. Causes of shadow economy

Causes of shadow economy	Authors	Results
Tax and social security contribution burden	Giles (1999) Giles and Tedds (2002) Feld and Schneider (2010)	While the difference between before and after tax income is significant, the likelihood to work in the shadow economy is greater.
Intensity of regulations	Johnson et al. (1998) Friedman et al. (2000)	More regulations always lead to a larger shadow economy.
Probability of detection	Pedersen (2003) Zukausakas (2015)	Significant negative effects of perceived risk of detection of conducting undeclared work in the shadow economy.
Tax morale	Torgler (2007) Körner et al. (2006) Alm et al. (2006) Putniņš and Sauka (2015) Schmolder (1975) Schneider and Enste (2000) Feld and Larsen (2005/2010)	The lower the tax morale, the larger the shadow economy.

Table 2. Measures of shadow economy

	Measures of shadow economy	Authors	Limitations
Direct approaches	Discrepancy between national expenditure and income statistics	Franz (1985) O'Higgins (1989) Smith (1985)	Such discrepancy reflects all omissions and errors in the national accounts, this estimate is therefore of questionable reliability.
	Discrepancy between official and actual labor force	Bruno Contini (1981) Del Boca (1981)	The main weakness of this method is that reduction of participation in the shadow economy can be caused by other factors. Moreover, people can work in both the formal and the informal economies.
	Transaction approach	Feige (1979/1989/1996)	Empirical requirements, which are necessary to obtain reliable estimates are difficult to fulfil. Thus, this application may lead to dubious results.
	Currency demand approach	Cagan (1958) Tanzi (1982)	The main limitation is that most transactions in the shadow economy are carried out by cash, but not all transactions.
	Physical input (electricity consumption)	Kaufmann and Kaliberda (1996)	Not all shadow economy activities require a considerable amount of electricity and also there are considerable differences in the elasticity of electricity/GDP across countries, which changes over time.
Model estimates	Multiple indicators multiple causes (MIMIC)	Feld and Schneider (2010)	Multiple causes and multiple indicators yield different estimates, and choosing the optimal one is problematic because of its subjective manner. Additional disadvantage of the model is that estimates are sensitive to the calibration method and still there is no universally accepted method, which is more suitable.
Indirect approach	Survey data	Zienkowski (1996) Kim (2003)	Results from survey data are sensitive and mostly depends on the formulation of questionnaire, and also the respondents' willingness to cooperate.
	Income audits	Clotefelter (1983) Feige (1986) Feinstein (1991)	

Annex 2. Descriptive statistics

Table 1. Variable definition

Variables	Questions
Growth of the firm	Please provide the following approximations about the company: annual turnover (EUR) currently and 5 years ago (2010).
Shadow economy participation rate	Please, estimate the extent of underreporting the business income by firms in your industry in 2014; Please, estimate the extent of underreporting the number of employees by firms in your industry in 2014 (percentage of unregistered employees); Please, estimate the extent of underreporting salaries paid to employees by companies in your industry in 2014;
Foreign owned	What percentage of the company is owned by private foreign individuals, companies, or organizations;
Exporter	Sales of goods and services can occur in the domestic (Latvian) market, can be indirectly exported by selling domestically to a third party that subsequently exports the good/service, or can exported directly to another country. Please estimate how the company's sales turnover is split between these three channels;
Management education	What is the highest level of education attained by the company's top manager Primary or secondary school Vocational Undergraduate degree Postgraduate
Size of firm (Log)	Please, provide the following approximations about the company: number of employees (full-time equivalent), including management (currently)
Age of firm (Log)	What year did the company begin operating?
EU funds	What was the source(s) of the financing raised during the past three years?
Financially constrained	Was the financing that your company raised during the past three years sufficient to fund desired new projects/investments/growth, or did you require, but were unable to obtain, more financing?
Corruption	To what extent would the following changes in the business environment increase the productivity of the company (i.e., increase the company's output for the same amount of inputs, such as workers)?

1. Growth of the firm — calculated as growth of sales during the period of five years (2010–2014)
2. Shadow economy participation rate — calculated from equation ②
3. Foreign owned — it is a dummy variable (= 1 if foreign ownership is higher than 10 %, = 0 otherwise)
4. Exporter — it is a dummy variable (= 1 if firm is either a direct or an indirect exporter, = 0 otherwise)
5. Management education — shows the highest level of education
6. Size of firms — measured by number of full-time employees
7. Age of firms — measured according to the time when the company starts operation
8. EU funds — it is a dummy variable (= 1 if the company has obtained funds from the European Union in the last 3 years, = 0 otherwise)
9. Financially constrained — it is a dummy variable (= 1 if the company has had financial constraintd during the last 3 years, = 0 otherwise)

Table 2. Correlation matrix and summary statistics

	Growth of sales	Shadow economy participation rate	Foreign owned	Exporter	Management education	Size of firm (Log)	Age of firm (Log)	EU funds	Financially constrained
Growth of firm	1.000								
Shadow economy participation rate	−0.021	1.000							
Foreign owned	0.271	−0.004	1.000						
Exporter	0.270	−0.056	0.214	1.000					
Management education	0.029	−0.117	0.114	0.108	1.000				
Size of firm (Log)	0.221	−0.126	0.273	0.309	0.250	1.000			
Age of firm (Log)	−0.061	−0.035	0.037	0.023	0.021	0.470	1.000		
EU funds	0.151	0.001	0.060	0.139	0.072	0.235	0.187	1.000	
Financially constrained	−0.112	0.032	−0.095	0.023	−0.071	0.101	0.189	0.000	1.000

Summary statistics (Table 2)

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
Growth of sales	504	0.031	0.193	−1	0.950
Shadow economy participation rate	209	0.175	0.208	0	0.891
Foreign owned	504	0.117	0.322	0	1.000
Exporter	504	0.345	0.476	0	1.000
Management education	504	3.258	0.936	1	4.000
Size of firm (Log)	504	2.043	1.492	0	6.413
Age of firm (Log)	504	2.608	0.470	1.609	4.060
EU funds	504	0.089	0.285	0	1.000
Financially constrained	504	0.202	0.402	0	1.000

Table 3. Distribution of firms by age

Age of firm	% of total firms
5–10	32.3 %
11–15	23.4 %
16–20	17.6 %
21–25	24.2 %
26 and above	2.5 %

Table 4. Distribution of firms by industry

Industry	% of total firms
Manufacturing	12.7%
Metal/machinery	1.8%
Timber and timber products	3.8%
Food and beverages	2.0%
Other	5.2%
Wholesale	16.1%
Retail	10.7%
Services	49.0%
Construction	5.2%
Others	6.4%

Table 5. Distribution of firms by size (number of employees)

Number of employees	% of total firms
Below 5	47.72 %
6–15	21.19 %
16–25	8.12 %
26–35	5.94 %
36–45	2.57 %
46–55	1.98 %

Table 6. Distribution of firms by legal status

Legal status	% of total firms
Individual merchant	9.7%
Limited liability company	85.7%
Joint stock company	2.8%
Branch	0.2%
Other	1.6%

Table 7. Distribution of firms by market orientation

Market orientation		% of total firms
Non-exporter	Was non-exporter and still is non-exporter	62.9%
	Was exporter and now is non-exporter	2.6%
Exporter	Was non-exporter and now exports	5.0%
	Was exporter and still exports	29.5%

Table 8. Average shadow economy participation rate by industry

Industry	Shadow economy participation rate
Manufacturing	15.8%
Wholesale	18.9%
Retail	19.2%
Services	17.6%
Construction	21.6%
Others	12.9%
Total	17.5%

Table 9. Average shadow economy participation rate by firm's legal status

Legal status	Shadow economy participation rate
Individual merchant	21.7%
Limited liability company	17.7%
Joint stock company	3.9%
Branch	—
Others	0.0%
Total	17.5%

Table 10. Distribution of average shadow economy participation rate by tax satisfaction

Level of satisfaction	Average shadow economy participation rate
Very unsatisfied	13.5%
Unsatisfied	19.1%
Neither satisfied nor unsatisfied	19.5%
Satisfied	16.2%
Very satisfied	4.5%

Table 11. Distribution of average shadow economy participation rate by tax avoidance

Tax avoidance	Average shadow economy participation rate
Completely disagree	21.7%
Disagree	14.7%
Neither agree nor disagree	21.1%
Agree	20.3%
Completely agree	6.6%

Annex 3. Regression results

Table 1. Robustness checks

	Growth quantiles (5% and 95% are excluded)		Age quantiles (5% and 95% are excluded)		Size quantiles (5% and 95% are excluded)	
	Shadow economy participation rate — I stage	Growth rate — II stage	Shadow economy participation rate — I stage	Growth rate — II stage	Shadow economy participation rate — I stage	Growth rate — II stage
Shadow economy participation rate (base = 0) 0–10		0.0592* (0.0358)		0.217*** (0.0623)		0.212*** (0.0520)
10–30		0.0693 (0.0477)		0.177** (0.0809)		0.237*** (0.0682)
30–50		0.116* (0.0639)		0.224** (0.109)		0.360*** (0.0916)
50 and above		0.113 (0.0883)		0.344** (0.152)		0.557*** (0.122)
Foreign owned	−0.261 (0.311)	0.0462 (0.0303)	−0.313 (0.297)	0.105** (0.0518)	−0.0703 (0.294)	0.0948 (0.0652)
Exporter	0.0472 (0.205)	0.0292 (0.0200)	0.0721 (0.201)	0.0610* (0.0351)	−0.140 (0.197)	0.0842* (0.0437)
Management education	−0.0209 (0.102)	0.00791 (0.0101)	0.00135 (0.0950)	−0.0162 (0.0169)	−0.00914 (0.102)	−0.0128 (0.0225)
Size of firm (Log)	−0.0568 (0.0756)	0.0124* (0.00739)	−0.0867 (0.0736)	0.0361*** (0.0129)	0.0124 (0.0901)	0.0261 (0.0200)
Age of firm (Log)	−0.355* (0.206)	−0.0276 (0.0229)	−0.0273 (0.221)	−0.0708* (0.0389)	−0.115 (0.199)	−0.0376 (0.0456)
EU funds	−0.0590 (0.328)	0.0616** (0.0299)	−0.135 (0.317)	0.0901* (0.0522)	−0.213 (0.328)	0.107 (0.0701)
Financially constrained	0.232 (0.218)	−0.0167 (0.0219)	0.0151 (0.203)	−0.0423 (0.0353)	0.0295 (0.204)	−0.0470 (0.0459)
Corruption						
Minor problem	0.341 (0.297)		0.511** (0.240)		0.466** (0.198)	
Moderate problem	0.629** (0.279)		0.430 (0.267)		0.295 (0.207)	
Major problem	0.670*** (0.203)		0.537** (0.213)		0.400** (0.157)	
Interview language	−0.354 (0.416)		−0.553* (0.287)		−0.0714 (0.214)	
Constant		−0.0465 (0.0823)		0.0655 (0.137)		−0.106 (0.157)
Industry dummies	YES	YES	YES	YES	YES	YES
Observations	186	186	195	195	170	170

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2. Regression for firms with non-positive and positive growth rate

| | Firms with non-positive growth rate | | Firms with positive growth rate | |
| | Shadow economy participation rate | Growth rate | Shadow economy participation rate | Growth rate |
	I stage	II stage	I stage	II stage
Shadow economy participation rate (base = 0) 0–10		0.131*** (0.041)		0.159 (0.126)
10–30		0.099* (0.051)		0.0915 (0.176)
30–50		0.077 (0.062)		0.209 (0.247)
50 and above		0.121 (0.085)		0.313 (0.323)
Foreign owned	–5.704 (3.570)	0.110 (0.074)	–0.038 (0.330)	0.077 (0.059)
Exporter	0.067 (0.317)	0.044 (0.031)	–0.141 (0.260)	0.074* (0.045)
Management education	–0.177 (0.135)	–0.006 (0.014)	0.159 (0.146)	–0.034 (0.027)
Size of firm (Log)	–0.021 (0.110)	0.024** (0.011)	–0.162 (0.106)	0.014 (0.024)
Age of firm (Log)	–0.104 (0.302)	0.018 (0.029)	0.0873 (0.301)	–0.071 (0.043)
EU funds	–0.061 (0.661)	0.043 (0.059)	–0.199 (0.384)	0.059 (0.061)
Financially constrained	0.072 (0.282)	–0.036 (0.027)	0.174 (0.362)	0.018 (0.054)
Corruption				
Minor problem	0.486 (0.414)		0.650* (0.351)	
Moderate problem	1.128*** (0.368)		0.278 (0.426)	
Major problem	0.595** (0.289)		0.647 (0.426)	
Interview language	–0.246 (0.385)		1.242* (0.721)	
Constant		–0.256*** (0.096)		0.356* (0.201)
Industry dummies	YES	YES	YES	YES
Observations	101	101	108	108

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3. Robustness check by industry

	Without service industry		Only service industry		Without construction industry	
	Shadow economy participation rate	Growth rate	Shadow economy participation rate	Growth rate	Shadow economy participation rate	Growth rate
	I stage	II stage	I stage	II stage	I stage	II stage
Shadow economy participation rate (base = 0) 0–10		0.131* (0.074)		0.195** (0.099)		0.119* (0.064)
10–30		0.0143 (0.085)		0.211 (0.135)		0.081 (0.081)
30–50		0.0702 (0.116)		0.190 (0.183)		0.081 (0.109)
50 and above		0.113 (0.157)		0.359 (0.256)		0.154 (0.155)
Foreign owned	0.081 (0.347)	0.179*** (0.051)	−0.593 (0.626)	0.071 (0.124)	−0.083 (0.289)	0.129*** (0.047)
Exporter	0.036 (0.286)	0.045 (0.039)	−0.093 (0.279)	0.116** (0.054)	−0.067 (0.197)	0.079** (0.032)
Management education	−0.066 (0.131)	−0.041** (0.019)	−0.098 (0.141)	0.011 (0.029)	−0.029 (0.098)	−0.013 (0.016)
Size of firm (Log)	−0.120 (0.100)	0.043*** (0.015)	−0.005 (0.106)	0.008 (0.021)	−0.096 (0.074)	0.025** (0.012)
Age of firm (Log)	0.0359 (0.270)	−0.054 (0.038)	−0.132 (0.291)	−0.007 (0.062)	−0.030 (0.199)	−0.047 (0.033)
EU funds	−0.344 (0.391)	0.080 (0.050)	0.000 (0.600)	0.139 (0.118)	−0.230 (0.314)	0.082* (0.048)
Financially constrained	0.142 (0.279)	−0.000 (0.041)	0.105 (0.291)	−0.083 (0.055)	0.073 (0.207)	−0.036 (0.034)
Corruption						
Minor problem	0.414 (0.475)		0.582* (0.342)		0.478 (0.325)	
Moderate problem	1.098*** (0.422)		0.291 (0.330)		0.708*** (0.273)	
Major problem	0.696** (0.295)		0.721** (0.319)		0.735*** (0.192)	
Interview language	0.534 (0.457)		−0.797* (0.456)		0.015 (0.333)	
Constant		0.124 (0.133)		−0.185 (0.265)		0.067 (0.127)
Industry dummies	YES	YES	YES	YES	YES	YES
Observations	103	103	106	106	200	200

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4. Robustness check by firms' type

	Local firms		Non-exporter firms		Not financially constrained	
	Shadow economy participation rate	Growth rate	Shadow economy participation rate	Growth rate	Shadow economy participation rate	Growth rate
	I stage	II stage	I stage	II stage	I stage	II stage
Shadow economy participation rate (base = 0) 0–10		0.199*** (0.065)		0.146** (0.058)		0.099* (0.057)
10–30		0.238*** (0.088)		0.108 (0.080)		0.016 (0.068)
30–50		0.273** (0.119)		0.094 (0.097)		0.060 (0.089)
50 and above		0.420*** (0.161)		0.137 (0.139)		0.046 (0.116)
Foreign owned			−0.007 (0.444)	0.152** (0.065)	−0.076 (0.196)	0.163*** (0.050)
Exporter	−0.049 (0.200)	0.078** (0.038)			−0.215 (0.314)	0.095*** (0.036)
Management education	−0.055 (0.094)	−0.009 (0.019)	−0.200* (0.113)	−0.010 (0.018)	−0.173 (0.237)	−0.024 (0.018)
Size of firm (Log)	−0.076 (0.072)	0.039*** (0.014)	−0.072 (0.085)	0.023* (0.012)	−0.070 (0.112)	0.012 (0.013)
Age of firm (Log)	0.006 (0.199)	−0.060 (0.039)	−0.120 (0.235)	−0.008 (0.036)	−0.109 (0.080)	−0.037 (0.035)
EU funds	0.051 (0.332)	0.045 (0.060)	0.033 (0.424)	0.080 (0.062)	−0.061 (0.223)	0.110** (0.054)
Financially constrained	0.145 (0.203)	−0.051 (0.039)	−0.069 (0.266)	−0.066* (0.037)		
Corruption						
Minor problem	0.476** (0.219)		0.375 (0.413)		0.203 (0.412)	
Moderate problem	0.403 (0.256)		0.844** (0.328)		1.043*** (0.294)	
Major problem	0.494** (0.210)		0.992*** (0.232)		0.855*** (0.224)	
Interview language	−0.479* (0.263)		0.023 (0.402)		0.757* (0.420)	
Constant		−0.064 (0.142)		−0.019 (0.140)		0.094 (0.125)
Industry dummies	YES	YES	YES	YES	YES	YES
Observations	188	188	142	142	165	165

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Impact of managerial ownership on enterprise performance in the Baltic states

Goda Gaušaitė, Arnas Vedeckis

This paper is dedicated to corporate governance of Baltic companies and provides analysis how managerial ownership (MO) affects private enterprise performance, measured as return on assets (ROA), return on equity (ROE) and profit before tax margin. We aim to show the link between agency theory and ownership structure by employing a sample of 51,776 private companies from Lithuania, Latvia and Estonia that were active in 2014. Using the cross-sectional research design and performing ordinary least squares regressions we find evidence of a cubic relationship. The link changes its direction twice at approximate levels of 22% and 64% of managerial ownership. At low and high levels of MO, a firm's performance measured by ROA improves, while it deteriorates at an intermediary one. The authors conclude that employment of professional management and a motivation system, when managers hold up to one fifth of equity, can benefit Baltic entrepreneurs the most, especially when a company grows.

Introduction

The dismissal of Michael Woodford as Olympus CEO, the Sino-Forest Corporation share price crash or the News Corp phones hacking story are only a few examples of recent multinational corporate governance scandals that caught the eye of politicians who, therefore, proposed a raft of new corporate governance regulations. For instance, the European Commission initiated a proposal for the revision of the Shareholder Rights Directive to solve current corporate governance shortcomings (The European Commission, 2014). Agent dilemma problems have already been researched for almost a century; however, corporate governance issues are still unsolved and relevant today.

Berle and Means (1932) were among the first to notice that interests of managers and shareholders are not the same, but as long as ownership and control remain in the hands of a few individuals, these interests can be aligned. The issue arises, however, when ownership is diffused among many individuals and control is concentrated in the hands of outside managers, who might have little interest in maximising the value of shareholders. This

leads to agency costs, management entrenchment and most importantly the destruction of shareholders' wealth about which Jensen and Meckling (1976) continue to talk.

Theoretical studies are backed up with an extensive empirical proof of a nonlinear relationship between managerial ownership and a firm's performance. The effect is tested in the major markets such as the US (Morck et al., 1988; McConnell & Servaes, 1990); the UK (Short & Keasey, 1999); France (Severin, 2002); Spain (Miguel et al., 2004); Germany (Mueller & Spitz, 2002); Hong Kong (Cheng et al., 2012); and others. However, almost all studies in the field are performed using a sample of publicly listed companies, and thus lack the information about managerial ownership's impact on private firms. In addition, the previous studies often employ samples of firms from developed countries, leaving out the analysis of developing ones, which differ by the quality of corporate governance.

We decided to perform a study using a dataset of Baltic enterprises, focussing on the Baltic region, firstly, to enrich the current literature with more evidence from developing countries, but more importantly, to fill the gap in previous studies by adding the insights from private companies. By employing a cross-sectional study design, we aim to answer the following research question: *What effect does managerial ownership have on the performance of private businesses within the Baltic states?*

The paper is organized, as follows. The next section reviews the theoretical and empirical studies performed in the field of our chosen topic. The third section expands on sample selection and methodological approach towards answering the research question, as well as presents additional tests used to check the data and models. The fourth section reviews the results obtained from our research, while the fifth discusses the main findings and limitations of the study.

Literature review   The purpose of this section is not only to review the research done in the managerial ownership field but, more importantly, to show the gap in literature that this paper intends to fill. The section starts with an overview of the separation of control and agency theory. Later, empirical findings of previous studies are introduced, as well as the possible differences of managerial ownership effect between developed and developing countries, private and public enterprises.

Developed and developing countries — the concepts "developed" and "developing" countries (instead of "advanced" or "emerging" countries) are used according to the United Nations Development Programme's country classification system (Gbadamosi, n. d.).

Managerial ownership (MO) — denotes a percentage of shares held by directors and the members of the board of a company (McConnel & Servaes, 1990). The study considers only the direct ownership of directors and board members. Sometimes, a term "insider ownership" is used as a synonym.

Tobin's Q — firm's market value (the sum of equity and value of a company's debt and preferred stock) divided by the replacement value of a company's assets (inventory and plant) (Morck et al., 1988).

THEORY   In the previous century, there was a tremendous change in the governance of firms, which led to a formation of a modern corporate governance model. A traditional business unit, owned and controlled by a concentrated group of related individuals, was replaced by a new type of firms. In such firms, ownership was diffused among many company-unrelated individuals (not employees or founders), whose wealth was surrendered to a central control body (Berle & Means, 1932). Companies of today are the evidence of the previous change. The modern corporate governance system is developed in a way that individuals, who have invested their personal wealth in a firm, do not necessarily influence the decision-making process, which, in fact, is performed by the management (Berle & Means, 1932). Of course, for large block-holders the separation of ownership and control is less evident. However, the modern corporate governance system allows a wide dispersion of ownership, which often enlarges power of a handful of managers, who are supposed, but rarely forced, to benefit the shareholders (Berle & Means, 1932).

Separation of ownership and control raises suspicion that managers will not always use their power to maximise the value of shareholders. Jensen and Meckling (1976) contribute to the analysis of this issue using agency theory as a theoretical framework, where they define agency relationship as an agreement, by which an agent receives some power to make business decisions on behalf of the principal (Jensen & Mecking, 1976). If an enterprise has a sole owner-manager, business decisions will be made in the best way to maximise a firm's value, because they directly influence the wealth of the owner (Jensen & Mecking, 1976). However, when the ownership level of the manager falls, it is likely that the agent will prioritize his own rather than the interests of a principal, if both parties are "utility maximisers". The manager might lose incentives to search for the best business opportunities simply because, relative to his ownership stake, he would be asked to put in excess effort (Jensen & Mecking, 1976). In such cases, manager might involve himself in the extraction of private benefits such as perquisite-taking, empire building or concentration on sales growth as long as those benefits create more wealth than gains from maximising a firm's value (Mueller & Spitz, 2002; Shleifer & Vishny, 1997).

Because the extraction of private benefits worsens a company's performance and destroys the wealth of shareholders, a firm is obliged to introduce a monitoring mechanism for managers: acquire bonding costs or employ a supervisory board (Jensen & Mecking, 1976). Such monitoring mechanisms are agency costs that continue to diminish a firm's resources. However, it is not possible to align the agent's and principal's interests at zero cost (Jensen & Mecking, 1976).

A manager could be incentivized to act in the best interests of a principal by acquiring a solid ownership stake in a company, thereby connecting his personal wealth with the value of the firm. It would suggest that, as long as managerial ownership increases, the firm's performance should improve (Jensen & Mecking, 1976); on the other hand, this is not necessarily the case. As previously stated, certain ownership stakes empower managers sufficiently as to extract private benefits of control, which witness management entrenchment (Ruan, Tian & Ma, 2009). It seems convincing that 100 % ownership of the managers would mean that a firm's value has reached its maximum because there is no separation of ownership and control (Ruan, Tian & Ma, 2009). Therefore, while the entrenchment effect suggests that at some intermediate levels of managerial ownership managers decrease the value of a firm, the incentive effect indicates that high MO boosts shareholders' wealth (Morck et al., 1988). The following conclusion suggests that there should be a non-linear relationship between different levels of managerial ownership and a firm's value.

PREVIOUS EMPIRICAL FINDINGS   Theoretical considerations sound compelling enough to believe that managerial ownership can affect a firm's performance; however, to unambiguously predict the direction of the relationship, empirical evidence is needed.

Developed countries. In this section, we review empirical findings focusing on the US and Western European countries. In general, most of the studies researching developed countries observe a nonlinear relationship between MO and the firm's value, proving that both convergence of interest and entrenchment hypothesis are valid. The turning points differ in each country because of the specifics of the corporate governance system, chosen performance measures and study period. Therefore, when comparing previous empirical findings, it is crucial to understand that differences in the results might be observed even among countries with the same development level.

Morck et al. (1988) find a statistically significant cubic relationship using a sample of the US listed firms. In the paper, the relationship between MO and Tobin's Q changes its sign twice. The increase in a firm's performance

is observed when managerial ownership rises from 0 to 5 % and from 25 % upwards. In the first case, the increase is rapid we argue that besides the convergence of interest effect, purely observed in the second case, managers of well-performing firms also exercise their stock options or get stock bonuses which increases MO marginally. The firm's value decreases when MO is between 5 and 25 % because these turning points give a US shareholder particular rights which most probably conduce to some form of entrenchment. Moreover, the evidence is found proving that it is not appropriate to impose a linear structure to examine the impact of MO (Morck et al., 1998).

The cubic relationship is also found in other studies (Short & Keasey, 1999; Miguel et al., 2004). Short and Keasey (1999) employ a sample of listed firms in the UK and using the return on shareholders' equity (RSE) as well as market value of the firm divided by the book value of equity (VAL) find higher turning points than in the Morck et al. (1998) study. It is explained that because there is a greater concentration of institutional ownership and board monitoring is more effective in the UK than in the US, managers need to own more equity to become entrenched. Miguel et al. (2004) studied a sample of Spanish companies. They choose the market value of shares divided by the replacement value of total assets as a performance measure and find higher turning points than previous studies in the US or the UK do. Moreover, entrenchment is present at a very wide range of managerial ownership (35–70 %). The reason for such outcome is claimed to be the differences in corporate governance system in Spain compared to the US and the UK: the more concentrated the ownership, the less effective the monitoring of boards, the lower the liquidity of assets and the less efficient the enforcement of investor protection.

Some studies claim that there exists a curvilinear relationship between MO and a firm's value: firstly, the value of the firm increases and afterwards falls (McConnel & Servaes, 1990; Bohren & Odegaard, 2004; Beiner et al., 2004; Severin, 2002). Stulz (1987) argues that a firm's value reaches its maximum, when MO is below 50 % and the minimum when managers hold 50 % or more of equity. McConnel and Servaes (1990) also employ a sample of the US firms and find that a firm's value is the highest at 49.4 % (in 1976) and 37.6 % (in 1986) of MO, which is consistent with Stulz (1987). McConnel and Servaes (1990) also perform the experiment using ROA as a dependent variable and conclude that the results are consistent with an initial experiment when Tobin's Q has been used. It suggests that the effect MO has on firm's market value measured by Tobin's Q should be of the same direction as on accounting measures, such as ROA, ROE or profit margin (McConnel & Servaes, 1990). A consistent quadratic relationship is also found in listed Norwegian (Bohren & Odegaard, 2004), Swiss (Beiner et al., 2004) and French (Severin, 2002) firms. What is more interesting, Bohren and Odegaard (2004) find that smaller boards are

more efficient and that even though the effect MO has on performance is highly dependent on measures used, Tobin's Q and ROA lead to consistent observations. Additionally, Beiner et al. (2004) observe that MO negatively affects the index which measures the level of corporate governance development of a firm.

On the other hand, there are some researches, which present contradictory evidence. Demsetz and Villalonga (2001) argue that ownership structure is an endogenous variable and at some level determined by firm's performance. They contemplate that, unless it is tested as to which part of managerial ownership pattern is explained by a company's performance in the simultaneous two-stage regressions, the coefficients turn out to be biased in one-stage regressions, which most of the previous studies performed (Demsetz & Villalonga, 2001). In their paper, the authors study a sample of US firms, construct a two-equation model and after accounting for reverse causality find no evidence to support that MO influences a firm's performance. The results are known as "neutrality theory" and are consistent with the findings of such studies as: Loderer and Martin (1997), who observe no evidence that managerial ownership projects Tobin's Q but, conversely, that Tobin's Q negatively affects insider ownership; Cho (1998), who similarly, by employing a cross-sectional study design, discovers that Tobin's Q affects insider ownership but not the other way around; and Himmelberg et al. (1999), who claim that insider ownership is determined by different firm-level or even-industry level characteristics that can be only partly observed but are ignored at a large scale in the previous studies. They use a set of ratios such as R&D to sales, advertising to sales, long-term assets and operating income-to-sales as well as firm-level dummies (which are claimed to increase model's fit (R²) considerably) and later find significant evidence of MO being an endogenous variable.

Nevertheless, some studies account for endogeneity and still find a link between MO and a firm's value (McConnell et al., 2008; Beiner et al., 2004; Kaserer & Moldenhauer, 2008). Cross-sectional studies are often criticized for interpretation that a firm's value reacts to changes in MO rarely testing this relationship over time. The study of McConnell et al. (2008) using a sample of the US firms responds to this concern by regressing a firm's value changes over the six-day period around announcements of manager equity purchases. They collect 4 years of data of insider stock purchases and using it show that the value of the enterprise varies in a curvilinear form. Kaserer and Moldenhauer (2008) address endogeneity by employing a simultaneous equation approach for which they use two-stage least squares estimators and employ a sample of German listed firms. They find that MO is positively related to a firm's performance but not vice versa. Moreover, in the previously mentioned study Bohren and Odegaard (2004) disagree that methodology

suggested by Demsetz and Villalonga (2001) is able to offer a deeper conclusion than OLS regressions because the former model suffers from lack of strong instruments.

Summing everything up, it can be concluded that there is no single answer to our research question in the previous conceptual and empirical works as different turning points or forms of linearity have been observed. In general, a significant number of empirical studies prove the link between managerial ownership and a firm's performance. However, the reverse causality issue must be taken into consideration to claim the existence of the effect MO has on performance. Therefore, basing our assumptions on the previous findings and theory we form the first hypothesis:

HYPOTHESIS 1: THE EFFECT MANAGERIAL OWNERSHIP HAS ON A FIRM'S PERFORMANCE IS NONLINEAR AND THE DIRECTION OF THE RELATIONSHIP DEPENDS ON THE LEVEL OF MANAGERIAL OWNERSHIP.

Developing countries. The empirical evidence explaining the relationship between MO and a firm's performance concentrates on developed countries, mainly on the US but there are few works, which analyse developing markets. Findings from the former countries cannot be blindly applied to developing countries. The outcomes vary greatly even among the developed countries because of differences in corporate governance systems, which appear to be even greater trying to compare developed and developing countries (Farooque et al., 2007). This section contains the review of studies performed in developing countries and Baltic countries' overview.

Shleifer and Vishny (1997) claim, that because legal systems highly differ, shareholders' rights and the effectiveness of their enforcement are not the same across countries. Low shareholder protection might ease the process of shareholder expropriation and management entrenchment, therefore, Bebchuk et al. (2000) contemplate that firms in developing countries might suffer from a larger scale of agency problems. Shareholders' protection is also highly dependent on the effectiveness of the board which size varies greatly across countries and is influenced by legal requirements (Shleifer & Vishny, 1997). Shleifer and Vishny (1997) propose an idea that ownership concentration can at some level substitute legal protection of shareholders which in developing countries is often low, because collective action of investors can be coordinated in a much easier way than when the ownership is diffused (often a case in developed countries). This would indicate that ownership concentration is more prevalent in developing countries. In fact, empirical results might depend not only on differences between developed and developing countries but also country specifics. For example, firms in Hong Kong have a family-concentrated ownership structure, while

in Malaysia and Turkey concentrated shareholding is prevalent comparing to other countries (Cheng et al., 2012; Zakaria et al., 2014; Mandaci & Gumus, 2010). Therefore, every study that analyses a particular country reveals unique results and only generalized conclusions can be adapted to certain types of countries.

Simoneti and Gregoric (2004) when employing a sample of listed and unlisted Slovenian firms find a U-shaped relationship between EBITDA/SALES and insider ownership, when the value of the firm firstly decreases and then increases, while MO goes up. The results are still consistent with a nonlinearity theory; however, there is no positive incentive effect at low levels of managerial ownership. It is claimed that in unlisted Slovenian firms the outside owners such as funds even having large equity shares are passive and often opposed by more active insiders. Then insiders might entrench themselves at a very low level of ownership (0–10%), as the funds do not involve themselves too much in manager monitoring and only higher ownership stakes can motivate managers to maximise a firm's value. However, in the study no relationship is found between MO and economic efficiency or total factor productivity growth, which would imply a positive long-term effect on a firm's performance. Farooque et al. (2007) use a sample of listed firms in Bangladesh and find evidence consistent with Demsetz and Villalonga (2001). They reveal the endogeneity of managerial ownership and show that it is negatively affected by Tobin's Q and ROA. They argue the validity of their results by showing the increase in the model's fit (R²), while addressing a reverse-causality issue. Mandaci and Gumus (2010) use a sample of Turkish listed firms and observe a negative relationship between managerial ownership and Tobin's Q. They also discover that ownership concentration, which, according to Schleifer and Vishny (1997), is more prevalent in developing than in developed countries, is positively correlated with Tobin's Q and ROA and helps to leverage poorer shareholders protection.

The Baltic states. The development of a corporate governance system in the Baltic countries began after the privatization process in the late 1980s. There were many reforms in the judiciary system in terms of rules of disclosure and investor protection, state regulation of capital markets, responsibilities of the managers and the boards and bankruptcy enforcement, which were driven by the development of business environment and financial markets (Mygind, 2007). However, despite a rapid development, EBRD Corporate Governance Sector Assessment 2004 reveals that Lithuania, Latvia and Estonia still lag behind the developed states because of shortcomings in corporate governance legislation, less developed financial markets and little presence of dispersed shareholding, the features that are all common

to Anglo-American and German bank-dominated market structures (EBRD Corporate Governance Sector Assessment, 2004; Mygind, 2007).

In fact, managers with equity holdings today have very strong decision-making power and control concentration in the Baltic states (Mygind, 2007). Even at the beginning of the privatization process, when employee-owned firms were widespread, managers, who had either no or very high ownership, often took a dominant role in the decision-making process (Mygind, 2007). It would not be surprising if dominance of concentrated ownership is found in the Baltic states because, as Shleifer and Vishny (1997) argue, in the developing countries, which the Baltic states have very recently been classified as (IMF, 2015a), concentrated ownership might help to monitor management more. On the other hand, in the Baltic countries the large shareholders are poorly represented because of the strong dominance of management (Mygind, 2007). Only the foreign shareholders, who have a higher authority than the domestic outside investors, are able to compete with management for control (Mygind, 2007).

After comparing corporate governance environment in the Baltic states (characterized by a possibility of intense management entrenchment) with empirical evidence from the developed countries, the second hypothesis is formed. In the hypothesis, we use manager's ownership spread as a proxy for the magnitude of management entrenchment. Thus, the wider the distance between two boundaries of observed negative effect on a firm's performance is found, the deeper the entrenchment is.

HYPOTHESIS 2: MANAGEMENT ENTRENCHMENT EFFECT, CHARACTERIZED BY A NEGATIVE RELATIONSHIP BETWEEN MANAGERIAL OWNERSHIP AND A FIRM'S PERFORMANCE, IS EVIDENT AT A WIDER OWNERSHIP RANGE THAN IN DEVELOPED COUNTRIES (AVERAGE SPREAD IN CASE OF A CUBIC AND QUADRATIC RELATIONSHIP IS 27.57% AND 41.75%, RESPECTIVELY).

In general, the analysis of corporate governance structure in the Baltics is very limited and mainly based on one study by Mygind (2007), who collects data from a survey conducted in 1996–1997. No studies examining the current corporate governance structure of the Baltic states were found. Moreover, we could not locate any papers that would test the link between managerial ownership and firm's performance in the Baltics. Consequently, the analysis of the corporate governance model of the Baltic markets would provide valuable insights. Moreover, according to IMF country classification, the Baltic states have just been reclassified from emerging and developing markets to advanced (developed) economies: Estonia in 2011; Latvia in 2014; Lithuania in 2015 (IMF, 2015b). As the reclassification has happened recently,

the pattern of corporate governance of developing countries can still be observed in the Baltic countries. Thus, the analysis will also contribute to the understanding of the corporate governance system and insider ownership effect on a firm's performance in the context of developing countries.

Private companies. Mainly all researches analysing the effect managerial ownership has on a firm's performance (value) are based on publicly listed companies. However, due to separation of control and ownership, conflicts between agents and principals are present in privately held companies, as well (Mueller & Spitz, 2002). Therefore, there is a gap in the current literature, which we aim to fill by researching a sample of privately held companies in the Baltics. In fact, the vast majority of companies in Lithuania, Latvia and Estonia are not listed. So, even though some empirical evidence could be found using data only from listed companies, it would be hardly possible to claim that these results are valid for the whole population of the Baltic enterprises.

In general, public and private companies differ in numerous ways. Private companies do not sell their shares publicly, although it becomes more popular to trade private company shares in markets such as the Nasdaq Private Market (Summers, 2013); private companies usually have less dispersed ownership than public firms (Fare et al., 1985); they are smaller in size, the owners of a firm more frequently are its managers (European Commission, 2012); and finally, in some cases they face less strict requirements (for example, most them can be unaudited). Therefore, management in private companies might become entrenched at lower levels of ownership than in public companies because of lower requirements of disclosure and supervision. Additionally, as private companies have limited access to external funds, the growth opportunities might be restricted, which would result in a poorer performance compared to publicly listed companies; on the other hand, being listed on the exchange creates additional costs, which private companies do not have to spend (Steyn, 2013). Finally, as public companies have a constant pressure from shareholders to maintain increasing stock prices the managers are more likely to make short-term-profit decisions, which might not be the best choice in the long-term (Steyn, 2013). These features of private companies are directly related to a firm's financial performance.

We found only one study, which tested the link between managerial ownership and a firm's performance in private companies besides the already presented study of Simoneti and Gregoric (2004), who analysed both listed and unlisted companies. Mueller and Spitz (2002) employ a sample of German private limited liability firms. They use survey-based data from ZEW and *Creditreform*, the largest credit rating agencies in Germany, and their findings are consistent with incentive and entrenchment hypothesis, as well

as nonlinearity theory (Morck et al., 1988; McConnell & Servaes, 1990; Short & Keasey, 1999). However, no evidence is found about previously contemplated management entrenchment at lower levels of insider ownership. On the other hand, for extremely high levels of manager equity holding, we claim that firms reach outstanding performance (Mueller & Spitz, 2002). Therefore, being consistent with the convergence of interests theory and previous empirical findings, we expect to observe Baltic companies, fully owned by managers, to perform better compared to the ones where managers are minority shareholders or do not own equity at all:

Hypothesis 3: Firms that have a maximum level of managerial ownership perform better than the ones where managers do not own 100% of equity.

Methodology

SAMPLE DESCRIPTION   To form the sample, we collected performance, ownership and management information of all the active Baltic companies. Firm level data was extracted from the *Orbis* database of Bureau van Dijk (BvD), the database included in Wharton Research Data Center platform and used in the top level academic journals' articles (Laitinen & Suvas, 2013; Kalemli Ozcan, Sorensen & Yesiltas, 2012; Burgstahler, Hail & Leuz, 2006). All data was extracted using a single database, which enabled avoiding potential inaccuracies among different sources of data. Financial data provided by *Orbis* database was in USD.

A raw sample of 575,618 active companies that were registered in the Baltic states was extracted on 12th November, 2015. The sample included: company profile (name, country, BvD ID number, sector name according to US SIC 3 digits' code classification, number of employees), ownership and management structures (direct and total shareholders' stakes, managers' names, their titles, size of the board, number of shareholders registered as companies) as well as key accounting information (turnover, profit before tax, book value of assets, total current and noncurrent liabilities, capital, expenditures, ROE and ROA ratios). To ensure that different corporate tax rates do not impact the results, we have chosen to use profit before tax instead of net profit in all calculations.

In the current research, we followed previous studies by choosing a cross-sectional research design (Morck et al., 1987; McConnell & Servaes, 1990). 2014 was chosen for this research as the most up to date year and the only year which had both ownership and accounting data. 369,872 companies were eliminated from the sample as the last information update for them was between 1997 and 2013. We also adjusted the dataset by taking out Tallinna Vesi from

the sample, the only company in the Baltic states that has a dual-class shares system. Then, all listed and delisted companies were deleted because the complete majority of enterprises in Lithuania, Latvia and Estonia are privately owned and their corporate governance level is still far behind the traded companies (Baltic Institute of Corporate Governance, 2011). Moreover, all businesses that provide financial services were taken out from the sample.

Due to unreported data with regards to ownership and accounting variables, and the existence of data anomalies in *Orbis* database (negative total assets or liabilities), the sample was further reduced by 59,177 firms. A potential sample consisted of 145,698 private businesses, however, after consultations with corporate governance researchers it was also decided to implement a threshold for enterprise size to avoid information from the neglect companies that were established only for one project or other purposes. As the Latvian companies' subsample was the biggest in the dataset, the we decided to follow the interpretation of micro enterprise according to Latvian law and implement a threshold of 100,000 EUR for annual revenue. Since the data in *Orbis* database was presented in US dollars, the threshold was converted to 121,410 USD according to the European Central Bank's USD/EUR exchange rate on 31st December, 2014 (1.2141 USD for 1 EUR). The same rate has been used by *Orbis* database to convert balance sheet data from euro to dollars. Finally, the usable sample consisted of 51,776 unique companies (5,186 in Lithuania, 25,282 in Latvia and 21,308 in Estonia) from 7 different sectors: mining; construction; manufacturing; transportation, communications, electric, gas and sanitary service; wholesale trade; retail trade; and services.

Our dataset can be favoured over samples used in previous researches because, firstly, our sample is more representable as we analysed a larger number of companies, including medium and small businesses; secondly, we used financial data to predict the relationship between MO and performance, not survey-based methodology, which often suffers from different biases and which other two papers used; thirdly, by assuming that (1) rate of manager turnover over one year is low; and (2) manager ownership stakes are unlikely to fluctuate drastically over the short term (Morck et al., 1988), we were able to use the cross-sectional research design instead of the longitudinal method. The overall ownership structure and the managerial ownership have only small year-by-year changes that can limit the conclusions derived from time series data (Kaserer & Moldenhauer, 2008).

METHOD   Research examining relationship between MO and performance is very limited for private businesses, therefore, the analysis method has not been clearly established. We were able to either follow Mueller and Spitz' (2006) methodology and apply a survey-based methodology or adapt models used for public companies' analysis. The latter quantitative

1   Assuming other variables being constant and denoting MO by x we obtained: $\beta_1 x + \beta_2 x^2 + \beta_3 x^3$. The turning points were derived by setting the first order derivative of the equation to zero.

analysis option was chosen. Methodological approach was based on Morck et al. (1987): (1) Initially a nonlinear regression model was constructed; (2) Inflection points were estimated;[1] and (3) The robustness of the nonlinear model and the obtained turning points were tested with a piecewise linear regression (see Additional tests section). Conversely to Morck et al. (1987), who used a piecewise regression, the main conclusions we drew were based on results from the nonlinear model. McConnel and Servaes (1990) and Short and Keasey (1999) also followed the same approach as used in this paper.

After supplementing the initial model with additional control variables that help to enrich the regression, we estimated the following Ordinary Least Squares (OLS) nonlinear model:

$$Performance_i = \alpha_0 + \beta_1 MO_i + \beta_2 MO^2_i + \beta_3 MO^3_i + \beta_4 Size_i + \beta_5 DI_i + \beta_6 NumDir_i + \delta_i + \lambda_i + \upsilon_i + \varepsilon_i \quad ①$$

Dependent variables. The dependent variable *Performance* that is on the left-hand side of the equation can be expressed as the return on assets (ROA) (Mehran, 1995), return on equity (ROE) (Short & Keasey, 1999) or profit margin (PBT margin) (Morck et al., 1988). The majority of finance and accounting articles discussed in this paper use Tobin's Q as a proxy for company performance (Al Farooque et al., 2007; Wenjuan, Tian & Shiguang, 2011; Gulamhussen et al., 2012). Nevertheless, we chose to focus on accounting performance measures because firstly, Tobin's Q ratio calculation requires the market value; secondly, accounting profitability indicators measure a company's performance better than market-based indicators (Joh, 2003); and thirdly, Tobin's Q ratio is perceived to be a more forward–looking measure, but we are interested in estimating the company's current achievements.

Conclusions will be based on the ROA variable that we perceive as most accurate for the analysis. ROE ratio is highly affected by the leverage, while PBT margin is very industry-dependent, leaving ROA as our primary ratio for analysis that shows the real operational efficiency of businesses. Nevertheless, regressions with ROE and PBT margin will be run as well to check the consistency between distinct performance proxies. ROA, ROE and PBT margin in 2014 were calculated by dividing PBT by Total Assets; PBT by Total Shareholder's Equity; and PBT by Turnover, respectively. In the regressions ROA, ROE and PBT margin variables were winsorized at 1/99 percentiles to avoid the issue of outliers having extreme values.

Independent variables. Managerial ownership (*MO_i*) is defined as the fraction of shares owned by management and the board (McConnell et al., 1990).

Size ($Size_i$). The natural logarithm of turnover is used to measure the size of a company (Himmelberg et al., 1999).

Debt intensity (DI_i). Debt intensity ratio is included, winsorized at 1/99 percentiles and measured as a book value of debt divided by total assets. We expected to observe a negative relationship between leverage and enterprise performance (Myers, 1984; Daskalakis & Psillaki, 2008; Vasiliou et al., 2009).

Board size ($NumDir_i$). As a proxy for a board size we used the natural logarithm of number of directors, managers and other contacts in each company (the definite size of the board in the database is not available) (Bohren and Odegaard, 2005). This measure is not a perfect proxy, however, it should represent the same board size effects, since the majority of directors are an integral part of the board.

Control variables. To control for institutional ownership, country and industry effects, we included:

δ_i — *company ownership dummy*. If there are firms or institutions among company's shareholders, this variable will be equal to 1.

λ_i — *country dummy variable*. Judicial and tax systems differ across the countries; therefore, every country might have some specific impact on enterprise performance (Gulamhussen et al., 2012).

v_i — *industry dummy control*. In line with the research about managerial ownership (Schmalensee, 1985; Rumelt, 1991; McGahan & Porter, 1997) this paper introduces industry dummy control variables to account for possible effects that each industry may have on our dependent variables.

ε_i — *error term*.

ADDITIONAL TESTS　　*Robustness check using piecewise linear regression*. The data used in our research was substantially different, since we analysed private companies. There were no studies previously carried out in the region for us to base our justified turning points on. Therefore, it was chosen to test the robustness of the inflection points derived from the non-linear equation with a piecewise linear ordinary least squares model (Morck et al., 1988; Börsch-Supan & Köke, 2002). By using this method, we captured the possible differences between types of sectors as well as countries. Three piecewise linear regressions were formed, one for each performance proxy:

$$Performance_i = \alpha_0 + \beta_1 MO1_i + \beta_2 MO2_i + \beta_3 MO3_i + \beta_4 Size_i + \beta_5 DI_i + \beta_6 NumDir_i + \delta_i + \lambda_i + v_i + \varepsilon_i \quad ②$$

Where $MO1$, $MO2$ and $MO3$ are ownership regions between the turning points that are obtained after testing for nonlinear cubic relationships (other variables stay the same as in model ①).

When the turning points were calculated, new regressors for the piecewise linear model ② were created. New variables accounted for different managerial ownership levels:

$MO1$ = managerial ownership　　　if MO < 1st turning point
　　　1st turning point　　　　　　if MO ≥ 1st turning point

$MO2$ = 0　　　　　　　　　　　　　if MO < 1st turning point
　　　(MO — 1st turning point)　　if 1st t. p. ≤ MO < 2nd t. p.
　　　($2nd$ — 1st turning point)　　if MO ≥ 2nd turning point

$MO3$ = 0　　　　　　　　　　　　　if MO < 2nd turning point
　　　(MO — 2nd turning point)　　if MO ≥ 2nd turning point

Robustness check using different form of nonlinearity. We also constructed a quadratic model for the main ROA variable to see whether the relationship between MO and firm performance does not show other types of nonlinearity. We ran an OLS regression and tested the obtained inflection point with the piecewise linear model:

Nonlinear regression:

$$ROA_i = \alpha_0 + \beta_1 MO_i + \beta_2 MO_i^2 + \beta_3 Size_i + \beta_4 DI_i + \beta_5 NumDir_i + \delta_i + \lambda_i + v_i + \varepsilon_i \quad ③$$

Piecewise linear regression:

$$ROA_i = \alpha_0 + \beta_1 MO1_i + \beta_2 MO2_i + \beta_3 Size_i + \beta_4 DI_i + \beta_5 NumDir_i + \delta_i + \lambda_i + v_i + \varepsilon_i \quad ④$$

Turning point and managerial ownership regions for piecewise linear model that tested the quadratic relationship were derived:

$MO1$ = managerial ownership　　　if MO < 1st turning point
　　　1st turning point　　　　　　if MO ≥ 1st turning point

$MO2$ = 0　　　　　　　　　　　　　if MO < 1st turning point
　　　(MO — 1st turning point)　　if MO ≥ 1st turning point

Tests for sample. As the analysis was performed on a previously untested sample of private businesses, we decided to implement heteroskedasticity and multicollinearity tests. As the most widely accepted Breush-Pegan or White's

heteroscedasticity tests work for linear models only, we performed White's heteroskedasticity test and an estimator for heteroskedasticity-consistent standard errors for piecewise linear regressions, which check the robustness. For the multicollinearity, the variance inflation factors (vif) were calculated. The papers considered earlier did not find any problems when conducting similar research (Al Farooque et al., 2007), however it was necessary to perform the robustness test in order claim the validity of our results.

Analysis of results

DESCRIPTIVE STATISTICS   The para-graphs below describe the patterns of managerial ownership, size and profitability of Baltic private businesses in 2014. When comparing results between the countries, one should note that Lithuania had a sample size five times smaller than Latvia or Estonia, because private enterprises in Lithuania are not obliged to disclose their owners to the state registry, if they have more than one shareholder (The Government of the Republic of Lithuania, 2003). On the other hand, many large Lithuanian companies still do due to the benefits of disclosure. This makes our data biased towards larger companies.

Graph 1 indicates that Estonia and Latvia had similar means of mana-gerial ownership: 65% and 62% respectively, and the same median of 100%. Lithuania had an average MO of 26% and a median of 0%. The distribution of MO was skewed negatively for Estonia and Latvia and positively for Lithuania. The total mean ownership of managers in the Baltic states was 60%, while the median was 100%. This average was much higher than in previous studies, which used the samples of public companies: 10.6% (Morck et al., 1998); 30% (Cheng et al., 2012); and 12.87% (McConnel & Servaes, 1990). When companies completely managed by the owners were excluded, the average of MO was 21%. In Estonia and Lithuania, the average number of directors and board members is higher than the total average of 1.70 (EE — 1.86, LT — 1.72), while in Latvia it is lower (1.56).

Lithuanian businesses had the highest mean of revenues and total assets (9,397 thousand USD and 6,747 thousand USD, respectively), while in Estonia and Latvia the mean of revenues was 2,449 thousand USD and 2,490 th. USD, respectively, and the mean of total assets was 2,605 thousand USD and 2,105 thousand, respectively. The total mean of revenues and total assets of private Baltic businesses were 3,165 thousand USD and 2,776 thousand USD, correspondingly. Data was positively skewed towards large private businesses as only 13% of the sample companies had revenues and 12% had total assets equal or higher than the total average.

The mean lacks representation power when an issue of outliers exists, therefore, the median was chosen to characterise the profitability

Figure 1. Patterns of Managerial Ownership, Size and Profitability of Private Baltic Enterprises in 2014 are presented using a revenue threshold of 121,410 USD
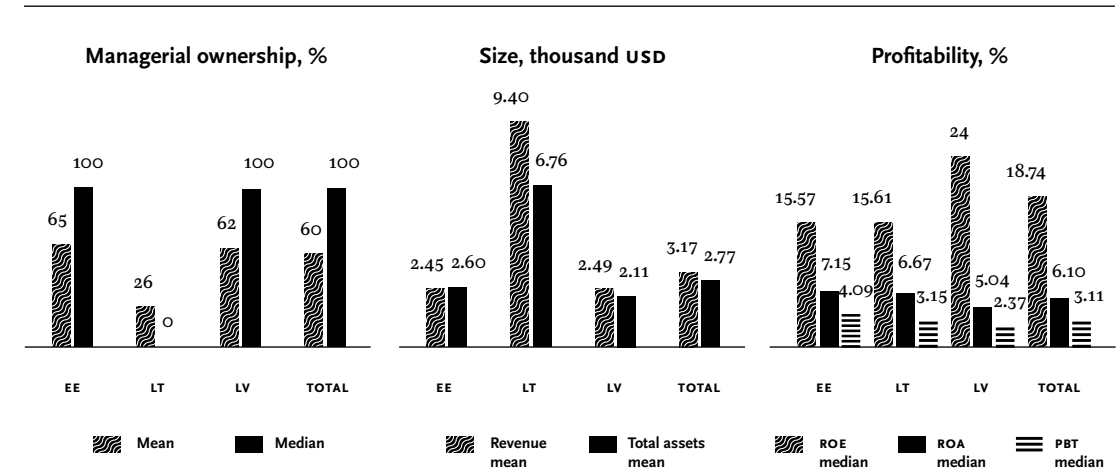
Extracted from *Orbis* database. (Created by authors)

of private Baltic companies. Returns on equity in Estonian and Lithuanian firms were below the total median of 18.7% (EE — 15.6%; LT — 15.6%), while in Latvian companies it was significantly higher (24.0%) (Figure 1). A notably high median ROE of Latvian enterprises might be explained by firms being highly leveraged in our sample (median of 0.72), thus, financed by a smaller percentage of equity. However, high leverage is associated with an increased risk of bankruptcy in non-financial companies. That is why Latvia had the lowest PBT margin in 2014. Meanwhile Estonian enterprises have generated the highest ROA (7.2%) and the greatest profit margin (4.1%) in comparison to Lithuania (ROA — 6.7%; profit margin — 3.2%) and Latvia (ROA — 5.0%; profit margin — 2.4%) (Figure 1). The median of the debt intensity of private Baltic enterprises was 0.57. Estonian businesses were the least leveraged (0.43), while Latvian companies were the most leveraged (0.72). Lithuanian firms had a debt intensity of 0.51.

While performing additional calculations from the available ownership data, we found that 23% of Estonian, 22% of Lithuanian, 18% of Latvian and 21% of all the private Baltic businesses were not managed solely by individu-als but also companies. These conclusions were derived from 22,308 Estonian, 5,186 Lithuanian and 25,282 Latvian private companies, which had reported their ownership structure and had revenues higher than 121,400 USD.

7 sectors were analysed: mining; construction; manufacturing; transport, communications, electric, gas, and sanitary service; wholesale trade; retail trade; and services. Services and wholesale trade sectors had the largest number of companies observed, while retail trade and mining had the smallest number. In all sectors except mining, according to the mean and median of MO, the owners managed at least half of the companies. The highest concentrations of managerial ownership were observed in construction, wholesale trade and retail trade sectors. Manufacturing, wholesale trade, and transportation, communications, electric, gas, and sanitary service sector firms generated the highest median revenues while companies in transportation, communications, electric, gas, and sanitary service, manufacturing, and mining sectors were the largest in terms of median total assets. On the other hand, construction and services sectors have generated the biggest return on equity, 22.95% and 23.34% respectively, as well as return on assets, 8.04% and 7.42% correspondingly. The mining sector had the lowest ROE while the retail trade sector had the smallest ROA ratios (ROE — 13.67%; ROA — 3.00%). The mining sector was the most profitable in terms of profit margin of 8.76%, while retail trade had the lowest median profit margin among other sectors (0.96%). The highest level of debt on average was held in the transportation, communications, electric, gas, and sanitary service; retail; and wholesale trade sectors (0.62; 0.79 and 0.62) while the mining sector was the least leveraged (0.42). The services sector had the highest percentage of companies not managed solely by individuals but also entities (29%).

We found that the highest level of profitability was reached when MO was between 95–100% and 5–10% (for ROE); 95–100% and 15–20% (for ROA); 80–85% and 10–15% (for profit margin). Managerial ownership levels, which were held by the biggest number of companies, were 95–100%; 0–5% and 45–50%. It is also suggested that the firms in which managers hold up to and including 50% of the equity were more profitable in terms of all three measures than those which had managerial ownership from 50 to 95% (including 95% but excluding the best performing level of MO which was 95–100%). In the first case the firms did better by 23%, 5% and 9% measured by medians of ROE, ROA and profit margin, respectively.

Graph 2 indicates that ROE, ROA and profit margin were fluctuating frequently, when MO levels were changing. Profit margin was decreasing steadily, when MO was increasing from 10 to 45%. It is noticeable that all profitability measures increased sharply at the very high MO levels (90–100%). Moreover, it is visible that ROE and ROA, when MO is from 0 to 50% are relatively higher than when MO is from 50 to about 85%. It was noted that level of MO was negatively correlated to companies not solely managed by individuals but also other firms (−0.65). Profitability measures were positively related to each other: ROE and ROA (0.64) as well as profit margin and ROA (0.50). ROA

Figure 2. Patterns of profitability and varying level of Managerial ownership of private Baltic enterprises in 2014 are presented using a revenue threshold of 121,410 USD
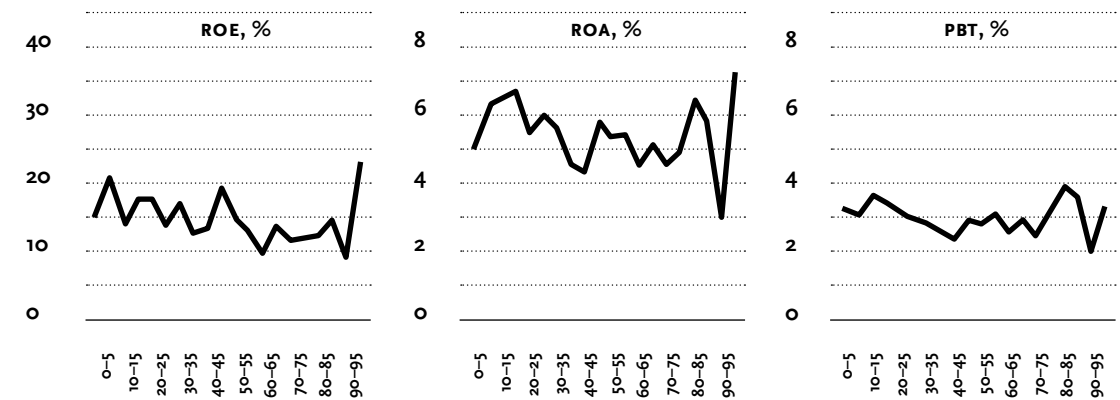
Extracted from *Orbis* database. (Created by authors)

was similarly correlated with managerial ownership (0.083) as noted in other studies (Demsetz & Villalonga, 2001; Cheng et al., 2012).

CUBIC RELATIONSHIP   *Nonlinear regression.* Table A.1 shows the results of a nonlinear cubic regression that have been performed to find the turning points and relationship directions. Although all three models were statistically significant (p-values associated with the F-statistic were used), the main variables within the models were not always significant. All three performance equations confirmed our expectation that manager's high equity stakes can positively affect the overall performance of a firm, however, only one of them proved the same effect at low MO level. Two out of three models showed statistically significant results indicating that intermediary managerial ownership level provokes managerial entrenchment.

Winsorized ROA regression estimated statistically significant results for almost all regressors, with the only exception being country dummies that are equal to 1 if business is from Lithuania or Estonia. The binary variable for Latvia was excluded intentionally to avoid multicollinearity. This regression presented almost twice better R-squared (0.0864) compared to the models, where ROE or PBT margin were used as proxies for performance, which implies that out of three measures return on assets explains the relationship between performance and MO the best. A firm's value

first increased, then decreased and afterwards rose again when manage-
rial ownership grew from 0 to 21.94 %, from 21.94 to 64.15 % and from 64.15 %
upwards, respectively. This is consistent with both management incentive
effect at low and very high levels of ownership and entrenchment hypoth-
esis at medium levels of managerial equity holding. The main difference
between a positive effect of MO at low and high equity stakes was the mag-
nitude of the impact. After the upper level of managerial ownership was
reached, the effect remained positive but at a substantially lower level. As
managers' equity stakes rose beyond 64.15 %, we detected an upward rate
of 0.00002 % for every 1 % increase in managerial ownership compared to
0.0903 % that was observed in the first region. The negative impact was
almost negligible as every percentage rise in MO between 21.94 and 64.15 %
had a corresponding decrease in ROA by 0.0027 %. The regression also pre-
dicted that an increase in the variable $NumDir_i$ has a negative impact on
an enterprise's performance (−2.57), which probably comes from the loss
of governing efficiency. An almost identical effect was observed for a bina-
ry variable $CompOwn$, which is equal to 1, if there are firms or institutions
among company's shareholders.

The same regressions were performed for a sample without Lithuanian
firms, which, due to different country legislation requirements, were under-
represented in our dataset. We observed slightly lower significance, howev-
er, the results and main conclusion in those regressions were the same. The
relationship pattern did not change and almost all coefficients were identi-
cal. Therefore, we chose to interpret our models without excluding Lithua-
nian firms.

Robustness of the model. As previously, a similar sample of private Baltic
enterprises has not been used, before proceeding to general conclusions, we
first ran heteroscedasticity tests for the linear model. White's test showed
that in all three piecewise models error terms might have a relationship with
independent variables. Therefore, models might suffer from heteroscedas-
ticity. To reduce the impact of it, White's hetero consistent standard errors
were used. This did not change the coefficients of independent variables,
however, it adjusted the standard errors, which directly impacted student
t-statistics.

As the second set of tests (piecewise linear regression models) were
used only to check the robustness of the cubic model and to obtain turning
points, we did not interpret each measure and rather focussed on drawing
general conclusions from these tests. The tests showed that the magnitude of
every variable has changed, nevertheless, each variable confirmed the same
direction of MO and performance relationship at distinct managerial own-
ership regions. Even though piecewise linear regressions lack significance

to prove the robustness of the relationship, it presents the same pattern of
non-linearity as in our core model.

As indicated in the methodology, we also constructed a quadratic
model and a piecewise linear model, allowing for one change, to test whether
the relationship between our main dependent variable (ROA) and MO could
be quadratic rather than cubic. Comparing cubic and quadratic models, it
turned out that they had almost identical R-squared values, however coef-
ficients from the latter were less significant. The curvilinear relationship
changed the direction at a lower ownership level compared to its cubic coun-
terpart. The 20.99 % inflection point was considerably lower than the ones
found in the US samples (McConnel & Servaes, 1990) and datasets of French
firms (Severin, 2002). Even though the negative effect from 0 % of ownership
till 20.99 % that could be related to management entrenchment was insignifi-
cant, a positive incentive driven impact was found. A number of directors
and debt intensity still pushed firm's value downwards, however, at a lower
rate than observed at winsorized return on assets cubic regression.

In ROA robustness check (piecewise linear regression) the justifica-
tion for negative impact of MO at a lower than 20.99 % level was weak and
insignificant. The opposite and statistically significant situation was pre-
dicted for ownership stakes beyond this point. In conclusion, both the
quadratic model and its robustness test indicated that the relationship
between managerial ownership and firm performance clearly did not fol-
low the quadratic terms.

Our variance inflation factors confirmed that cubic models did not
suffer from serious multicollinearity. All coefficients except for manageri-
al ownership and its squared and cubic counterparts were lower than 2.08.
High vif for *MO, MO2 and MO3* are caused by the inclusion of managerial
ownership products (powers to allow for nonlinearity).

Reverse causality. This paper does not examine whether managerial
ownership is affected by the performance of the company, thus, reverse
causality case is not analysed. Previous studies claim that managerial
ownership can be affected by performance mainly because (1) managers
adjust their shareholdings due to performance expectations (Demsetz &
Villalonga, 2001); (2) managers receive stock based compensation or
exercise their stock options, if the company performs well (Demsetz &
Villalonga, 2001; Cho, 1998; Hughes, 2007); (3) higher separation of cash and
control rights are due to poor company performance expectations (Lins,
2003). Even though theoretically executives can be compensated with
stock or stock options in the Baltic markets, such practise is not com-
mon (Dauksaite, 2009; Verseckas, 2015). Firstly, legislative limitations and
lack of regulation demotivate firms to consider equity compensation as an

incentive system in Baltic firms. Practical implementation is often questioned and there exists a strict taxation system on stock option profits, especially in Lithuania, which is far from efficient comparing to Western countries (Kreston International, 2016; Zeimantas, 2013). Secondly, in private companies the value of the stock is ambiguous and shares are illiquid. To evaluate the stock a company must perform a stock valuation, which for smaller companies turns to be an expensive option. The accuracy of this valuation is also questionable, because in small markets such as the Baltics there might exist little comparison in the sector due to small industry size (Rimas, 2009). This ambiguity hardly motivates a manager to take an interest private company stock. What is more, a manager might be not able to sell the stock and in this way earn his compensation, unless the other shareholders agree to buy the shares. These reasons suggest that managers in private Baltic businesses rarely get stock or stock options as a compensation or incentive if a company performs well. Even if there are some cases in Baltic private companies when managers are compensated with stock or stock options, ROA, ROE and PBT margin, computed for 2014, will influence managerial ownership only in the following years but not in year 2014 itself, the managerial ownership data of which was at our disposal. Because the private firms' market lacks liquidity, the managers are not able to adjust their shareholdings frequently and according to the expected company's performance, which is possible for public company shares owners. Therefore, no evidence would suggest that a severe reverse causality issue could be present in our dataset and in private Baltic firms generally.

We would also like to note, that even if we choose to address the reverse causality, having in mind limited data availability the only option would be to construct simultaneous equations models using instrumental variables. In the literature, the method is criticized for its inability to find strong instruments, which would affect managerial ownership but not performance (Himmelberg et al., 1999; Bohren & Odegaard, 2004). Therefore, 2SLS coefficients derived from a simultaneous equations model might be inaccurate due to weak instrumental variables and would not add clarity towards OLS regressions, which we use as our primary model. We suggest the readers of our research to consider the possibility of reverse causality in the observed relationship; however, we claim it is not likely to be present.

Discussion of results   This paper attempted to analyse the relationship between managerial ownership and private enterprise performance in the context of Baltic countries. At the outset, we discuss the Baltic corporate governance environment and then concentrate on answering the hypothesis and the research question.

The current study highlights some features of the Baltic corporate governance system. Initially, relatively high mean and median of managerial ownership show that private Baltic businesses are mostly run by their founders or founder's family members. Secondly, ownership concentration is predominant, as in our sample the average number of shareholders is only 2. Thirdly, despite the fact that in Lithuania, private companies are allowed to choose to have either General Meeting or Board of Directors; in Estonia and Latvia businesses are obliged to have a Board of Directors (Baltic Legal (n. s.); Siems & Cabrelli, 2013; Mazanti-Andersen et al., 2008), and the number of board members or managers rarely rises above 1 (average 1.70). Therefore, concentrated governance is prevalent in the Baltic private businesses, which mainly can be explained by the small size of Baltic companies.

Descriptive statistics analysis reflects that companies rarely become shareholders of private Baltic businesses, which can be explained by the reluctance of the founders to sell a part of their business to outsiders (companies, funds, foreigners). Another explanation could lie in the fact that currently businesses are not attractive to corporate investors (e. g. almost a half of companies in our sample provided services; businesses generated small revenues). The Baltic countries lack fresh startups, which could catch the eye of institutional investors, especially the foreign ones. Additionally, the Baltic market is relatively small, according to the average revenues and total assets private Baltic businesses are twice less the boundary of micro enterprise of the EU (The European Commission, 2015). Therefore, the Baltic private businesses generate only a tiny portion of total revenues of private EU businesses, which is due to the small size of the Baltic countries and less developed infrastructure.

During the sample gathering, several interesting facts were observed regarding corporate governance differences within the Baltics. Ownership data for Lithuanian companies was very scarce compared to Latvian and Estonian data. In our sample, Lithuanian mean and median MO values highly differed. The possible reason for such anomaly might be the fact that private enterprises in the largest Baltic country are not obliged to disclose their equity owners to the state registry in case there are more than one shareholder; therefore, only large companies tend to present ownership structure voluntarily (The Government of the Republic of Lithuania, 2003). We believe that such regulation harms the overall quality of corporate governance, because only the listed or larger unlisted enterprises that seek additional financing currently are interested in disclosing such information. Moreover, as defined by the Baltic Institute of Corporate Governance, one of the main aims of private sector enterprises should be to defend the rights of shareholders (Baltic Institute of Corporate Governance, 2011); however, there is apprehension that such protection cannot be

assured and monitored by regulators when the ownership information does not reach the state registry.

Furthermore, results from the regression analysis showed that having more directors and board members in a company reduced the performance of private Baltic businesses, which most likely could be associated with the loss of efficiency in governing. Debt intensity was found to harm companies' profitability ratios. Even though leverage is associated with increased efficiency of the business, in our sample companies, which have more debt tend to perform worse. It suggests that the burden of repaying debt obligation and strict requirements posed by banks or other lenders outweigh the positive leverage effect on performance. Size affected company's profitability positively. The growth of a company is usually associated with gaining bigger market shares in the industry, thus having more constant revenues, exploiting the advantages of economies of scale, establishing a trust among suppliers and many other advantages which benefit a firm's performance.

The first hypothesis is confirmed. We conclude that MO affects a firm's ROA nonlinearly. When managers own up to 22% of equity, ROA is affected positively, and every percentage increase in MO improves ROA by 0.0903%. This might be associated with the owner's decision to bring professional managers to daily business operations. Such actions benefit company performance and boost manager motivation, since owners are willing to share up to one fifth of equity. On the other hand, ROA starts to diminish, when management owns from 22 to 64% of total shares. Paulius Martinkus, the president of Baltic Institute of Corporate Governance, claims it is unlikely that a professional management would own that much equity in private Baltic enterprises. Therefore, such shareholding most probably indicates that a manager is also a founder or founder's family member. We believe that due to historical reasons Baltic private businesses, managed and controlled by the older generation, lack trust to share or give up control, including management, external investors, etc. The practice shows that such manager-founder not always has up-to-date knowledge how to manage a company the most efficiently and continue its growth (Martinkus, personal communications). Therefore, decisions a manager-founder makes can be less sophisticated, creative or sensible than the ones of professional management, which would result into slowdown of growth or even a decrease of firm's performance. Due to historic reasons and because comparing to other European countries, companies in the Baltic states are much more risk averse (Noreika, 2004), managers-owners are often entrenched and keep business from the opportunities, which can be brought by professional managers. Finally, when a manager owns more than 64% of equity, ROA starts to increase again, however, almost negligibly, as for every 10% increase in managerial ownership ROA

rises only by 0.000214%. We interpret the negligible improvement in ROA as a result of increased governance concentration, which, according to our data, is more efficient. It suggests that a growing number of directors affect ROA negatively and it is a case that the average number of directors when MO is from 0 to 64% (1.92) is slightly higher than in 64–100% range (1.52). To sum up, we are able to prove the first hypothesis.

We also confirm the second hypothesis. Even though Baltic managers need more equity to get entrenched (22%), compared to their counterparts from developed countries (17%), the entrenchment spread (42%) is much wider than in the US (Morck et al., 1988), the UK (Short & Keasey, 1999) and even slightly higher than in Spain (Miguel et al., 2004). This clearly shows that entrenched managers in developing countries can enjoy their benefits of control substantially longer than in the developed states. The possible reason lies in a weaker corporate governance system, which requires significant improvement. Firstly, since MO average in private Baltic firms is very high (59.76%), better minority shareholders protection should be guaranteed to secure their wealth from entrenched managers. Secondly, legislation should be improved significantly not only to ensure equal representation of minority shareholders but also by adding more consistency. For example, Lithuanian enterprises are based on Nordic corporate governance model; however, some enterprises implement characteristics common to German corporate governance system. Therefore, we believe that by clearing out those inconsistencies, more conflicts between managers and owners as well as managers and board of directors could be avoided. This would clearly help to reduce the higher management entrenchment spread in Baltic private businesses compared to public companies in US, the UK, Spain and, most likely, other developed countries.

The confirmation of the third hypothesis is based on analysis of descriptive statistics. We observed that all profitability measures had a tendency to increase sharply at very high managerial ownership levels (90–100%) (Figure 2). In fact, the best performing companies in terms of median ROE and ROA were the ones, which had managerial ownership of 95–100%. This provided a strong evidence that 100% or very high ownership of the manager would mean that a firm's value has reached its maximum, because there is no separation of ownership and control (Ruan, Tian & Ma, 2009). Such pattern is consistent with a research, which uses the sample of German private firms (Mueller & Spitz, 2002). The acceptance of the third hypothesis would confirm the convergence of interest hypothesis. However, the second biggest ROA ratio and relatively high ROE and PBT margin are also reached at 15–20% managerial ownership levels. As previously mentioned, it could indicate the effect of professional management. An interesting point — the average revenue of firms, where MO is between 95–100% and 15–20%, is 1,088

thousand and 4,278 thousand USD, respectively. Therefore, we can assume that large companies already understand the importance of professional management and thus, very high managerial ownership is unsustainable while the company grows. Even though a manager-founder has right skills to build a business, to maintain it and tolerate higher levels of risk when a company grows, professional management should be hired.

The above-mentioned findings lead to a conclusion that the link between performance and managerial ownership of private businesses within the Baltic states tends to be non-linear. At low and high levels of MO, firm's performance measured by ROA improves, which is consistent with incentive and convergence of interests theory and worsens at intermediary levels of MO, which is in line with entrenchment hypothesis. It might be summarized, that professional management boards are vital for a company's success as the firms grow. In fact, the ability to separate managers from the main or founding shareholders, which is evident in many developed countries, is an indicator of corporate governance advancement (Martinkus, personal communications).

LIMITATIONS OF THE STUDY.　　Performing the research, we encountered several limitations that should be considered by readers when comparing this paper with other studies and applying our results.

One of the main limitations of this study is the quality of data extracted from the *Orbis* database. *Orbis* collects information from national registries, and we are not able to check the reliability of data using publicly-available alternative databases. The financial information about the companies from the three Baltic countries in many cases was very outdated. *Orbis* database still contained companies that had the last update in the previous millennium, and these firms were eliminated from the sample. An especially weak sample seems represent Lithuania, as only 3.8 % of the whole population satisfied our sample criteria (comprised information about their ownership structure and financial data up to date). Finally, as we extracted only active companies, our data has a survivorship bias. Despite all those negative effects, we shaped the dataset in a way that the obtained results would be comparable with other studies by accounting for outliers and getting rid of a large portion of inaccurate data. Due to data source constrains, we were able to employ only cross-sectional research design and did not test the relationship over time, thus, the results might be biased by the specifics of the chosen research year. However, the longitudinal research design is not necessarily superior over the cross sectional one in Baltic private company context, because due to inactive incentive system based on stock or stock options and illiquidity of private company shares, managerial ownership does not vary much over time (Kaserer & Moldenhauer, 2008).

The study focus is on businesses that are larger than micro enterprises (revenue higher than 100,000 EUR); therefore, generalisation of the results for all companies in the Baltic states should be made with prudence. Adding the rest of the companies might affect the skewness of the distribution of MO, as there would be a significantly greater number of small entities that are solely managed by the owner.

Conclusions

The majority of papers in the research field of managerial ownership analyse the biggest world markets and leave small and still developing countries underresearched. Moreover, the results highly differ among the existing studies, thus, leaving the discussion regarding the ways to improve corporate governance still open. We aimed to fill the gap in the literature and present an up to date and novel Baltic managerial ownership research, which could serve as a guidance for Lithuanian, Latvian and Estonian entrepreneurs, as well as the governments.

The proposed research question "*What effect does managerial ownership have on the performance of private businesses within the Baltic states?*" was answered, as follows. We found that managerial ownership impacts company's performance nonlinearly. The relationship tends to follow the cubic form, when the performance firstly improves, then diminishes and afterwards increases again, while manager's equity stake grows. We would like to emphasize the importance of the first region of this relationship, which appeared to have the strongest effect. Enterprise performance can benefit from a decision to bring professional management to a private company and motivate it by transferring up to one fifth of ownership to them. In other words, professional management boards, who are also partial owners of businesses are vital for a company's success as the firms expand.

Appendix A. Results from regressions

Table A.1. Results from regressions while testing a cubic relationship

Regression	A	Regression	B
No. of observations	47,485	No. of observations	47,485
Variable	ROA	Variable	ROA
MO	0.0903 (0.043)**	$M1$	0.0337 (0.224)
MO^2	−0.0027 (0.027)**	$M2$	−0.0193 (0.353)
MO^3	0.00002 (0.009)***	$M3$	0.0790 (0.000)***
$NumDir$	−2.5716 (0.000)***	$NumDir$	−2.5960 (0.000)***
DI	−7.6324 (0.000)***	DI	−7.6341 (0.000)***
Δ	−2.6139 (0.000)***	Δ	−2.6154 (0.000)***
$Size$	0.8839 (0.000)***	$Size$	0.8805 (0.000)***
$Industries$	All significant	$Industries$	All significant
$Countries$	All insignificant	$Countries$	All insignificant
$Constant$	13.4450 (0.000)***	$Constant$	13.5033 (0.000)***
$Turning\ points$	21.94% 64.15%	$Turning\ points$	21.94% 64.15%

F-statistics tests the null hypothesis

	299.21 (0.000)		79.08 (0.000)

Regression summary statistics

R^2	0.0864		0.0863
Adj. R^2	0.0861		NA

(Created by authors)

The table summarizes (A) the results from a nonlinear (cubic) OLS regression and (B) the estimated coefficients obtained from the regressions with White's heteroskedasticity consistent standard errors:

The table reports the estimated coefficients obtained from the regressions with standard errors. The model used: $Performance_i = \alpha + \beta_1 MO_i + \beta_2 MO^2{}_i + \beta_3 MO^3{}_i + \beta_4 Size_i + \beta_5 DI_i + \beta_6 NumDir_i + \delta_i + \lambda_i + \upsilon_i + \varepsilon_i;$

The model used: $Performance_i = \alpha + \beta_1 M1_i + \beta_2 M2_i + \beta_3 M3_i + \beta_4 Size_i + \beta_5 DI_i + \beta_6 NumDir_i + \delta_i + \lambda_i + \upsilon_i + \varepsilon_i;$

Standard errors (in parentheses below the coefficients) and F-statistics (with p-values in the parentheses below, R^2 and adjusted R^2 are calculated by running an OLS regression. (1) * indicates a 10% significance level, (2) ** indicates a 5% significance level, (3) *** indicates a 1% significance level of the estimated coefficients.

Foreign direct investment: Boost or hindrance to Latvian international trade

Diana Karhu, Alesia Nikalaichyk

Despite solid theoretical background stating that FDI substitutes international trade, empirical research often finds complementary effect between them. Furthermore, empirical evidence on the countries of Eastern Europe remains scarce. We try to solve the puzzle of FDI-trade relationship for the case of Latvia (following Türkcan, 2006) by assuming different FDI effect on trade of final and intermediate goods. We find that both inward and outward Latvian FDI complement the total Latvian exports as well as exports of final and intermediate goods separately. Therefore, it may be beneficial for Latvia to encourage FDI flows even further. Results for imports are weaker and may reflect low inward FDI manufacturing profile. Results are robust, if we exclude offshore jurisdictions from our sample of countries. It takes about five quarters for both types of FDI to be reflected in Latvian trade.

Introduction

Foreign direct investment (FDI) — an investment made into a foreign enterprise with the intent to have a control stake/a management position in that entity (UNCTAD, 2013). Due to absence of capital controls between the EU members, relatively cheap labour, high economic growth and one of the lowest corporate income tax rates among the EU countries, Latvia is an attractive destination for foreign investors. Attracting FDI to a country may be beneficial due to a variety of reasons: transfer of technology, promotion of domestic competition, human capital development, contribution to corporate income taxes, etc. (Loungani & Razin, 2001). Latvian government has been consistently interested in attracting FDI to Latvia, and its inward FDI has been on the rise since entering the EU (LIAA, 2016). Outward FDI may have a positive impact on a source country as well. Among other benefits it may promote presence in new markets and faster market entry, provide economies of scale, and retain competitive advantage in terms of low cost inputs and cheap labour source (Aml et al., 2011).

Nevertheless, encouraging inward and outward FDI may not necessarily be beneficial. For example, outward FDI leads to capital outflows, whereas inward FDI may result in adverse selection costs, corporate failures or uneven domestic competition (Loungani & Razin, 2001). One of the popular disputes in the area is FDI influence on foreign trade. There is a number of theories supporting the idea that outward FDI reduces (substitutes) international trade, meaning that FDI is used to expand a firm's reach to markets over national boundaries (horizontal expansion), and to produce and trade goods there rather than to export from the home country.

However, the empirical findings are mixed. The most popular finding in the empirical literature is that FDI and trade reinforce (complement) each

other. There are three main types of the empirical studies: the ones that use trade flows on (1) country, (2) industry, or (3) product level data. Mixed results were obtained on the first two levels of aggregation, and practically no attempts have been made to use bilateral product level flows in their analysis. Türkcan (2006) explains the inconsistency in FDI — trade relationship's findings (FDI-trade puzzle) by different FDI impact on final and intermediate goods. He bases his idea on the presence of different FDI motives — horizontal and vertical FDI expansion. Vertical FDI is the FDI performed by Multinational Enterprises (MNEs), which by definition, reach new destination markets or fragment production process and achieve competitive advantage (Dunning & Lundan, 2008). MNEs conduct business on a multinational scope to separate stages of production among several countries according to cost implications (comparative advantage) (Radulescu, Druica & Omran, 2012). Such investments may not necessarily reduce trade flows, but rather enhance trade in intermediate goods (Türkcan, 2006).

We believe that Türkcan's findings are relevant and interesting as MNEs play a significant role in the global economy, and substantially contribute to the process of globalization. There is an increasing number of research on the topic of MNEs and their role within the economy (Dunning & Lundan, 2008). Also, as it is shown in the theoretical overview, recent theories that connect FDI and trade also focus on the separation into horizontal and vertical motive for FDI to reflect global value chains. In addition, the reduction of trade barriers and transportation costs, and improvements in communication technologies facilitate complex distribution networks and allow taking advantage of any differences in factor endowments between countries.

However, we find it puzzling that after Türkcan (2006) nobody has chosen to come back to his idea of how an economic puzzle of FDI and trade linkages can be explained. We hypothesize that among the reasons for that could be the unavailability of intercountry bilateral product level data, no consensus on product classification into final and intermediate goods, or difficulties in distinguishing between different FDI types. Moreover, we consider the methodology in his paper to be not thorough enough.

The theory on FDI-trade relationship is interesting for policy implications as it may show whether the means of attraction of foreign capital may help or harm foreign trade.

As many papers have been written since then, with various new methodologies developed, and mixed results on the FDI impact on exports and imports are still being obtained, we decide to come back to Türkcan's idea of a product level study and try to check it on a new methodology and country, taking into account both inward and outward FDI. Additionally, we perform the Granger causality test.

We take Latvia for our study, as it is a country, which attracts and makes much FDI; whose government is implementing measures to encourage FDI in specific sectors; and which trades extensively both in the EU (without capital controls), and with the CIS countries. Furthermore, it is a member of NATO and the WTO, and is seeking to receive the OECD membership. Among other benefits, being an OECD member means compliance with high standard investment protection, improved legal framework, defined business operations standards and investors' confidence, which are likely to attract even higher volumes of FDI (Ministry of Foreign Affairs of the Republic of Latvia, 2016).

To our knowledge, no such studies have been performed for this region. Additionally, there are only a few works that take into account both imports and exports at the same time (Goh, Tham & Wong, 2013; Goswami & Saikia, 2012).

Therefore, we have decided to fill the gap and see how FDI impacts Latvian trade, and whether the impact is different for final and intermediate goods flow. To achieve this, we come up with the following research questions:

TO WHAT EXTENT DOES *OUTWARD* FDI INFLUENCE LATVIAN INTERNATIONAL TRADE (TOTAL TRADE, TRADE IN FINAL AND INTERMEDIATE GOODS)?

TO WHAT EXTENT DOES *INWARD* FDI INFLUENCE LATVIAN INTERNATIONAL TRADE (TOTAL TRADE, TRADE IN FINAL AND INTERMEDIATE GOODS)?

The structure of the research is, as follows. The second section gives a brief overview of Latvian inward and outward FDI, and the measures of their encouragement. The third section contains the review of literature and the main empirical findings about possible FDI-trade relationship. The fourth section on data analysis describes the used data sources, country choice and periods of investigation. The fifth (methodology) section describes the approach used for panel data analysis. The sixth section summarizes the results. The seventh section is a small additional study of the causality between Latvian exports, imports and both FDI types. It is divided into further subsections on data, methodology and results description. Section eight discusses the findings and limitations of the results, while section nine provides the conclusions.

Overview of Latvian FDI   According to Investment and Development Agency of Latvia (LIAA), the inflow

of FDI to Latvia has been rising since entering the EU. Inward FDI stock has reached 11.7 billion EUR by the end of the 2nd quarter of 2014, although, before the crisis, a large part of that inflow had entered the non-tradable sectors (LIAA, 2016). Another trend that appeared with the rise of MNEs is the establishment of foreign subsidiaries according to cost advantages. In other words, companies found it profitable to move labour intensive activities to countries with lower labour costs (Radulescu, Druica & Omran, 2012). Overall, the main factors encouraging FDI inflows included search for new market opportunities in other countries, the advantageous Latvia's geographic location between the EU and CIS, prudent monetary policy; and relatively well-developed infrastructure (LIAA, 2016). To promote FDI further, Latvia organizes bilateral investment promotion and has protection agreements with large partners. Additionally, Latvia is a member of the WTO and NATO, and participates in EUREKA, Horizon 2020 and other programs for research and development (R&D). Also, Latvia tries to implement promotion strategy to attract FDI in manufacturing, specifically in wood and forestry sectors. LIAA implemented the electronic database of real estate to streamline the access for foreign investors. In 2011, a rebate of 15–25% for Corporate Income Tax (CIT) was re-implemented for priority sectors in case investment exceeds 7 million EUR (BalticExport, 2016; LIAA, 2016).

Additionally, investing in business, property or credit institutions in Latvia serves as grounds for receiving a residence permit. For example, in cases when a foreigner invests more than 150,000 EUR in a business entity with more than 50 workers and with annual revenue in excess of 10 million EUR, or when he invests more than 250,000 EUR in real estate (PMLP, 2016). FDI in manufacturing sector, which may have the largest impact on the Latvian real economy, has also been on the rise (0.5 billion in 2006, 1.4 billion by the 2nd quarter of 2014), which comprises 12% of total inward FDI. Still, the largest inflow of FDI is in the service sector (financial intermediation—25%), real estate—13%, wholesale and retail trade—11% (LIAA, 2016).

As of 2011, there were 437 companies where share capital owned by foreigners exceeded 1.4 million (BalticExport, 2016). Looking at the geographical profile of inward FDI, historically most of it has been made from neighboring countries. Recently, the largest amount came from Sweden (22% for the 2nd quarter of 2014), followed by the Netherlands (8%), Russia (6%), and Germany (6%). Overall, in 2013, 69% of inward FDI came from the EU countries (LIAA, 2016).

Absence of capital movement within the EU, and foreign competitive markets encourage outward FDI, as well. There are much fewer options for Latvian government to influence these movements and to keep investments within the economy. Essentially, Latvian government can only promote domestic investment opportunities, making Latvia attractive for

investors and boosting competition; implement prudent and predictable fiscal and monetary policies, protecting new industries; and offer favorable tax regimes. Generally, the OECD report shows that taxes and enforced double tax treaties play a very significant role in the decisions on where to invest capital (OECD, 2008). Double tax treaties, for example, reduce effective taxes payable on profits and often eliminate taxes on repatriated profits, which may stimulate outward FDI (ICAEW, 2016). Latvia has signed 56 conventions and 54 are effective for application (Ministry of Finance of the Republic of Latvia, 2016). According to our dataset, the major target markets for outward FDI are Lithuania, Switzerland, Estonia, Russia, Belarus, and Cyprus.

Literature review　　　This section overviews the theoretical and empirical research concerned with the linkages between international trade and FDI.

OVERVIEW OF THEORETICAL LITERATURE　　　Overall, there are theories in favour of both kinds of relationships, with the earliest models arguing for pure substitution, while those, which account for the division of FDI into vertical and horizontal, allow for the possibility of complementarity. One of the oldest theoretical models is the Heckscher-Ohlin trade model.

The Standard Heckscher-Ohlin (H-O) trade model explains the decision of two countries to trade based on the differences in factor endowments (comparative advantage); limitations are the assumptions of perfect competition and no transportation costs (Feenestra, 2004). Mundell (1957) uses the H-O model's assumptions to show that in theory international trade and FDI function as substitutes, and concludes that eventually FDI would completely substitute exports. There are several extensions of the model, for example, Markusen (1995) expands the H-O by relaxing the assumption of perfect competition. An additional extension of the H-O model by Brainard (1993) is the proximity-concentration trade-off approach.

The proximity-concentration trade-off approach states that in the presence of transaction costs, a firm faces a choice between international trade and FDI. The decision depends on the trade-off between being close to the target market, or focusing the production in one location and benefiting from the economies of scale. The choice between trade and FDI depends on a firm's fixed and transportation costs in the presence of trade barriers (Brainard, 1993).

The productivity approach is based on the discrepancies in the productivity of MNEs. Helpman, Melitz & Yeaple (2003) develop a model that illustrates substitutive relationship between FDI and international trade, where firms choose either to export or invest abroad. The conclusion stems

from the fact that only highly productive firms could afford the fixed costs of setting an affiliate in a foreign market to accommodate a future gain in the form of lower variable costs.

The kind of investment MNEs seek to perform is another approach to distinguishing the relationship between FDI types and international trade. In case of horizontal FDI, firms produce essentially the same final goods in different countries, which might substitute trade. And in case of vertical FDI, firms benefit from the differences in the costs of inputs across various production stages. Vertical FDI is more attributive between developed and developing countries, as it reinforces trade of intermediate goods. With the appearance of increased services trade, some people start to distinguish the third type of FDI, namely, ancillary FDI that is used for R&D and technical support in the form of call centres and other post-sale assistance (Ferragina & Colacurcio, 2015). It is, however, unclear, whether it has any impact on trade between countries. In practice, it is not easy to separate this type of FDI and see its individual impact.

Markusen & Venables (1998) and Markusen (2004) explore market-seeking, i. e. horizontal FDI, which according to them takes place between countries that are close in income, factor endowments and technological progress. It substitutes trade. This is in line with the theory of internalization stating that FDI would function as a substitute under sufficient costs to trade in countries that are relatively close in size and factor endowments. Also, Markusen (2004) finds a negative relationship between skill differences and horizontal FDI.

Vertical FDI could lead to an increasing trade due to the fragmentation of production stages and increasing flow of intermediary trade, as argued by Helpman (1984), as well as Helpman and Krugman (1985). They present General Equilibrium Model presuming that MNEs are vertically integrated companies functioning in the monopolistic surroundings. Thus, companies choose to locate intermediate production abroad based on factor costs and resource endowments. This leads to a larger inter-industry trade between home and host countries. Such kinds of relationships are more likely to occur between developed and developing countries.

New Trade Theory (see, for example, Baldwin & Ottavino, 2001), models both horizontal and vertical FDI motives and allows their coexistence. MNEs engage in FDI due to non-zero trade costs. Baldwin and Ottavino (2001) argue for more complicated interrelations. Market oriented multinational enterprises engage in horizontal FDI, while vertical FDI is suitable for cost optimization. As a result, there is a possibility for both substitutive and complementary relationships.

The knowledge-capital model that combines both types of FDI (see Baltagi, Egger, & Pfaffermayr, 2007; Carr, Markusen, & Maskus, 1998) predicts

that horizontal FDI would most likely occur among countries with similar factor endowments and higher trade costs. Alternatively, FDI can also complement trade indirectly through the influence factor on a foreign market in the form of knowledge capital and reputation. For instance, the presence of MNEs in a foreign market can expand the demand from one product that is produced in the foreign market to an entire line, thus increasing exports (Alguacil & Orts, 2002; Lipsey & Weiss, 1984).

OVERVIEW OF EMPIRICAL LITERATURE   The empirical studies can be separated on the basis of aggregation level. While there are a lot of papers on country level, there are fewer works on industry level and only a few that differentiate trade by firms or products. Firstly, we overview studies at the broadest level of aggregation—country level, which has been researched rather extensively. Then, we move further down the aggregation to industry level and conclude with the least researched—product level, which is the focus of our paper.

Country level studies. The earliest studies for country level tend to find only complementary relationships, see, for example, Grubert and Mutti (1991), Pfaffermayr (1994) and Clausing (2000). Clausing (2000) uses panel data regressions and implies a gravity-type model for the US exports and FDI with 29 destination markets with and without fixed country effects. He finds strong complementary relationships, highly significant for intra-firm trade. Principally, he proves the complementarity by showing that as multinational activity in the form of FDI goes up, exports decrease. He finds additional evidence in favour of the complementarity by looking at exports versus the costs of multinational activity, proxied by taxes, employee compensation, openness, and distance. Furthermore, he looks at relations between inward FDI and imports, but does not reach decisive results. Barrel and Pain (1997) find positive linkages at country level for the OECD economies except for Sweden, France, the UK, and Germany.

Recent studies employ alternative models, for example, Mitze, Alecke & Untiedt (2009) analyse the linkages between German FDI (inward and outward) and international trade (imports and exports) using a simultaneous equations approach based on the gravity model. They find a substitutive relationship for trade and outward FDI. Additionally, the authors conduct the same procedure for regional data in Germany and find structural differences between West and East Germany. The macro level analysis on international trade and FDI for West Germany versus EU27 reveals evidence for substitutive relationships, while the analysis of West Germany versus U15 reveals complementary relationships. For East Germany, the authors uncover purely substitutive relationships. The results are robust to sub-samples

based on clustering on income per capita level. Tadesse & Shukralla (2013) look at the effects of FDI on horizontal export diversification in 131 countries. Generally, they detect that FDI should increase export diversification; however, there are mixed results regarding the magnitude of the effect.

More recently, there have been a number of papers dedicated to developing countries, as they have started to play a larger role in the proportion of outward FDI. Goh, Tham & Wong (2013) conduct a study for Malaysia using the gravity model and looking at both types of international trade (exports and imports) and FDI (inward and outward). They find that inward FDI complements international trade and is significant for both exports and imports. However, outward FDI does not reveal any significant linkages to trade. The authors assume that this is due to the extensive service sector's influence on outward FDI, and the country being a net capital importer. Radulescu, Druica & Omran (2012) look at Central and Eastern Europe with the focus on Romania and do not find any significant impact of FDI on exports. They conclude that it stems from insufficient local production and other country-specific factors.

Some studies looked at host market characteristics (destination markets) to uncover the nature of relationships in a greater detail. Tadesse & Ryan (2004) find that complementary relationship tends to appear in trade with developing countries. Lee et al. (2009) argue that outward FDI to large developing economies, e.g. China, could lead to lower export levels to small source economies. Falk and Hake (2008) also separate FDI by destination regions and find significant positive linkages for CEE and developed countries (the US, Japan, Canada, Norway, etc.).

Alguacil & Orts (2002) apply an aggregate time-series approach for the Spanish economy, using the VAR and Granger causality models, while controlling for size and trade barriers. They uncover long run complementary relationships in the direction from FDI to exports, but not vice versa; the short run relationships are slightly negative. Dritsaki & Stiakakis (2014) use Granger causality and perform a study for Croatia for the period 1994–2012 on linkages between FDI, trade (exports), and economic growth. To uncover causality, they use the autoregressive distributed lag (ARDL) approach and the Granger causality test. They find that FDI does not lead to economic growth due to a limited influence on exports in the country.

Goswami & Saikia (2012) look at inward FDI and manufactured exports through the vector error correction model (VECM) and find bidirectional causality between the two. They claim that inward FDI makes the host country an export platform due to a certain comparative advantage. Additionally, there are indirect effects, such as boosting productivity of other domestic firms (spillover effects) through knowledge transfer or employees' movement. Namely, they find that inward FDI causes manufactured exports growth that in turn encourages even more FDI.

Industry level studies. At industry level, the results are even more mixed. Marchant et al. (2002) find positive FDI-trade linkage for the US food processed industry. Aizenman & Noy (2006) use the intertemporal approach to uncover relationships between FDI and decomposed trade (manufacturing, foodstuffs, fuel, and metal). They find the strongest relationship for manufacturing sector. By using the Granger causality test, they claim mutual causality between FDI and trade flows.

Falk & Hake (2008) perform a study for the EU15 on exports and outward FDI at industry level, using a causality test. Unlike previous studies, they find that exports cause FDI, and not vice versa. Additionally, they find the persistence of the effect in the long term. However, they do not consider other variables such as GDP and country size.

Ferragina & Colacurcio (2015) investigate FDI effect on trade for Italy by approximating FDI activity by the number of employees in foreign affiliates, and the number of the affiliates. They disaggregate the data to sector level, and find complementary relationships, using a gravity-type model for both exports and imports. The authors conclude that Italy should boost FDI to strengthen their economy. The results are robust to both fixed and random effects models.

Franco (2013) studies the effect of the US FDI on the host countries on sector level. He uncovers spillover effects that enhance the host country's exports intensity, independent of whether the MNE that performed FDI was initially export-oriented or not.

Bronzini (2010) looks at medium to large Italian firms to find linkages among domestic and foreign activities of Italian firms. He compares the performance of firms that export or have foreign affiliates with the firms that only consider doing so. He finds that sales and productivity decrease several years after horizontal FDI was performed. Thus, he concludes that complementary relationships between FDI and trade are more likely. Over the time period of 6 years he tends to find only positive effects.

Product level studies. Finally, there are few papers dedicated to product level. We consider the reason to be the lack of data and the complexity involved into decomposition. Swenson (2004) argues that the findings of positive FDI-trade linkages stem from an overly broad aggregation and should disappear at product level. He looks at the US imports in various manufacturing sectors, and disaggregates FDI into product, industry and overall manufacturing levels. He finds substitutive effect at product and industry levels, but not at the manufacturing level. Building on Swenson's idea, Zarotiadis & Mylonidis (2005) also disaggregate FDI and find complementary linkage only at manufacturing level. They include exports in their study and perform it for the UK.

Blonigen (2001) finds substitutive linkage for Japanese industry of automobile parts and 11 other consumer final products with respect to the US imports. Türkcan (2006) examines the linkages between outward FDI and trade, building on the idea of vertical vs. horizontal type of FDI for the US economy. He divides exports further into final and intermediary goods, and uses a gravity-type equation model. He concludes that disaggregation of trade flows into final and intermediate goods allows for a better understanding of the linkages with FDI. While on the aggregate level, he confirms complementarity, and he finds weak substitutive effects between FDI and exports of finished goods. At the same time, he establishes significant complementarity between outward FDI and exports of intermediary goods, which confirms his hypothesis of vertical motives of MNEs.

Studies for the Baltic states. Finally, we are not aware of such studies being performed for the Baltic states. The closest research on a similar topic for the aforementioned geographic region was made by Fidrmuc and Martin (2011). They conduct a study for Central, Eastern and South-Eastern Europe (CESEE), including all three Baltic states, and assess the effect of large inflow of FDI on growth prospects in the countries. Using the VECM model, they arrive at the opinion that both exports and inward FDI stocks are positively linked to industrial production that leads to higher economic growth. They conclude that the region should aim at encouraging exports and attracting additional FDI.

As a result, no consensus is reached on FDI-trade relations in either theoretical or empirical literature. In this paper, we aim to provide a further look at the puzzle. We expand on the empirical research that performs disaggregation to product level following Türkcan (2006) and Blonigen (2001). However, we employ another methodology, as Türkcan's (2006) version is not completely thorough. The majority of previous studies on product level have been done with respect to the US, while there is no evidence regarding European countries. Also, following the ideas from the recent papers (Goh, Tham & Wong, 2013; Ferragina & Colacurcio, 2015), we include imports and inward FDI as additional explanatory variables to draw more complete conclusions about the effect of FDI on the economy.

Data description

In the paper, we use secondary data compiled from various databases. Firstly, we obtain the data on Latvia's bilateral export and import flows with the rest of the world. The data is obtained from the Central Statistical Bureau of Latvia (2015), in current prices (euro currency). In order to choose a sample of countries for our study, we calculate the total Latvian trade flows (imports and exports) with each country for 2014, and calculate their share in total Latvian trade (imports plus exports) in 2014. We exclude countries with very little or no trade (share of Latvia's trade below 0.2%; 2014 year data). We choose the threshold to avoid outliers, and select the sample of significant trade partners, which represents 96.77% of Latvian trade in 2014. Due to the unavailability of data for the year 2015 at the time of sampling, we have decided to use 2014; and we consider our sample to be representative of the main trade partners for Latvia. We choose 40 countries, the list of which is provided in Appendix A. This is the final sample, and for these countries we download all the subsequent data with annual frequency. We believe that such frequency is optimal for our study as more frequent data may be influenced by seasonal and one-off factors. Moreover, bilateral FDI stock is our limiting factor, for which only annual data is available.

Secondly, we obtain the data on inward and outward FDI stocks for the period 2001–2014 from the Bank of Latvia (2015). We have decided to include inward FDI as well, as its volumes and significance for Latvia are much higher than those of outward FDI. We choose stock data, as it was done in previous works, due to the fact that, once the FDI is made and/or a company is created, FDI continues to influence international trade (complement or substitute) for subsequent years. If one uses flow data, it is unclear how many lags in FDI one should take in order to trace its impact on this year's trade flow. It is, therefore, reasonable to expect a change in trading activity with an increased country's FDI stock (Tadesse & Shukralla, 2013; Falk & Hake, 2008).

The data on countries' GDP (in current prices) and GDP per capita (in current prices) is obtained from the International Monetary Fund (2015). Due to the unavailability of data in euro for all countries at the *Eurostat*, we decide to obtain the US dollar GDP indicators, which we convert to the euro using the yearly average EUR/USD exchange rate from the *Eurostat* (2015). Such a method of conversion was previously used in Ferragina & Colacurcio (2015). We use all variables in current euro, as later on we remove exchange rate and inflation effects in our regression, normalizing our variables by Latvian GDP (in current euro).

We followed Türkcan's (2006) methodology to calculate real exchange rate (RER):

$$RER_{foreign,t/lv,t} = E_{foreign,t/lv,t} \times \frac{CPI_{lv,t}}{CPI_{foreign,t}} \quad ①$$

Here, $RER_{foreign,t/lv,t}$ stands for the real exchange rate between Latvia and a foreign country at the time t, $E_{foreign,t/lv,t}$ stands for the nominal exchange rate between the countries at time t, and $CPI_{lv,t}$, $CPI_{foreign,t}$ stand for Latvian and foreign consumer price indices correspondingly at time t. The

data on bilateral average yearly exchange rate (*E*) is mostly obtained from the *Eurostat* (2015a, 2015b). For some countries we refer to the relevant National Banks. We define the exchange rate as a nominal exchange rate expressed as the number of units of foreign currency per unit of home currency. Home currency is either the lat or the euro, depending on the year; foreign currency is a country's currency in circulation in the same year. We take the national currency each year for calculations to make RER a proper measure of competitiveness. The consumer price index (CPI) indicators that measure inflation are obtained from the International Monetary Fund (2015).

The data on the distance between countries is taken from Distance Calculator.net (2015) and is calculated as the direct distance between capitals, also known as the Great-circle distance. The method was previously used by OECD (2006) for Gravity model type research.

We take the period from 2001 to 2014, as at that time the European Union has already been established and there were no significant changes in the trade barriers of Latvia with other countries. We add dummy variables for countries, which are the EU members in each year. For countries, which entered the European Union in the middle of the year (e. g. May of 2004), we consider this year as a year of membership. The reason is that the decision of letting a country in is usually made before the first day of actual membership and several contracts, large trade orders might have been already concluded by that time. After dropping zero values we obtain 349 observations for our regressions for exports and imports each.

Methodology

As it was previously mentioned, there were numerous studies on the impact of FDI on trade flows with mixed results obtained on various levels of trade flow aggregation. To our knowledge, no works, however, have attempted to employ the proposition of Türkcan (2006) to use bilateral product level trade flows in their analysis. There is one earlier research by Blonigen (2001), but he uses several specific consumer products only, which makes his sample incomplete. As it was mentioned, Türkcan (2006) considers that the economic puzzle of inconsistent linkages between trade and FDI is, to a certain extent, resolved through separating the flow of export into sub-samples of final and intermediate goods. Complementarity between FDI and trade is therefore uncovered using exports of intermediate goods, while the substitution, in its turn, is uncovered using final goods. Other studies on broader levels of aggregations have been conducted adopting new various methodologies, and mixed results are still procured. We choose to return to Türkcan's idea of conducting a product level study and re-attempt it on a recently developed methodology. We firstly regress the total bilateral flows (exports/imports) on

FDI, checking the complementary or substitutionary effect between them, and secondly, regress bilateral flows in final and intermediate goods on FDI separately, aiming to establish the effects like Türkcan (2006) did. However, we use another country and employ the updated BEC classification scheme.

To separate trade flows of final goods from the intermediate ones, we employ several classification schemes. One of them is the revised United Nations Classification by Broad Economic Categories (BEC) scheme (OECD, 2011). The new version gives a more precise classification, separating a new group — capital goods, which were previously included into one of the existing categories. We have decided to omit them from our regressions of final and intermediate goods, as there is no straightforward economic theory explaining FDI impact on them, and also because they are usually not traded frequently. We use another classification scheme obtained from agricultural statistics by European Commission (2015), which helps us to precisely classify agricultural products by code into final and intermediate ones.

After we classify each product into one of the groups, we aggregate them into bilateral final and intermediate goods trade flows, and use for the subsequent panel data regressions analysis. As a result, we arrive at three categories: final goods flow, intermediate goods flow, and total flows of international trade (exports or imports). However, it should be noted that the total trade flows are not a sum of final and intermediate goods flows due to statistical database adjustments, categories that we omitted from classification, and capital goods (e. g. machinery) that in BEC scheme is a separate category, and thus cannot be characterized as either final or intermediate goods.

For panel data regressions we employ the extension of the Gravity model, one of the most well recognized and widely used models for analyzing trade flows between countries. In this paper, we lean to a large extent to a new model specification, developed by Ferragina & Colacurcio (2015) in their recent paper on Italian exports and FDI on industry level. As their specification is perfectly suitable for panel regressions on different levels of exports aggregation (country, industry or product level), we decide to use it for the product level analysis and see whether the proposition of Türkcan (2006) helps to resolve the puzzle. However, unlike the work of Ferragina & Colacurcio (2015) described earlier, we decide to use (1) the product level data, (2) Latvian FDI stock data instead of the stock of employees in foreign affiliates; to include (3) the real exchange rate and (4) both types of FDI; to exclude dummies for (5) preferential trade agreements and (6) sea and (7) land borders. The reason we use the stock of FDI data is that it was widely used in previous works, such as Falk & Hake. (2008) and Mitze, Alecke & Untiedt (2009), and that once FDI is created (e. g. a firm is built), it may continue to impact (contribute or substitute) trade for the whole subsequent period in time. The reason we include the real exchange rate is again that

it was used extensively in recent works and that it is reasonable to assume that countries' competitiveness influences its trade. We have added inward FDI into the regressions, as it was proposed in Goh, Tham & Wong (2013) and as its volume is significant for Latvia. We exclude the number of preferential trade agreements, because in our case they are common for the whole European Union and will lead to multicollinearity with the EU dummy. Additionally, we make similar regressions for imports, as it was widely done by many authors since then, to see whether the opposite is true for imports and FDI for Latvia.

Thus, we use the following model specifications for our analysis:

$$(ln(EX_{ijt})) - ln(GDP_{lt})) = \beta_0 + \beta_1(ln(GDP_{it}) - ln(GDP_{lt})) + \beta_2(ln(PCY_{it}) - ln(PCY_{lt})) + \\ \beta_3(ln(OFDI_{it}) - ln(GDP_{lt})) + \beta_4(ln(IFDI_{it}) - ln(GDP_{lt})) + \\ \beta_5 ln(RER_{it}) - \beta_6 ln(Dist_i) - \beta_7 ln(EU_{it}) + \varepsilon_{it} \quad ②$$

$$(ln(IM_{ijt})) - ln(GDP_{lt})) = \beta_0 + \beta_1(ln(GDP_{it}) - ln(GDP_{lt})) + \beta_2(ln(PCY_{it}) - \ln(PCY_{lt})) + \\ \beta_3(ln(OFDI_{it}) - ln(GDP_{lt})) + \beta_4(ln(IFDI_{it}) - ln(GDP_{lt})) + \\ \beta_5 ln(RER_{it}) - \beta_6 ln(Dist_i) - \beta_7 ln(EU_{it}) + \varepsilon_{it} \quad ③$$

Where the index j stands for intermediate, final goods trade flows or total trade flows, i — for a country, l — for Latvia, and t — for a year. The description of each variable is given in Table 1.

Here it should be noted, that $(ln(GDP_{it}) - ln(GDP_{lt}))$ and $(ln(PCY_{it}) - ln(PCY_{lt}))$ stand for different economic meanings. The former corresponds to relative market sizes, whereas the latter compares economic likeness and purchasing power between the countries.

The expected sign of each variable, as well as economic meaning for exports and imports are summarized in the following tables, where ETF denotes total exports flow, EFGF — exports of final goods flow, and EIGF — exports of intermediate goods flow. ITF denotes total imports flow, IFGF — imports of final goods flow, and IIGF — imports of intermediate goods flow.

As there is an empirical puzzle regarding how IFDI and OFDI influence total foreign trade, their coefficients' signs represent the main interest for us. Similar to Türkcan (2006), we expect to see that outward FDI increases exports in intermediate goods and decreases trade in final goods for the countries. Similarly, we expect that inward Latvian FDI will lead to an inflow of imports in intermediate goods and to a decrease in imports of final goods to Latvia. It is necessary to confirm the stationarity of variables in order to proceed with further steps. Several tests are available for panel data estimations that assess whether the series have a unit root or

Table 1. Description of each variable used in regression analysis

Variable	Description
$(ln(EX_{ijt})) - ln(GDP_{lt}))$	Export flows of final/intermediate goods or total exports from Latvia to a country i during time t, taken as a ratio to Latvian GDP during the same time period, in order to remove price and exchange rate effects.
$(ln(IM_{ijt})) - ln(GDP_{lt}))$	Import flows of final/intermediate goods or total imports to Latvia from a country i during time t, taken as a ratio to Latvian GDP during the same time period, in order to remove price and exchange rate effects.
$(ln(GDP_{it}) - ln(GDP_{lt}))$	GDP of a country i during time t, relative to Latvian GDP during the same period. Proxy of the relative market size.
$(ln(PCY_{it}) - ln(PCY_{lt}))$	Per capita income in country i, during time t, compared to Latvia. Proxy for economic likeness and purchasing power of each country.
$(ln(OFDI_{it}) - ln(GDP_{lt}))$	Outward Latvian FDI stock to a country i, during time t, taken as a ratio to Latvian GDP to remove price and exchange rate effects.
$(ln(IFDI_{it}) - ln(GDP_{lt}))$	Inward Latvian FDI stock from a country i, during time t, taken as a ratio to Latvian GDP to remove price and exchange rate effects.
$ln(RER_{it})$	Real exchange rate between Latvian and the country i's currency during period t, as a proxy of competitiveness between countries.
$ln(Dist_i)$	Great-circle distance between Riga and the capital of country i.
$ln(EU_{it})$	Dummy showing whether a country i is in the European Union at a year t. Proxy for trade barriers.

Table 2. Expected signs of coefficients and economic meaning behind the equation of exports

Regression for *Exports* flows

Variable	ETF	EFGF	EIGF	Description
$(ln(GDP_{it}) - ln(GDP_{lt}))$	+	+	+	The larger and more competitive the foreign economy, the more trade is expected to be conducted with it. The variable stands for relative market sizes.
$(ln(PCY_{it}) - ln(PCY_{lt}))$	+	+	+	The higher foreign per capita income, the more likely it is that people can afford buying products from Latvia.
$(ln(OFDI_{it}) - ln(GDP_{lt}))$	+/−	−	+	We expect to find complementarity in intermediate goods trade and substitution in final goods trade.
$(ln(IFDI_{it}) - ln(GDP_{lt}))$	+/−	+	+/−	Inward FDI to Latvia may boost production and exports of final products.
$ln(RER_{it})$	−	−	−	Appreciation of the real exchange rate makes domestic products more expensive, which is likely to reduce foreign demand on them.
$ln(Dist_i)$	−	−	−	The longer the distance between countries, the higher theer transportation costs, and the less trade is expected.
$ln(EU_{it})$	+	+	+	The abolition of trade barriers is likely to increase the trade between partners.

not. We used the Levin-Lin-Chu (2002) and Fisher-type (Choi, 2001) tests for the dataset (Fisher-type works better with missing values in case of international trade and FDI). The stationarity was confirmed for all variables on the first difference, and zero lags.

Table 3. Expected signs of coefficients and economic meanings behind the equation of imports

Regression for *Imports* flows

Variable	ETF	EFGF	EIGF	Description
$(ln(GDP_{it}) - ln(GDP_{lt}))$	+	+	+	The higher the relative foreign market size compared to Latvian economy, the more likely that Latvia will need to import some of its products, which it cannot produce domestically.
$(ln(PCY_{it}) - ln(PCY_{lt}))$	−	−	−	The higher foreign per capita income, the more differently developed the economies are, and the less likely a Latvian citizen will afford to buy products from that country.*
$(ln(OFDI_{it}) - ln(GDP_{lt}))$	+/−	−	+	We expect to find complementarity in intermediate goods trade and substitution in final goods trade.
$(ln(IFDI_{it}) - ln(GDP_{lt}))$	+/−	−	+/−	Outward FDI (outsourcing of production stages) may reduce imports of intermediate goods.
$ln(RER_{it})$	+	+	+	The higher the real exchange rate, the more competitive foreign products for Latvia become.
$ln(Dist_i)$	−	−	−	The longer the distance between countries, the higher transportation costs are and the less trade is expected.
$ln(EU_{it})$	+	+	+	The abolition of trade barriers is likely to increase the trade between partners.

* See, for example, Linder Hypothesis (Investopedia, 2015) that states that countries with similar PCY, consume similar products, and, as a result, trade more with each other. Also Ramezzana (2000) tests and confirms this hypothesis in practice.

For each regression, we employ both fixed and random country effects models corrected for heteroskedasticity and compare the results, taking into account the outcomes of Hausman test that is used to decide, which model is more appropriate, and the joint significance of the coefficients, as suggested by F-statistic and Wald chi² test. In case of fixed effect model specification, we exclude the $ln(Dist_i)$, as it is already taken into account in a country-specific component μ_i.

For a robustness check, we additionally make a control sample of countries, from which we exclude countries that may be classified as offshore jurisdictions. The reason for their exclusion is that Latvian capital may flow to them without much economic meaning and can be unlinked to trade, but flow there for secrecy or tax minimization purposes. Alternatively, trade flows can be lowered because of transfer pricing. We use the joint classification scheme of OECD, FSF-IMF & TJN (2007) in order to distinguish offshore jurisdictions. The sample of excluded countries can be found in Appendix A. We repeat the same analysis for a control group, for the exports of final, intermediate and total goods flow. We do not make it for imports, as Latvia has relatively high tax rates compared to classical offshore jurisdictions with near 0% tax rates (KPMG, 2016).

Results

EXPORTS   The obtained results for exports are summarized in Table 4. We might see that the Hausman test predicts a better fit of the model with fixed country effects for final goods flows and total exports, however, we have jointly significant coefficients in both specifications, as the Wald chi² and F-statistics show it. Moreover, the signs of the coefficients in both specifications are similar. Overall, we see that outward FDI leads to a higher international trade in total, as well as in final and intermediate goods separately. This contrasts with the findings of Türkcan (2006), who claimed that outward FDI leads to lower exports of final goods, but is in line with the fact that it leads to higher intermediate goods trade. The same is true for inward FDI to Latvia. Both types of FDI promote trade between countries in various types of products.

Additionally, we might see that Latvian exports are positively influenced by the countries' likeness in income. Presence in the European Union, and the absence of trade barriers at the same time positively contribute to trade in intermediate and total goods flows. We have a positive coefficient for final goods as well, but it is insignificant. Real exchange rate appreciation harms trade in final goods and total trade, and possibly intermediate goods, for which we have an insignificant coefficient. In the random country effects specification we see that a larger distance between the capitals hinders trade, exactly as expected.

In the following paragraph, we interpret the coefficients of the specification suggested by Hausman tests and enter in the brackets the additional coefficients suggested by the alternative specification.

A 1% increase in the outward FDI stock as % of Latvian GDP correlates and may lead to a **0.10%** (0.11%) increase in the total exports (as % of GDP); of which exports of final goods (as % of GDP) may increase by a **0.09%** (0.10%); while exports of intermediate goods (as % of GDP) may increase by **0.09%** (0.09%).

A 1% increase in the inward FDI stock as % of Latvian GDP correlates and may lead to a **0.13%** (0.15%) increase in the total exports (as % of GDP); of which exports of final goods (as % of GDP) may increase by a **0.15%** (0.10%); while exports of intermediate goods (as % of GDP) may increase by **0.17%** (0.15%). Overall, it can be observed that the total exports, as well exports of final/intermediate goods move in line with the increased inward FSF and outward FDI.

IMPORTS   In case of imports, we do not obtain robust results, as the majority of coefficients are insignificant (although Wald chi² and F-statistics point out that model is still significant as a whole). Therefore, we have decided not to interpret them in detail. However, we see that the presence in the EU as a proxy for no trade barriers positively contributes to Latvian imports; and large distance harms international trade.

EXPORTS (CONTROL SAMPLE WITHOUT OFFSHORE JURISDICTIONS) The coefficients are similar in signs to the main exports group and still have jointly significant coefficients. The outward FDI-trade correlation increases in all cases except for the exports of final goods in the specification of fixed effects. The inward FDI correlation changes in a less straightforward manner, but in all cases continues to positively correlate with exports.

We return to the specifications suggested by Hausman test in each case. We recognize an increased outward FDI effect and a decreased inward FDI effect on total exports and exports of intermediate goods. The opposite is true for final goods: the outward FDI has weaker effect, while the inward FDI has a stronger effect. We admit that to arrive at compelling conclusions about change of the magnitude of the effect, additional tests for the significance of the differences must be performed. This can be a subject for further research with a purpose of studying the potential tax implications. Therefore, we do not interpret the numerical magnitudes and propose the conclusion below: even if we exclude the commonly known offshore jurisdictions from the sample and leave the countries, to which, most probably, the real investments are coming, we still see that they significantly correlate with higher trade volumes (exports).

Table 4. Summary of results for equation of exports

Exports	Fixed effects			Random effects		
	Intermediate	Final	Total	Intermediate	Final	Total
OFDI	0.092**	0.092***	0.104***	0.090**	0.096***	0.110***
IFDI	0.148	0.149***	0.126**	0.167**	0.166***	0.153***
PCY	(0.164)	0.033	(0.707)	(0.044)	0.360*	(0.154)
GDP	0.301***	0.776***	0.619**	0.281**	0.498***	0.345***
EU	0.589***	0.235	0.687***	0.591***	0.189	0.645***
RER	(0.013)	(0.242)**	(0.106)**	(0.006)	(0.149)***	(0.063)*
Distance	—	—	—	(0.0005)***	(0.0006)***	(0.0004)***
Const	(11.214)	(13.301)***	(11.159)***	(9.030)***	(12.007)***	(10.361)***
Hausman test	2.31	40.50***	15.89**	2.31	40.50***	15.89**
Wald chi²	—	—	—	96.20***	125.07***	252.72***
F (all coeffs)	9.10***	1774***	54.38***	—	—	—
Nobs	349	349	349	349	349	349
R^2–within	0.283	0.436	0.489	0.282	0.419	0.477
R^2–between	0.348	0.116	0.126	0.544	0.635	0.615
R^2–overall	0.253	0.059	0.061	0.407	0.471	0.453

***, **, and * denote statistical significance at the 1%, 5% and 10% respectively. The list of explanatory variables for exports is on the left hand side. For the list of the variables and their economic meaning, please refer to Tables 1, 2 and 3 above, respectively. OFDI, IFDI, PCY, GDP, and exports are taken as a ratio to Latvian GDP. All the variables are taken in logarithmic forms. The first three columns represent the results from the model with fixed effects; the next three columns — from the model with random effects. "Intermediate", "Final" and "Total" note the following dependent variables (correspondingly): exports of intermediate goods, exports of final goods, and total exports.

Granger causality tests

Having found the correlation between Latvian FDI and trade, we decide to check for causality: whether it is possible that FDI can influence Latvian trade, meaning that FDI growth happens prior to GDP growth. This section briefly describes the methodology and results.

DATA We use slightly different sample for this part of the study. We have decided to take quarterly frequency of the data, as it gives more observations and allows taking lags in time. We do not take intermediate and final goods' flows separately, as there is no quarterly data thereof. Thus, we perform the analysis only for the total exports/imports flows. Moreover, we believe that the data on total exports flows will help us to understand general FDI-trade relationships. We take Latvian FDI flow and trade flows at current prices (in euro). Similar to the studies of Goswami & Saikia (2012) and Dritsaki & Stiakakis (2014), we decide to take our FDI and trade flows as a ratio to Latvian GDP. The data on GDP was obtained from the *Eurostat* (2016). The data on international trade and FDI was obtained from the same sources as before, the Central Statistical Bureau of Latvia (2015) and the Bank of Latvia (2015), respectively.

METHODOLOGY Overall, we perform four causality tests for: (1) exports and outward FDI, (2) exports and inward FDI, (3) imports and outward FDI, (4) imports and inward FDI.

Prior to the analysis ,we require a suitable model specification. Firstly, we test our variables for stationarity, i. e. the absence of a unit root. The empirical analysis of time-series data assumes that variables are stationary. If the variables have unit roots, e. g. are non-stationary, then they have to be integrated (differenced) several times until the stationarity is achieved. We use the augmented Dicky-Fuller (ADF) test to check for stationarity. The test shows that all the variables have a unit root in levels. However, their first differences are stationary.

Secondly, we test the variables for cointegration. If the variables are cointegrated, they tend to move in the same direction over time, and then there must be a long-run relationship between them (Giles, 2011). If the variables are cointegrated, we may use the vector error correction (VECM) model that looks at both long term and short term effects. If not, we may use the vector autoregression Granger (VAR Granger) model, which gives us an insight about short-term relationships.

In order to test the variables for cointegration, similar to Goswami & Saikia (2012), we use the Engle-Granger (1987) method. We regress the variables in levels, and check the residuals for stationarity. For this purpose, we estimate the following equations:

$$EXP\_GDP_t = \alpha + \beta(IFDI\_GDP)_t + e_t \quad ④$$
$$EXP\_GDP_t = \alpha + \beta(OFDI\_GDP)_t + e_t \quad ⑤$$
$$IM\_GDP_t = \alpha + \beta(IFDI\_GDP)_t + e_t \quad ⑥$$
$$IM\_GDP_t = \alpha + \beta(OFDI\_GDP)_t + e_t \quad ⑦$$

EXP_GDP_t & IM_GDP_t stand for Latvian exports and imports respectively during time t, taken as a ratio to Latvian GDP during the same time period; $(IFDI\_GDP)_t$ & $(OFDI\_GDP)_t$ stand for inward and outward FDI flows to and from Latvia correspondingly, during time t, taken as a ratio to Latvian GDP.

Next, we obtain the residuals for each equation and test them for stationarity:

$$e_t = EXP\_GDP_t - \alpha - \beta(IFDI\_GDP)_t \quad ⑧$$
$$e_t = EXP\_GDP_t - \alpha - \beta(OFDI\_GDP)_t \quad ⑨$$
$$e_t = IM\_GDP_t - \alpha - \beta(IFDI\_GDP)_t \quad ⑩$$
$$e_t = IM\_GDP_t - \alpha - \beta(OFDI\_GDP)_t \quad ⑪$$

For this, we use the augmented Dicky-Fuller test. If the residuals do not have unit roots, it means that the variables are cointegrated. For all residuals, the null hypothesis of the presence of a unit root cannot be rejected. Therefore, the variables are not cointegrated and we should proceed with the vector autoregression Granger (VAR Granger) model. One variable (X) is said to granger cause another (Y), if lagged X can show statistically significant information about Y (Giles, 2011).

We decide on the number of lags for each variable. After performing the Akaike information criterion (AIC) tests, we find that 5 lags is an optimum amount for the majority of variables. Post estimation test also showed that 5 lags is an optimum choice.

The estimation equations for VAR Granger look, as follows:

$$\Delta trade\_flow_t = + \alpha_0 + \sum_{i}^{n}(\beta_i \Delta trade\_flow_{t-i}) + \sum_{j}^{m}(\gamma_j \Delta FDI\_flow_{t-j}) + e_t \quad ⑫$$

$$FDI\_flow_t = + \alpha_0 + \sum_{i}^{n}(\beta_i \Delta trade\_flow_{t-i}) + \sum_{j}^{m}(\gamma_j \Delta FDI\_flow_{t-j}) + e_t \quad ⑬$$

$\Delta trade\_flow_t$ represents Latvian imports/exports (in differences) during time t ($\Delta trade\_flow_{t-i}$—during time $t-i$), and ΔFDI_flow_t presents Latvian inward/outward FDI flows (in differences) during time t (ΔFDI_flow_{t-j}—during time $t-j$). The Granger short-term causality is tested by the joint significance of the coefficients before lagged variables (Giles, 2011). Finally, we check the stability of the coefficients.

RESULTS   We obtain jointly significant coefficients only before FDI. It means that both outward and inward FDI Granger-causes exports (during 5 lags), inward FDI Granger-causes imports (during 4 lags), and outward FDI Ganger-causes imports (during 5 lags). Each lag stands for 1 quarter. There is no evidence, however, that exports or imports Granger-cause FDI. VAR satisfies stability condition in all cases.

Limitations and discussion of results

We may see that both outward and inward FDI positively influence Latvian trade (the results are weaker for imports), independently of whether we include offshore jurisdictions to the sample of countries or not. The 1% increase in outward FDI (as% of GDP) may further impact the increase in total exports (the effect is roughly the same for the flows of final and intermediate goods) by 0.10% as% of GDP. The highest impact of inward FDI is felt by exports in intermediate goods (0.17%), followed by exports of final goods (0.15%) and total exports (0.13%). For imports, we only report the inward FDI effect as% of Latvian GDP of 0.06% on the imports of final products to Latvia (as% of GDP). One of the reasons for weak findings for imports might be a low manufacturing profile of FDI coming to Latvia. As it was previously argued by Goh, Tham & Wong (2013), one may expect an inflow of imported intermediate products, if a vertical FDI in the manufacturing sector was created.

We acknowledge that we cannot be sure of the causal relations between FDI and trade flows. We find that inward and outward FDI flows precede Latvian international trade flows on average in 4–5 quarters (around 1 year). This doesn't prove the causal relationships between the variables, but neither does it rule out the possibility that FDI can influence Latvian trade. The performed analysis, rejects, however, that Latvian trade may further boost FDI. The authors admit the possibility of omitted variable bias, which means that there might be other variables that influence both Latvian FDI and trade, allowing for changes in Latvian FDI to precede changes in Latvian international trade. Nevertheless, it may be a valuable finding for policy recommendations that foreign direct investment in and out of Latvia does not go in line with a reduction in trade. On the contrary, absence of trade and capital barriers in the EU, government attempts to create favorable conditions for foreign investors, attractive tax regime and promotion of FDI may not only attract investments but also increase Latvian international trade.

Helpman, Melitz & Yeaple (2003) and later Wagner (2006) show that firms' choice to serve the offshore markets depends on the level of productivity, meaning that a firm starts to export or perform FDI only after reaching a certain level of productivity, with the most productive firms choose

to perform FDI. Meanwhile, Javorcik (2004) conducts a study for Lithuania and finds evidence that inward FDI positively impacts productivity through spillover effects, mainly relating to the affiliates that share domestic and foreign ownership. Similarly, Lane and Milesi-Ferretti (2006) consider that large inflows of capital to CESEE region positively impact convergence with other more developed countries by providing "attractive risk-sharing and technological benefits". In such a way, there is a reason to assume that the large inflow of FDI to Latvia would enhance productivity and eventually encourage both FDI and trade, with possible complementarity between the two (see e.g. Clausing, 2000; Aizenman & Noy, 2006).

In general, policies aiming at creating a business-friendly environment in the form of regulations, flexible labor markets and good infrastructure should attract FDI. In contrast to popular opinion, Globerman & Chen (2010) argued that similar policies should encourage both types of FDI (inward and outward), e.g. policies aiming at improving productivity (see Helpman, Melitz & Yeaple, 2003) and economic growth. Improving competitive advantage of domestic firms is the key in their line of thinking. The authors also cite several less conventional approaches of attracting FDI, like reducing corporate tax rates; lowering regulatory review mechanisms in relation to foreign investors; subsidies and grants to prospective offshore investors; and eliminating, if exist, limitations on foreign ownership in more "sensitive" industrial sectors. Though, as was noted by Bems & Schellekens (2007) there is always an issue that those FDI inflows benefit the non-tradable sector (real estate, construction, finance) rather than exports.

Although we do not uncover substitutive outward FDI influence on exports of final goods, as Türkcan (2006) did, we find support for another theory of his that vertical outward FDI promotes trade in intermediate goods. We consider four possible reasons for our discrepancies in the findings on final goods: (1) there are some statistical discrepancies (as well as missing values) in bilateral product level data for Latvia; (2) there is an imperfect classification of the products flow into final and intermediate goods; (3) there is a different econometric specification; or (4) the underlying theory is wrong. In any case, further in-depth research is needed to prove, whether there is a different FDI effect on final and intermediate goods trade or not. As such, our results are not in line with the theory, especially with the earlier ones that allow only for substitutional linkages. The more recent ones, such as new trade theory and the knowledge-capital model, however, predict the possibility of either complementarity or substitution depending on the FDI profile. At the same time, it is in line with a large number of empirical works, see e.g. Ricotta (2008), Aizenman & Noy (2006). Even though, by following the idea of Türkcan (2006) to separate trade flows into final and intermediate goods, we cannot explain the puzzle in empirical research, we still add to the pool of

empirical complementary FDI-trade relationships findings but on the least researched level of trade aggregation—product level—and with a reference to a new (previously unresearched) country.

Conclusion

The ongoing debate about the FDI impact on the economies encouraged us to join the pool of empirical research on FDI-trade relationships. For the majority of studies, the findings contradict the theory, and mixed results are obtained on different levels of research. Contrary to most theoretical models and in line with the majority of empirical findings, we establish complementarity between inward/outward FDI and Latvian exports. We find partial support of Türkcan's (2006) findings that outward FDI complements trade in intermediate goods, but we do not uncover evidence that outward FDI substitute trade in final goods. Overall, we find that a 1% increase in outward FDI stock as % of GDP is in line with a 0.10 % increase in Latvian exports (as % of GDP), and that similar increase in inward FDI stock may lead to a 0.13 % increase in Latvian exports (as % of GDP). The results are less pronounced for imports and we consider low manufacturing profile of incoming FDI as one of the reasons for no effect in intermediate goods imports. In the case of exports, our results are robust regardless of whether we include offshore jurisdictions or not. We establish Granger causality from both FDI types to imports and exports, and not the other way around. We observe that it takes about 4–5 quarters for FDI to have a positive effect on Latvian trade.

The absence of capital controls within the EU, cheap labor, a favorable tax regime, residence permit based on investing, membership in the WTO, NATO and several other conditions make Latvia a very competitive place for foreign FDI. FDI has been consistently on the rise in Latvia since entering the EU, and its attraction is also one of the recent considerations for obtaining the OECD membership. Besides the continuation of already pursuable policies on FDI attraction, we would recommend stimulating higher volumes of FDI in non-service and non-real estate sectors to further stimulate trade (exports). Tax rates and double tax treaties in force play a role in determining FDI destinations, and may be a valuable tool in policy recommendations for encouraging both FDI types. However, in line with the discussed limitations of this paper, we acknowledge that the effect of FDI on other sectors of the economy is not fully established for the Baltic states and further research is needed.

Appendix

Table A.1. Control group

Total sample of countries	Control group	Total sample of countries	Control group
AT — Austria	■	IR — Iran	■
BE — *Belgium*		IT — Italy	■
BG — Bulgaria	■	KR — Republic of Korea	■
BY — Belarus	■	KZ — Kazakhstan	■
CH — *Switzerland*		LT — Lithuania	■
CN — China	■	NI — Nicaragua	■
CY — *Cyprus*		NL — *Netherlands*	
CZ — Czech Republic	■	NO — Norway	■
DE — Germany	■	PL — Poland	■
DK — Denmark	■	PT — Portugal	■
EE — Estonia	■	RU — Russian Federation	■
EG — Egypt	■	SE — Sweden	■
ES — Spain	■	SI — Slovenia	■
FI — Finland	■	SK — Slovakia	■
FR — France	■	TR — Turkey	■
GB — *United Kingdom*		TW — *Taiwan*	
HK — *Hong Kong*		UA — Ukraine	■
HU — *Hungary*		US — United States	■
IE — *Ireland*		UZ — Uzbekistan	■
IN — India	■	VN — Vietnam	■

The list of counties in italics was classified as offshore jurisdictions by OECD, FSF-IMF & TJN (2007). The bullets (■) on the right represent countries in our control group (i. e. not classified as offshore finance centers).

Latvia: Catching up with the world production frontier. An industry-level analysis

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We applied the Stochastic Frontier Analysis True Fixed Effects model with time-varying technical progress to the World Input-Output Database to establish, in which industries Latvia has been catching up with the world production frontier during the past two decades, and which factors could foster this convergence in the future. Our results show that (given the amount of capital stock and labour) output of the agriculture, hospitality, trade and transportation industries in Latvia still substantially lags behind its peers. Over the last 20 years, construction and private sector services such as trade, transportation and hospitality experienced substantial efficiency gains, spurring Total Factor Productivity (TFP) growth well above average in our sample. In turn, manufacturing and agriculture failed to increase efficiency and thus experienced rather low TFP growth. We find that R&D spending and trade openness are significant efficiency determinants for all industries, while foreign direct investments are not. Furthermore, we document the positive association between efficiency and several variables of The Economic Freedom Index and Global Competitiveness Report. Thus, business-friendly institutional reforms such as fighting corruption and judicial system improvements can raise labour productivity not only by promoting capital accumulation, but also through TFP gains.

Introduction

Total factor productivity has been researched extensively and is of a great importance to both policy makers and as a tool of assessing a country's performance. Although several researchers, such as Fadejeva and Melihovs (2010), analysed TFP by industries, to our knowledge, none of the researchers have touched upon a sectoral breakdown of TFP in Latvia in the post-crisis period. In this paper, we fill this gap by identifying the efficiency determinants of main private sector industries in Latvia: agriculture, construction, accommodations and hospitality, manufacturing, trade and transportation. We analyse the period from 1995 to 2014, and compare the growth of TFP in Latvia along with 39 other countries. This forms our sample and allows us to capture Latvia's position relative to the world's production frontier.

Thus, the goal of the study is: firstly, to study TFP growth across sectors in Latvia, decomposing it into world technical progress (movements of world production frontier over time) and efficiency growth (catch-up to world production frontier); secondly, to identify factors that have a significant effect on efficiency within each industry. Our analysis covers the following factors: spending on Research and Development (R&D), the trade openness of a country, the amount of foreign direct investments (FDI), as well as various indicators from the Economic Freedom Index (EFI) and Global Competitiveness Index (GCI).

We employ Stochastic Frontier Analysis (SFA) True Fixed Effects (TFE) with time-varying technical progress as our main model and Data Envelopment Analysis (DEA) 2-stage method as a check for robustness. Both models are widely used for TFP growth decomposition; the majority of prominent scholars in their papers on this topic employ at least one of these models. Performing our analysis, we answer three research questions:

1. In which industries is Latvia more efficient (close to the world production frontier)?
2. Which one, technical or efficiency change, is the main driver of TFP growth within the analysed industries in Latvia?
3. How can Latvia foster catching up with the world's production frontier?

Our paper is structured in the following manner: section 2 consists of a literature review; section 3 describes methodology and data; section 4 presents our empirical findings, section 5 discusses the results, while the conclusion is provided in the last section.

Literature review

In this paper, we employ the neoclassical theory of production; according to this theory, output depends on three key factors: the amount of physical capital, labour and technology. Felipe and Adams (2005) note that this function is the most widely used in the analysis of labour productivity and growth. Many prominent scholars have sought to establish, which factors are the main determinants of labour productivity growth. Blinder and Yellen (2002) state that labour productivity is directly related to economic performance, and that a decrease in the growth of labour productivity in the 1970s was responsible for "the woeful macroeconomic performance of that decade". Mankiw, Romer and Weil (1992) study a sample of 98 countries and report that about 80% of cross-country difference in per capita income can be explained by physical and human capital. Jorgenson and Stiroh (2000) report that during the period from 1958 to 1998, capital accumulation was the main factor for labour productivity growth in the US, while Stiroh (2001) states that in the 2000s, productivity growth in the US was mainly driven by technology improvements. Baier, Dwyer and Tamura (2006) report that TFP accounts for about 34% of the economic growth in Western Countries. These thoroughly different results highlight the importance of both TFP and capital on productivity.

SCOPE OF RESEARCH   Existing literature on the topic differs by scope. We divide existing evidence in three groups—country level, industry level and firm level. A country level analysis of labour productivity seems to be the most prevalent, as evident by the bulk of researches focusing on this field. Country level analysis allows conducting a cross-country comparison of developments in labour productivity, and gives macro level understanding of a countries' performance. A country level analysis of labour productivity with a subsequent analysis of several industries and efficiency determinants, with particular focus on Latvia (among other countries), was conducted by Krasnopjorovs (2012), Filippetti and Peyrache (2013), Puharts and Kloks (2015).

Other authors have studied labour productivity using firm-level data. For example, Battese, Heshmati and Hjalmarsson (2000) studied labour productivity in the Swedish banking industry; Børing (2012) analysed labour productivity across Norwegian manufacturing firms, and Selim (2012) covered labour productivity in the agricultural sector of Bangladesh. To our knowledge, there have been only a few papers, which studied firm-level productivity in Latvia, for example, Aleksandrovics and Smilts (2015).

The remaining group of works focuses on industry level analysis of labour productivity. Dozens of labour productivity related papers, which cover Europe and Asia, indicate that this sphere of the economy is of great interest to both academics and policymakers, e. g. Dragomir and Tanasie (2010), and thus we believe that it is worth expanding it to include Latvia. Fadejeva and Melihovs (2010) published the only paper, which presents an industry-level TFP study in Latvia. The authors of that paper construct estimates of TFP growth across six sectors of the Latvian economy, though the analysis does not present the decomposition into technical progress and efficiency catch-up. Moreover, their paper covers the period from 2000 to 2008, hence, the post-crisis period is left unanalysed. Znotina and Jermolajeva (2011) compare the labour productivity of regions in Latvia with labour productivity of the European Union. They briefly observe productivity changes by industry, but do not analyse the driving factors of changes in labour productivity.

A countrywide analysis could show that productivity has increased on a country level, but without a sectoral breakdown, as it is impossible to conclude, whether productivity has indeed increased in every industry or there has been an expansion of more productive industries and a contraction of less productive ones. This phenomenon is discussed by Javorcik, Fitriani and Iacovone (2012) and MTI (2014) in the context of Indonesia and Singapore, respectively. On the other hand, a country level analysis that reports no changes in productivity fails to explain the reasons of such results: it is impossible to say whether the productivity was constant in all

of the industries or it fell in some sectors of the economy and increased in others. Both cases present the weakness of a country level analysis. The latter idea is supported by the empirical research, which covers 20 countries across the globe, and shows that it is crucial to study productivity with an industry breakdown to better explain overall productivity in the economy (Manyika et al., 2010). Thus, to present country-level evidence and avoid misleading conclusions about a country's productivity and competitiveness, we analyse productivity by industries.

Many studies have shown that TFP growth has been positive during a prolonged period of time. For example, Fadejeva and Melihovs (2010) show that TFP growth was positive after Latvia was admitted to the EU, as well as it differed across industries. Puharts and Kloks (2015) show that country-wide TFP growth was positive in the Baltic states and particularly in case of Latvia within the period of 1995–2013. Based on these results, we propose our first hypothesis:

ALTHOUGH COUNTRYWIDE TFP GROWTH WAS POSITIVE IN LATVIA DURING 1995–2014, IT DIFFERED ACROSS INDUSTRIES.

DIRECTION OF THE RESEARCH   TFP growth can be decomposed into the catch-up effect and technical changes. Escribano and Stucchi (2008) study TFP emphasizing the catch-up effect: a movement towards a production possibility frontier. Other scholars focus on studying the technical change or a shift in the production possibility frontier over time (Mitra et al., 2011; Sabasi & Shumway, 2014). We study both factors in conjunction.

Performing an industry level analysis of TFP growth, we seek to analyse the impact of technical change and efficiency change across different industries. Worthington (2000) reports that in Australia, change in TFP was mainly driven by technical change, Färe et al. (1994) document that technical change alone explained more than 50% of Japanese TFP change. According to Nishimizu and Page (1982), TFP growth in Yugoslavia was driven mainly by an efficiency catch-up. We are not able to predict, which component of TFP is the dominant driver of productivity growth in each industry in Latvia and the other countries sampled. However, we believe that in 1995, Latvia showed low efficiency in all industries, which is partially supported by Badunenko, Henderson and Zelenyuk (2008), who report that all post-Soviet countries had low efficiency scores in the 1990s; thus, our second hypothesis is, as follows:

IN THE PERIOD OF 1995–2014, IN ALL THE INDUSTRIES IN LATVIA THE CATCH-UP EFFECT ACCOUNTS FOR THE LARGER PART OF TFP GROWTH AS COMPARED TO TECHNICAL CHANGE.

Two frontier models are often used in literature to decompose TFP growth. The first, Data Envelopment Analysis (DEA) is a nonparametric model based on the linear programming (Färe et al., 1994; Perelman, 1995; Hu & Cai, 2004). The second, Stochastic Frontier Analysis (SFA), first proposed by Aigner, Lovell, and Schmidt (1977). The main difference between the models is that SFA operates within the econometric framework, while DEA does not. SFA is based on maximum likelihood estimations, and it also accounts for noise in the data. DEA is based on linear programming and assumes no noise.

Still, both models provide similar tools for TFP decomposition. SFA and DEA allow determining inefficiency, which measures the output distance between a country and the production frontier. Pilat (1996) documents that the importance of decreasing inefficiency is well-pronounced as companies that fail to use existing technologies efficiently are outperformed and are forced "to restructure, freeing resources for other productive users", thus creating structural changes in the economy. Ikhsan-Modjo (2006) employs SFA to decompose TFP into technical progress, changes in technical efficiency and scale economies effect. Kong et al. (1999) performs analysis on Chinese state-owned companies, while Bragagnolo et al. (2010) performs a SFA analysis in the agricultural industry. Moreover, both approaches are used to find factors that affect efficiency.

In this paper, we not only decompose TFP growth into technical and efficiency change, but also try to find variables that influence changes in efficiency. Several authors have aspired to identify factors that affect labour productivity in several industries. For example, Attar et al. (2009) study factors affecting the construction industry, Khan (2006) assesses the impact of several well-known factors to TFP, without introducing any experimental ones in the manufacturing industry. There are only a handful of papers looking at several factors that affect TFP in a countrywide dimension, e.g. Razak et al. (2014), and there are none, to the authors' attention, which assess variables in an industry-wide dimension.

Many scholars have studied the effect of R&D expenditure on efficiency. For example, Pilat (1996) claims that R&D expenditure significantly boosts efficiency (and thus, labour productivity). Perelman (1995) finds that R&D activities significantly and positively correlate with technical changes in the sample of OECD countries. Similarly, CBO (2005) reports that R&D expenditure has a significant impact on labour productivity in the US. We aim to identify sectors of economy in which efficiency is significantly linked to the amount of R&D expenditure.

Several researches have shown that FDI has a significant impact on labour productivity growth. Baltabaev (2013) analyses 49 countries and reports that FDI is a statistically significant determinant of productivity

growth. Studying 34 OECD economies over the period of 1990–2010, Amann and Virmani (2015) report that FDI has a positive long term impact on labour productivity growth. Ilbuodo (2014) and Tanna (2009) report that FDI has a statistically significant impact on productivity growth for the mining and banking industries, respectively. Based on these works, we expect to obtain similar results for Latvia.

Moreover, efficiency is likely to be linked with institutions. For instance, Puharts and Kloks (2015) identify that efficiency could be promoted by the development of property rights, and, consequently, the court system. Thomson and Rushing (1999) report that patent protection positively correlates with TFP, while Chanda and Dalgaard (2008) emphasise the importance of strong protection of property rights for the level of TFP. Thus, we analyse whether changes in the Economic Freedom Index (EFI) and Global Competitiveness Index (GCI) drive efficiency changes, and, if true, which sub-indices of EFI and GCI are the most important for each industry.

Openness to trade positively correlates with TFP growth, as reported by Khan (2006). Ferreira and Trejos (2011) argue that trade is associated with a more efficient allocation of resources which further increases TFP. In general, trade allows for a spillover of both knowledge and technology, which leads to larger TFP growth in countries further from the production possibility frontier. This view is supported by Bloch and Tang (2007), as well as Hwang and Wang (2004).

Thus, we propose our third hypothesis: *higher* R&D *spending,* FDI, *better institutions and trade openness are positively linked to efficiency.*

Methodology and data   We use the Stochastic Frontier Analysis (SFA) True Fixed Effect (TFE) model with a time-varying technical progress as our base specification and non-parametric Data Envelopment Analysis (DEA) 2-stage method as a robustness check.

First, we employ SFA to measure output elasticity with respect to labour and capital and decompose TFP growth in Latvia to technical and efficiency changes in each industry. Then we proceed with analysing possible efficiency determinants. Additionally, as a robustness check, we test whether efficiency determinants obtained from SFA are robust within the DEA framework.

STOCHASTIC FRONTIER ANALYSIS TRUE FIXED EFFECT MODEL   In general, the SFA frontier stems from the Cobb-Douglas production function. A generalized formula for the model is, as follows (to simplify the equation, industry specific indexes are excluded):

$$y_{it} = \beta + \beta_1 \times k_{it} + \beta_2 \times l_{it} + \beta_3 e_{it}, \qquad e_{it} = v_{it} - v_{it} \quad ①$$

We use labour and capital (both in logs) as inputs (denoted as k_{it} and l_{it}, respectively), while beta is a vector of technology parameters. Unlike DEA, y_{it}, k_{it} and l_{it} are in logarithmic form for the SFA model. The error component (e_{it}) consists of statistical noise v_{it} and inefficiency u_{it}. Employing the model, one can estimate whether a particular industry operates on ($u_{it} = 0$) or beneath ($u_{it} > 0$) the production frontier. While v_{it} is normally distributed by default, we adhere to a half-normal distribution of u_{it}; estimation function is following the method documented by Jondrow et al. (1982).

Given the period of 1995–2014 (T = 20 years) maximum likelihood estimate is appropriate, as highlighted by Belotti and Ilardi (2012). Otherwise, the estimates might be inconsistent — an incidental parameter problem (biased country specific intercepts) could arise as first described by Neyman and Scott (1948), who argue that for smaller samples, it is impossible to obtain consistent results. Heckman (1981) also discusses this problem; he reports that the problem becomes unimportant when the number of analysed periods becomes large. He shows that the problem ceases when a sample of 100 individuals is analysed over 8 periods (total number of observations, 800, is the same as in our study). Moreover, Wright and Douglas (1976) use 20 years for each individual in their sample and report no bias. In this study, we use exactly the same number of periods, consequently, we believe that a problem with incidental parameters will not arise.

In addition to country specific intercepts, we add a time dummy variable, as proposed by Kumbhakar and Lovell (2003). A time dummy allows a frontier to move over time, thus reflecting technical changes and global economic cycles. SFA TFE model with time-varying production frontier takes the following form:

$$y_{it} = \beta_i + \beta_1 \times k_{it} + \beta_2 \times l_{it} + \sum_{t=1996}^{2014} \beta_t \, dyear_t + v_{it} - u_{it} \quad ②$$

Further, we extend our model. In order to test which factors are significant determinants of inefficiency, we expand u_{it} term. The extended model consists of 2 equations, which are estimated simultaneously. The first is the same as in equation ③, while the second equation expresses inefficiency term as a function of possible inefficiency determinants:

$$u_{it} = \delta + \delta_1 \times R\&D_{it} + \delta_2 \times TO_{it} + \delta_3 \times I_{it} + \delta_4 \times EFI_{it} + \delta_5 \times GCI_{it} + e_{it} \quad ③$$

In this paper we test whether R&D expenditure as a percentage of GDP, exports as a percentage of GDP (denoted as TO — trade openness), foreign direct investments as a percentage of GDP, institutional proxies (EFI and GCI

and its sub-variables) are significant efficiency determinants. First, we test each factor alone, for significant ones we complete a robustness check by looking at whether they remain significant in the presence of other factors.

ROBUSTNESS CHECK VIA TWO-STAGE DEA APPROACH To check the robustness of our results, we use a two-stage DEA approach. Although we believe that TFE is a superior model due to its econometric nature, we check whether the results obtained from TFE are similar to ones that we get from DEA.

In the first stage, we use output-oriented DEA and calculate inefficiency for each observation in our sample. We do not compare inefficiency estimates obtained from DEA with the ones we obtain from TFE. Due to different assumptions of the models, efficiency estimates could differ a great deal.

In the second stage, we study which factors are significant determinants of efficiency. As efficiency is censored between 0 and 1, we use Tobit regression, with upper limit 1 for dependent variable. Tobit regressions are widely used in a two-stage DEA framework; it uses maximum likelihood estimation and assumes a truncated normal distribution (Tu & Wan-Chu, 2013). Coefficients from Tobit regressions are easily interpretable and comparable to the ones we obtain from TFE model.

The advantage of DEA is its simplicity, but it suffers from ignoring "noise" in the data and its non-parametricity, which causes problems with hypothesis testing (Trick, 1998). Unlike DEA, SFA TFE accounts for noises, eliminates heterogeneity problems associated with using country specific intercepts and is widely used by prominent scholars, e. g., Greene (2005) and Carroll et al. (2007).

DATA We use the data of 40 countries from 1995 to 2014. Our main data source is WIOD (World Input Output Database). The data in WIOD is available up to 2009 or 2011. For the subsequent period, we extrapolate data by using both the IMF and World Bank databases. These databases are compatible, since WIOD itself was formed using data from World Bank, IMF, and *Eurostat.*

As a target variable (dependent variable), we use value-added produced within a particular industry, data is adjusted to purchasing power parity (PPP) in USD. We have two inputs: labour, measured as a total number of hours worked, and stock of capital, measured in USD at PPP. We obtain data for the total number of hours worked from WIOD, and, as the data from WIOD does not cover 2012–2014, it was prolonged with data from *Eurostat* and the World Bank. We use the WIOD database to obtain data on capital stock in 1995 within each industry of our interest and calculate changes in capital stock by applying the perpetual inventory method. We assume geometric

depreciation at a constant rate, which allows the expression of capital stock at time *t* as follows:

$$K_t = (1 - depreciation\ rate) \times K_{t-1} + GFCF_{t-1}, \quad ④$$

where *GFCF* stands for Gross Fixed Capital Formation for a particular industry. Data about *GFCF* is collected from WIOD, *Eurostat* and IMF. We use WIOD to obtain data on GFCF until 2009, and prolong it to 2014 using *Eurostat* and IMF. We calculate annual changes in *GFCF* from 2009 to 2014 using data from *Eurostat*/IMF, and then these results are used to extend data obtained from WIOD. Capital depreciation rates vary by industry and are obtained from WIOD (Erumban et al., 2012).

Empirical results

We find technical change to be positive in Latvia during 1995–2014 in all 6 industries within our sample. Furthermore, 4 out of 6 industries—construction, hospitality, trade and transportation—benefited from catching up with the world production frontier. Thus, TFP growth in these industries in Latvia was higher than average in the sample. However, manufacturing and agriculture industries in Latvia failed to catch up. Results show that R&D is a significant determinant of efficiency in all industries observed, while EFI was significant in all tested industries except for agriculture. FDI is not a significant determinant of efficiency in any of the industries. We find that higher exports are associated with higher efficiency in the manufacturing, trade and transportation industries. Also, efficiency in various industries is dependent on freedom from corruption, monetary freedom, trade freedom, and financial freedom. We document that better infrastructure, a stable macroeconomic environment and well-developed higher education and training improve efficiency in some of the analysed industries.

ANALYSIS OF TFP GROWTH AND EFFICIENCY In this section, we present the results obtained from TFE regressions for each industry following the SFA approach. At this time, efficiency determinants are not included. For each industry, we find labour and capital to be significant output determinants at the 1% level. Coefficients for labour and capital can be viewed as output elasticity to respective production factor. Constant returns to scale in respect to capital and labour together are evident in the construction, manufacturing and trade industries (see Table 1). According to our results, the law of diminishing returns applies to agriculture and hospitality, possibly reflecting the importance of geography and climate. A similar result is observed in transportation.

Table 1. Output elasticities to labour and capital

	Agriculture	Construction	Hospitality	Manufacturing	Trade	Transportation
Labour	0.197***	0.490***	0.240***	0.446***	0.459***	0.273***
Capital	0.193***	0.415***	0.043***	0.543***	0.533***	0.091***
Wald test	0.000	0.356	0.000	0.128	0.657	0.000
Observations	800	800	800	800	800	800

Significance: *** 1 % level; ** 5 % level; * 10 % level. Wald test: testing for scale effect; p-value > 0.1 — constant return to scale, otherwise — decreasing returns to scale.

Time dummies in our model allowed us to track annual technical changes. The majority of time dummies in our regressions are statistically different from 0 at 1 % confidence level. Results suggest that for all industries, the production frontier moved up as compared to the base period (1995), reflecting world technical progress. The weighted average technical change for the whole sample over the 20-year period is 29.2 %, the largest positive technical change was recorded in the hospitality industry (73.8 %) and the lowest in agriculture (17.9 %).

The years of the Great Recession are capturing effects of the global economic crisis on the production frontier. Our results show that all industries faced downward movements in the production frontier around 2008 and 2009: evidence, that is supported by Fernald (2014) and Hicks (2013). Annual technical changes in the agriculture industry are volatile, which is partially supported by work of Sunding and Zilberman (2001), who state that in the agriculture industry, each technical change is only accepted gradually, with long adaptation periods that creates spikes of technical changes followed smaller amounts of new technical inputs. This is also explained by a high dependency on weather conditions in agriculture, as reported by Gornall et al. (2010), and weak output elasticity to labour and capital inputs (consistent with our results). For all industries, we find the inefficiency term, σ_u, to be significant at the 1 % level. We also calculate signal-to-noise ratio, γ, that indicates, whether deviations from frontier come from inefficiency or is pure statistical noise. We find that γ varies from 0.634 to 1, which again strongly supports the presence of inefficiency.

We observe that the mean of inefficiency term in our country sample ranges from 8.7 % to 17.9 %, with trade and manufacturing being closer to

Figure 1. Mean inefficiency scores with 95% confidence intervals
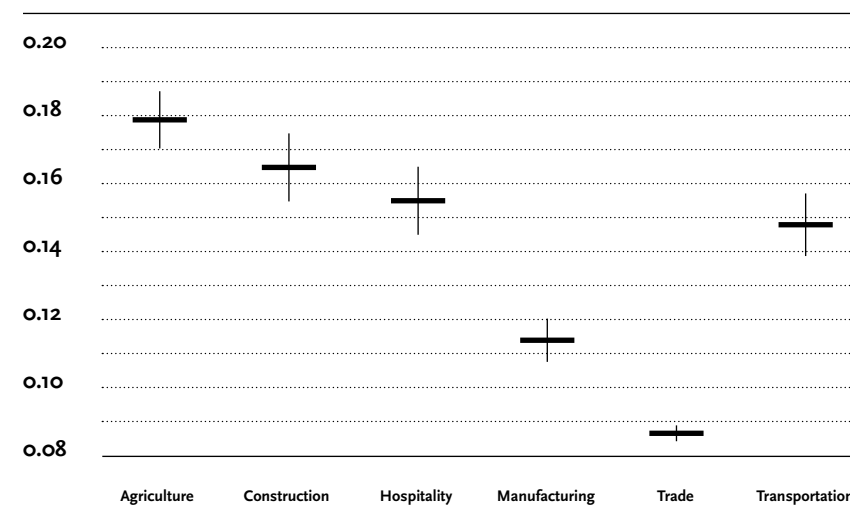
Bars depict average inefficiency and lines show 95 % confidence interval.
(Created by the authors)

the world production frontier than other industries. Figure 1 presents mean inefficiency scores for all industries with 95 % confidence intervals.

Although agriculture had a rapid catch-up period at the end of the 1990s, estimates suggest that the efficiency of the agriculture industry is below Latvia's economy efficiency and is close to the average efficiency within our sample. The agriculture industry in Latvia in 2014 had the highest inefficiency estimate, 22.8 %, among the major industries included in our research. The transportation and hospitality industries were less efficient in 2014 than the entire economy of Latvia, but more efficient than the respective industries in other countries.

In turn, the construction industry in Latvia is more efficient than the entire economy of Latvia. Similar results are obtained for manufacturing and trade industries in Latvia: these industries are more efficient than both the Latvian economy and the average of our sample. Table 2 shows our results of TFP decomposition into technical and efficiency change during 1995–2014. These results support our first hypothesis, overall countrywide TFP growth was positive, but doesn't support our second hypothesis — technical change is larger than efficiency change in all industries.

We find that efficiency has increased in 4 out of 6 industries in Latvia. The largest increase in efficiency in Latvia is in the hospitality industry (52.6 %), while the sample average is –0.1 %, hence, the great efficiency

Table 2. TFP growth decomposition on technical and efficiency change by industry, 1995–2014

	Agriculture	Construction	Hospitality	Manufacturing	Trade	Transportation
Efficiency change						
Latvia	−3.2%	26.7%	52.6%	−1.1%	17.8%	34.5%
Sample (average)	−1.8%	−2.0%	−0.1%	4.1%	1.1%	3.3%
Technical change	17.9%	30.6%	73.8%	19.1%	28.3%	51.5%
TFP growth						
Latvia	14.7%	57.3%	126.4%	17.9%	46.1%	86.0%
Sample (average)	16.1%	28.5%	73.7%	23.2%	29.4%	54.8%

(Calculations by authors)

turnabout in the hospitality industry could be explained by its notable inefficiency at the beginning of 1995 (when the estimated inefficiency was 67%).

Latvia recorded higher than the sample average of TFP growth in 4 out of 6 industries — hospitality, construction, trade and transportation. The largest TFP growth is recorded in hospitality and transportation industries (126.4% and 86%, respectively).

ANALYSIS OF EFFICIENCY DETERMINANTS Further, we proceed with an analysis of possible efficiency determinants. At this stage, we analyse four factors: R&D, EFI, FDI and exports. Later, the analysis is moved to another institutional variable: GCI and its sub-variables (because data is only available from 2006). First of all, we test each factor separately and then combine them to test robustness.

We exclude the hospitality industry from further analysis since the efficiency in this industry is largely dependent on tourism/geographic factors, therefore the results obtained from factor analysis would not be reliable, if efficiency is explained solely by, e. g., institutional variables. Since no papers that discuss the factors affecting efficiency in hospitality industry have been found, we assume that the other authors have arrived at the same conclusion.

Table 3. Inefficiency equations for agriculture

EFI			0.013	(0.009)			−0.064***	(0.024)
R&D	−0.536***	(0.057)	−0.617***	(0.085)	−3.002**	(1.435)	−1.913***	(0.430)
FDI					−0.096	(0.077)	−0.036	(0.056)
Exports					−0.204***	(0.075)	−0.018	(0.013)
Constant	−1.738***	(0.096)	−2.455***	(0.502)	7.38	(5.287)	2.507*	(1.399)

Table 4. Inefficiency equations for construction

EFI	−0.082***	(0.007)	−0.131***	(0.018)	−0.129***	(0.018)	−0.133***	(0.020)
R&D			−2.350***	(0.281)	−2.389***	(0.284)	−2.366***	(0.288)
FDI					−0.033	(0.022)	−0.031	(0.021)
Exports							0.004	(0.008)
Constant	2.756***	(0.447)	6.756***	(1.101)	6.688***	(1.100)	6.801***	(1.130)

Table 5. Inefficiency equations for manufacturing

EFI	−0.121**	(0.056)	−0.117***	(0.027)	−0.029***	(0.009)	−0.093***	(0.028)
R&D			−0.831***	(0.293)	−0.287***	(0.086)	−0.667**	(0.086)
FDI					0.000	(0.002)	−0.058	(0.042)
Exports							−0.042***	(0.009)
Constant	2.658	(2.847)	3.134**	(1.536)	2.472***	(0.568)	3.103**	(1.573)

Significance: *** 1% level; ** 5% level; * 10% level. Standard errors in parenthesis.

Our analysis shows that in the agriculture industry, the only significant and robust determinant of efficiency is R&D. None of the remaining factors pass the robustness test as seen in Table 3. Although EFI is significant in regression with all factors, when combined only with R&D, it becomes insignificant.

We find that two factors, EFI and R&D, are significant efficiency determinants for the construction industry (Table 4).

We find three factors, R&D, EFI and exports, to be significant determinants of efficiency in manufacturing, trade and transportation industries (see Table 5, 6, and 7, respectively). All factors are significant at a 1% or 5% confidence level, both separately and combined together.

Further, we divide manufacturing into two groups based on their reliance on technology and innovation according to CSB (2015) classification. The first group consists of medium-high technology manufacturing such as pharmaceutical and chemical products, electronics, optical products, machinery, weapons, etc. In turn, the second group encompasses low technology manufacturing, and compiles the manufacture of basic metals, plastic products, food products and beverages, apparel and paper products, etc.

The results suggest that country's R&D expenditure is a significant and robust determinant of inefficiency in the medium-high technology manufacturing sub-industry. Contrary, and as expected, inefficiency in the low technology manufacturing sub-industry does not significantly depend on R&D expenditure in the country (the coefficient is insignificant). We present inefficiency equations for trade from TFE model in Table 6.

Inefficiency equations from the TFE model for transportation are presented in Table 7. We find that EFI, R&D, and exports are significant determinants of the inefficiency in transportation.

In Table 8 we summarize the TFE model's results regarding factors that are statistically significant determinants of efficiency. We find that FDI is not a significant efficiency determinant in any of the industries in our study. We report that R&D is a significant determinant of efficiency in all five industries, while institutional variables (EFI and its components) have a significant and robust impact on efficiency in all but agriculture industry. Trade openness is associated with a higher efficiency in manufacturing, which could reflect its export-intensiveness, as well as in trade and transportation.

Further, to test for institutional variables, we break EFI into its components: property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom. In this work the labour freedom sub-variable was excluded from our analysis. The reason for this is data shortage — data on labour freedom is available only from 2005, while data on other EFI sub-variables is available from 1995.

Table 6. Inefficiency equations for trade

EFI	−0.142***	(0.031)	−0.119***	(0.028)	−0.119***	(0.030)	−0.110***	(0.023)
R&D			−0.651***	(0.214)	−0.659***	(0.213)	−0.743***	(0.227)
FDI					−0.019	(0.013)	−0.030	(0.029)
Exports							−0.026***	(0.009)
Constant	4.880***	(1.632)	4.207***	(1.579)	4.258**	(1.684)	4.502***	(1.358)

Table 7. Inefficiency equations for transportation

EFI	−0.111***	(0.006)	−0.155***	(0.016)	−0.151***	(0.016)	−0.153***	(0.017)
R&D			−2.543***	(0.282)	−2.513***	(0.276)	−2.645***	(0.291)
FDI					0.009	(0.007)	−0.018	(0.024)
Exports							−0.021***	(0.007)
Constant	4.165***	(0.430)	8.282***	(1.018)	8.055***	(0.985)	8.888***	(0.990)

Significance: *** 1% level; ** 5% level; * 10% level. Standard errors in parenthesis.

Table 8. Efficiency determinants by industry: summary

	Agriculture	Construction	Manufacturing	Trade	Transportation
EFI		■	■	■	■
R&D	■	■	■	■	■
FDI					
Trade openness			■	■	■

Factors that have significant impact on labour efficiency in a particular industry are marked (■). For example, efficiency in trade industry is determined by EFI, R&D and exports.

Table 9. Inefficiency equations with EFI sub-variables, construction

Freedom from corruption	−0.035***	(0.003)			−0.347***	(0.005)
Property rights			−0.041***	(0.003)	−0.002	(0.006)
Monetary freedom			−0.005	(0.005)		
Trade freedom					0.005	(0.005)
Financial freedom	−0.017***	(0.004)			−0.017***	(0.004)
Constant	0.207	(0.195)	0.417	(0.348)	−0.016	(0.314)

Table 10. Inefficiency equations with EFI sub-variables, manufacturing

Monetary freedom	−0.030***	(0.005)	−0.028***	(0.005)	−0.029***	(0.005)
Business freedom			−0.006	(0.005)	0.002	(0.004)
Freedom from corruption					−0.007	(0.006)
Constant	−1.360***	(0.354)	−1.066**	(0.441)	−0.995	(0.463)

Table 11. Inefficiency equations with EFI sub-variables, trade

Trade freedom	−0.077***	(0.014)	−0.039***	(0.007)	−0.030***	(0.007)
Financial freedom			−0.037***	(0.007)	−0.028***	(0.007)
Monetary freedom			−0.013***	(0.005)	−0.010**	(0.005)
Freedom from corruption					−0.008	(0.008)
Property rights					−0.012	(0.008)
Constant	0.905	(0.655)			1.878***	(0.577)

Significance: *** 1 % level; ** 5 % level; * 10 % level. Standard errors in parenthesis.

Table 12. Inefficiency equations with EFI sub-variables, transportation

Freedom from corruption	−0.044***	(0.002)	−0.029***	(0.003)	−0.024***	(0.004)
Monetary freedom			−0.037***	(0.005)	−0.041***	(0.006)
Trade freedom					−0.029***	(0.005)
Constant	−0.578***	(0.145)	1.317***	(0.339)	3.205***	(0.489)

Significance: *** 1 % level; ** 5 % level; * 10 % level. Standard errors in parenthesis.

Table 13. Institutional variables that have significant impact on inefficiency

	Construction	Manufacturing	Trade	Transportation
Property rights				
Freedom from corruption	■		■	■
Fiscal freedom				
Government spending				
Business freedom				
Monetary freedom		■		■
Trade freedom			■	■
Investment freedom				
Financial freedom	■		■	

Factors that have significant impact on labour (in) efficiency in a particular industry are marked (■).

We begin with the construction industry, and find that five EFI sub-variables are significant efficiency determinants, if taken alone. Robustness check excludes three of them: property rights, monetary freedom and trade freedom. In Table 9, we show that freedom from corruption and financial freedom are robust determinants of efficiency in the construction industry.

Our results for manufacturing suggest that monetary freedom, freedom from corruption and business freedom are significant efficiency determinants if taken alone. Taken together, only monetary freedom remains statistically significant (see Table 10).

We find that all variables are significant determinants of inefficiency in trade industry, if taken alone. However, only three of them (trade freedom, financial freedom and monetary freedom) remain statistically significant after a robustness check (see Table 11).

Freedom from corruption, monetary freedom and trade freedom are all significant determinants of efficiency in transportation at a 1% confidence level (see Table 12).

We find that property rights, government spending, business freedom, and investment freedom are not significant determinants of efficiency in any of the industries presented in this study. Consistent results for freedom from corruption were achieved in all but the manufacturing industry. Monetary freedom is significant in the manufacturing and transportation industries. Trade freedom is a significant determinant of efficiency in trade and transportation industries, while financial freedom is robust in the construction and trade industries. The summary of our results is shown in Table 13, while a discussion is presented in section 5.

Further, we proceed to test GCI and its pillars. As data for GCI is available beginning from 2006, GCI against EFI was first tested to establish, which is a better determinant in the later years. These two variables are compared since both of them include significant amount of institutional variables and are very close in composition.

We find that higher GCI scores are associated with higher efficiency in the construction, trade and transportation industries. Moreover, in the construction and trade industries, we observe that EFI has become insignificant, once GCI is added to the regressions, thus indicating that GCI is closer linked to efficiency. The summary of these results is shown in Table 14 (other industries are excluded from this table to conserve space). Then, for the industries, where GCI is a significant determinant, we test for its sub-variables.

In total, the GCI index is formed by 12 pillars. In this analysis, we choose 5 of them: institutions, infrastructure, macroeconomic environment, health and primary education, and higher education and training. We select these

Table 14. Inefficiency equations with GCI and EFI as inefficiency determinants, all industries

	Construction		Trade		Transportation	
GCI	−1.274***	(0.212)	−1.776***	(0.197)	−2.516***	(0.757)
EFI	0.011	(0.012)	0.005	(0.012)	−0.246***	(0.040)
Constant	1.809**	(0.824)	3.366***	(0.727)	21.008***	(4.629)

Table 15. Inefficiency equations for construction with GCI sub-variables

Infrastructure	−0.498***	(0.129)	−0.256*	(0.152)	−0.274**	(0.138)
Macroeconomic environment			−0.661***	(0.101)	−0.637***	(0.100)
Health and primary education					0.507	(0.361)
Higher education and training			−0.256*	(0.152)	−0.745***	(0.258)
Constant	−0.934**	(0.464)	−0.661***	(0.101)	1.531	(1.763)

Table 16. Inefficiency equations for trade with GCI sub-variables

Institutions	0.113	(0.164)			0.124	(0.167)
Infrastructure	−0.426***	(0.158)	−0.364***	(0.128)	−0.411**	(0.164)
Macroeconomic environment	−0.189*	(0.098)	−0.154*	(0.086)	−0.192*	(0.098)
Health and primary education					−0.159	(0.449)
Higher education and training	−1.084***	(0.203)	−1.049***	(0.201)	−1.042***	(0.241)
Constant	3.21***	(0.792)	3.069***	(0.779)	3.862*	(1.975)

Significance: *** 1% level; ** 5% level; * 10% level. Standard errors in parenthesis.

pillars, because government has an opportunity to influence them directly and thus there is a possibility of changes to them.

In Table 15, we present results for determinants of inefficiency in construction, using GCI sub-variables. We conclude that infrastructure, macroeconomic environment and higher education are significant and consistent determinants of inefficiency.

For the trade industry, we find that infrastructure, macroeconomic environment, as wel as higher education and training are significant determinants of inefficiency. In turn, pillars 1 and 4 are insignificant, when combined with other variables (see Table 16).

We observe infrastructure and macroeconomic environment as having significant efficiency determinants in transportation (at 1% significance level; in all combinations; see Table 17).

To summarize, we have established that institutions and health and primary education are not robust in any of the industries, while higher education is significant in the construction and trade industries. Moreover, macroeconomic environment and infrastructure form a significant determinant in all of the industries (see Table 18).

In order to obtain additional insights, GCI pillar sub-variables were tested. Finding which of them are significant efficiency determinants, allows us to make more substantiated policy suggestions. Moreover, while the pillar itself is not a significant determinant of efficiency, some of its sub-variables may still be significant. Thus, we test not only pillars 2, 3 and 5, bus also pillar 1. We exclude health and primary education from our analysis as this aspect of economy is already well developed in most of the countries in the sample. Pillar 1 is comprised from more than 25 sub-variables. We test only a handful of them and find that many of them alone are significant determinants of efficiency, but judicial independence remains significant also in combinations with other institutional variables. Although wastefulness of government spending and transparency of policy making are significant efficiency determinants if taken alone, these factors become insignificant if other variables are included in the model.

Further, we test three sub-variables of the second pillar (infrastructure): quality of roads, quality of port infrastructure and quality of air infrastructure. We find that a higher quality of all these factors have a positive impact on efficiency in construction, trade and transportation industries with all variables being significant at the 1% level. Caution should be exercised, when interpreting these results, however, as factors have a rather high mutual correlation, which indicates that infrastructure has been developed evenly, without a significant emphasis on any certain category.

An in-depth analysis of the third pillar (macroeconomic environment) shows that government debt and gross national savings (both as % GDP) are

Table 17. Inefficiency equations for transportation with GCI sub-variables

Institutions	−0.206	(0.164)			−0.068	(0.187)
Infrastructure	−0.649***	(0.145)	−0.724***	(0.130)	−0.573***	(0.157)
Macroeconomic environment	−0.228**	(0.093)	−0.278***	(0.082)	−0.270***	(0.097)
Health and primary education			−0.249	(0.328)	0.079	(0.383)
Higher education and training					−0.328	(0.280)
Constant	0.442	(0.568)	1.647	(1.610)	0.801	(1.656)

Significance: *** 1% level; ** 5% level; * 10% level. Standard errors in parenthesis.

Table 18: GCI sub-variables that have significant impact on inefficiency

	Construction	Trade	Transportation
Institutions			
Infrastructure	■	■	■
Macroeconomic environment	■	■	■
Health and primary education			
Higher education and training	■	■	

Factors that have significant impact on labour efficiency in a particular industry are marked (■).

significant and consistent determinants of efficiency. Lower government debt results in higher efficiency (hence, positive coefficients in the inefficiency equation). In turn, higher gross national savings are positively linked to efficiency in three industries: construction, trade and transportation.

Our previous results suggest that among 5 GCI pillars, higher education and training are among the efficiency determinants for construction and trade. The fifth pillar (higher education and training) is broken into

sub-variables and tested to determine which of them is a significant determinant of efficiency. We find that tertiary education enrolment rate (in gross %), extent of staff training, and quality of educational system are associated with higher efficiency.

Discussion of results   Our analysis shows that for each industry time dummy, which is interpreted as technical changes, is positive and significant at a 1 % level for year 2014. We find that all the analysed industries achieved improvements in technologies over the period of 1995 to 2014, but each rate of improvement was different. Positive efficiency changes are observed in 4 out of 6 industries in Latvia. More interestingly, we see that there are certain factors that have influenced improvements in efficiency in different industries. Notably, we discover that EFI and R&D are significant determinants of efficiency, while FDI is not.

We estabblish that industry-level TFP growth in Latvia has been faster than average TFP growth in our sample in 4 industries — construction, hospitality, trade, and transportation. Although the agriculture and manufacturing industries in Latvia have demonstrated a slower TFP growth, the difference of the sample average and Latvia's TFP growth is small (1.4 pp and 5.2 pp, respectively).

Next, we propose a discussion of each variable separately to understand the impact of efficiency determinants and further implications thereof.

R&D   We find that R&D is a significant determinant of efficiency in all industries in our sample. Moreover, in all but one industry the variable is significant at a 1 % level.

Several researches have documented the importance of R&D spending. For example, Alston et al. (2000) surmise that return on investment (ROI) on agriculture R&D brings in on average a 100 % return. Indeed, Beintema and Elliott (2009) report that R&D expenditure has increased by an average of 3 % per year. This, undoubtedly, fuels the efficiency changes, since there is a high correlation between R&D spending and efficiency. According to Alston (2010): "[productivity growth in agriculture] has been enabled by technical change resulting from public and private investments in agricultural R&D". Consequently, it is reasonable to say that R&D expenditure also drives technical changes. In other studies, Singh and Trieu (1996), as well as Voutsinas and Tsamadias (2014) look at the macro level and show that R&D positively influence efficiency. Thus, we document that efficiency is improved not only by direct R&D expenditure in specific industries, but also by the country's overall R&D expenditure.

We can, therefore, surmise that R&D is indeed an important efficiency determinant. Further implications are that, if a country aims to catch up with the world production frontier, it should promote R&D.

It seems that in Latvia low R&D spending (0.6 % of GDP in 2013, compared to the EU average of 2.0 %) could be one of the factors hindering catch-up efficiency and therefore also TFP growth.

FDI   We find that FDI is not a significant determinant of efficiency in any of the industries. This is contrary to the view of Amann and Virmani (2015) who claim that FDI enhances productivity growth. This contradiction may reflect situations, where FDI has a direct impact only on labour productivity via capital accumulation, without affecting the distance to the frontier. In addition, our sample consists of already well-developed countries, for which FDI is unlikely to bring technology transfer, as it might be the case for less-developed economies.

EXPORTS   Our results show that trade openness (export) is a significant determinant of efficiency in the manufacturing, trade, and transportation industries. There are at least two explanations about an export-led increase in efficiency. First, in the past there was a conception that exports increase efficiency via learning-effects. As reported by the Stiglitz (1996), countries who enjoyed freer trade (and thus more exports) learned from others and thereby increased efficiency. This was achieved by both technical spillovers and knowledge migration. Alternatively, new studies show that there could be another effect: exports do not lead to increased efficiency per se, rather, it is a self-selection phenomenon, whereby the more efficient companies become, the higher exports they have, as reported Graner and Isaksson (2009). Therefore, we cannot be certain which of the effects take place first, but this does not impede our analysis, the conclusion still stands that exports are associated with higher efficiency.

Furthermore, it is reasonable that exports are not a significant efficiency determinant in the construction industry, as demonstrated by our results. This conclusion is supported by Grosso, Jankowska and Gonzales (2008) who report, "the construction sector generally remains a local activity", with a share of total service exports of about 1.8 % among OECD countries.

EFI   The Economic Freedom Index variable was observed to be a significant and robust determinant of efficiency in every industry, except agriculture. We find that 4 out of 9 variables comprising EFI are significant determinates of efficiency in at least one of the industries. We find that property rights, fiscal freedom, government spending, business freedom, and investment freedom are not significant determinants.

This is an interesting insight, since it is contrary to results by Puharts and Kloks (2015), who found that the property rights variable is a significant determinant of efficiency. While Puharts and Kloks chose a sample of three (out of 9) EFI variables, we enlarged the sample to encompass all available variables. This allows for the identification of variables, which are better determinants of efficiency (and thus rendered property rights insignificant).

Also fiscal freedom, measured as a tax burden, is found to be insignificant. Our results are supported by OECD paper on tax and policy reforms (OECD, 2010), which states "effects of [tax] on the long-run level of TFP are estimated to be relatively small".

Our results suggest that, overall, government spending is not a significant determinant of efficiency, and these results are supported by both IISD (n. d.) and a paper by Espinoza (2012), who state that governments can rarely affect industry performance (and thus, efficiency) directly with spending patterns. It is possible that business freedom is not a significant determinant of efficiency, since this variable mostly deals with starting the business. As the most added value is generated by the companies that are already established, this index may not represent any hurdles or assistance to those companies. We find that business freedom and investment freedom have a rather high correlation of 0.54, which explains the insignificance of this variable in explaining efficiency; since both are strongly correlated, the two of them have a similar effect on efficiency.

We find that freedom from corruption is a significant determinant of efficiency in three out of four industries, for which the EFI variable was significant. Higher corruption levels are usually associated with lower efficiency, as documented by Kato and Sato (2014). We note that freedom from corruption is not a significant determinant of efficiency in the manufacturing industry, which can partially be explained by the results reported by OECD (2014). They state that: (1) manufacturing is less exposed to bribery cases than, for instance, construction and transportation; (2) bribes in manufacturing are lower than in other industries, e. g., trade and transportation.

Further, monetary freedom is the only (from EFI sub-variables) significant efficiency determinant in manufacturing. Monetary freedom is comprised of data evaluating price controls and inflation levels. It stands to reason that more stable prices, and hence, also stable and predictable exchange rates, are more beneficial for export intensive industries. This evidence is exhaustively covered by Cavalcanti et al. (2012) who claim that price volatility has a negative impact on exports. Moreover, the manufacturing industry could be exposed to inflationary shocks much more than the construction, trade or transportation industries due to long term contracts in the latter industries (BCG, 2011).

Figure 2. Scores assigned to EFI sub-variables in 2015
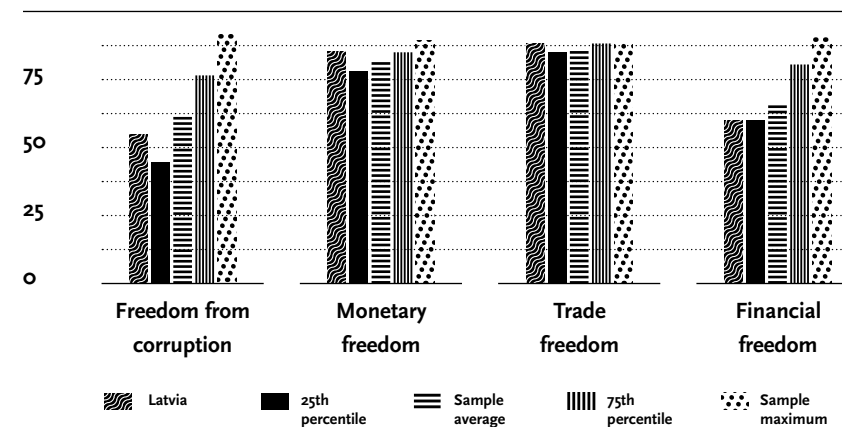
(Created by authors, based on GCI database)

In the Heritage Foundation's methodology, the trade freedom index is composed of two factors: trade-weighted average tariff rate and non-tariff barriers. Both variables include barriers that may hinder exports, consequently, higher coefficient would mean less hindrance to trade. Therefore, it is reasonable that this variable is significant for the trade industry, which is import-dependent. In addition, the transportation industry benefits from trade freedom via freer trade, as noted by ATAG (2005), who claim that transportation is one of the building blocks of the modern world, and that a reduction in international trade barriers has promoted transportation development.

Financial freedom is composed of data about the banking sector and government regulations affecting opportunities to attract funds. Construction, being highly capital dependent, benefits a great deal from more opportunities to attract funds, as evident by the real estate building crisis following the Great Recession (when funds were harder to obtain). Toby and Peterside (2014) document that commercial loans (used as a proxy for financial freedom) in the manufacturing industry does not have a significant impact to value added in the total economy.

In Figure 2 we compare EFI sub-variables' scores assigned to Latvia in 2014 to our sample average scores and maximum scores within our sample. We can see that freedom from corruption and financial freedom are significantly below sample average. It means that fighting corruption, as well as promoting financial freedom is likely to foster catching up with the world production frontier, thus accelerating TFP growth.

GCI   In all industries, pillar 1 (institutions) is a significant determinant of efficiency, if taken alone. However, our results suggest that other pillars are even better determinants of efficiency than pillar 1, since it is rendered not as significant when tested together with other variables. So, the conclusion is, as follows: while better developed institutions promote efficiency in observed industries, the impact is likely to be indirect, for instance, via a better infrastructure and macroeconomic environment.

Our results for infrastructure variable are close to the expected outcome. For construction, trade, and transportation, infrastructure is crucial for generating added value, mainly through roads, railroads, ports and air transport.

We find that macroeconomic stability is an important efficiency determinant for all industries. This is explained by the fact that stability in a macroeconomic environment usually leads to higher ease of doing business which further translates to productivity growth. This view is supported by Bhattacharjee et al. (2009). Moreover, there is a strong association between macroeconomic instability and economic downturn, as reported by Haghighi et al. (2012).

Our results show that efficiency in transportation is less dependent on higher education and training than in construction and trade. This is partly supported by Corrado, Hulten and Sichel (2005), who demonstrate that similar trends were observed in the US, namely, higher education had a much larger impact on trade than on other industries. Moreover, in all the industries pillar 4 (health and primary education) loses its significance, when combined with pillar 5 (higher education and training). All industries require specific skills and knowledge, so there is a relatively higher importance of higher education in comparison with primary education, as discussed by Bloom, Canning and Chan (2006). In addition, for majority of countries in our sample, a very high level of primary education attainment has already been achieved; therefore, the variable is rather similar across the countries and does not explain the differences in inefficiency.

In Figure 3 we compare the GCI pillar scores assigned to Latvia in 2014 to our sample average scores and the maximum scores within our sample. The figure suggests that infrastructure in Latvia is still insufficiently developed in comparison with the other countries within our sample. Thus, there is a space for infrastructure improvement, which has a potential to boost efficiency and therefore also labour productivity in Latvia, particularly in construction, trade, and transportation. Macroeconomic environment indicator in Latvia is above sample average, and higher education and training is almost at par with the sample average. Still, there may be an opportunity for improvement, as Latvia scores substantially below the sample maximum. Further on, each pillar is discussed in detail.

Figure 3. Scores assigned to GCI pillars in 2015
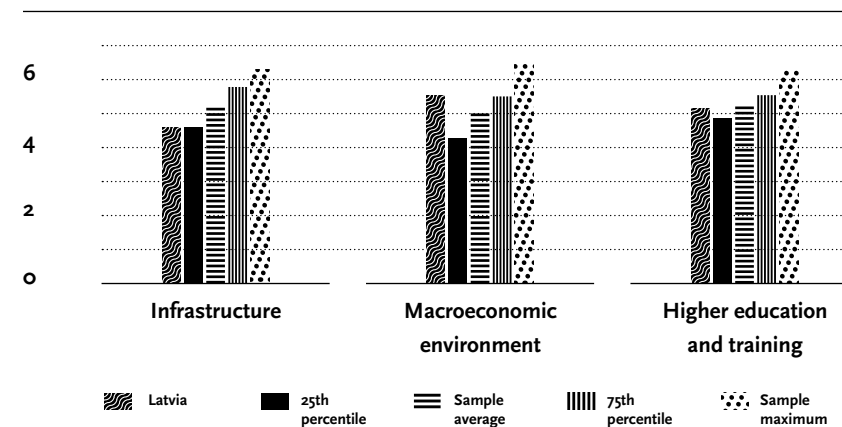
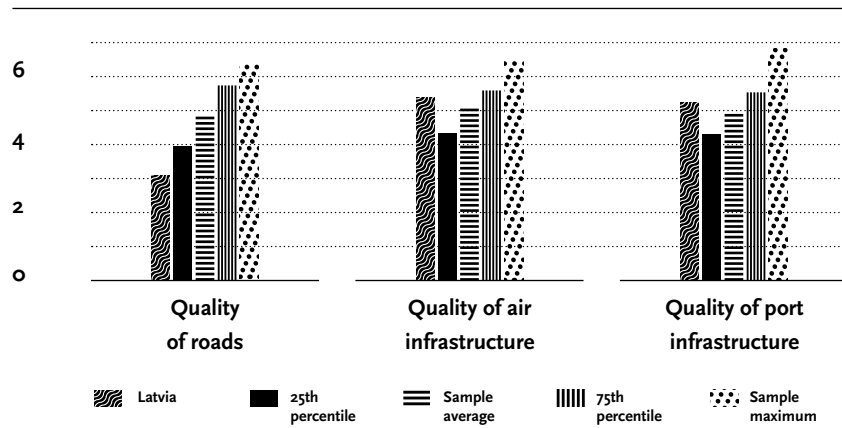(Created by authors, based on GCI database)

Figure 4. Scores assigned to judicial independence in 2015
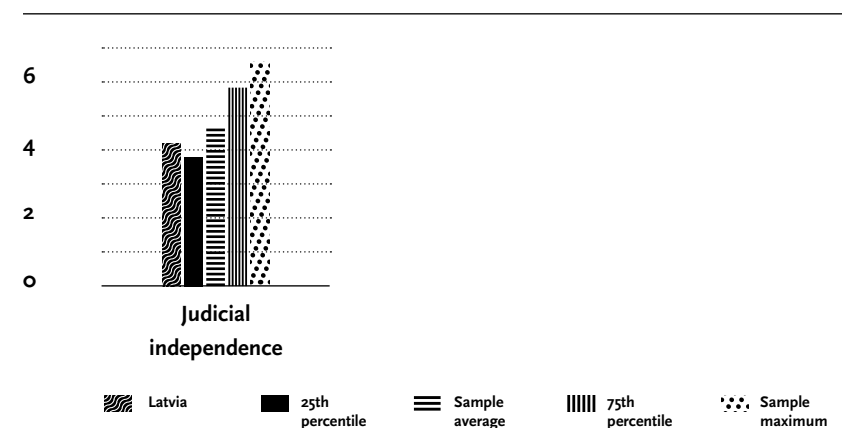
(Created by authors, based on GCI database)

GCI SUB-VARIABLES   We find that improvements in the judicial system have the potential to increase efficiency in construction, trade and transportation. Fox et al. (n. d.) report that a well-functioning judicial system is a crucial component for any economy to perform well. This is important for Latvia, since, according to GCI, the Latvian judicial system is less independent than that of the majority of countries in our sample.

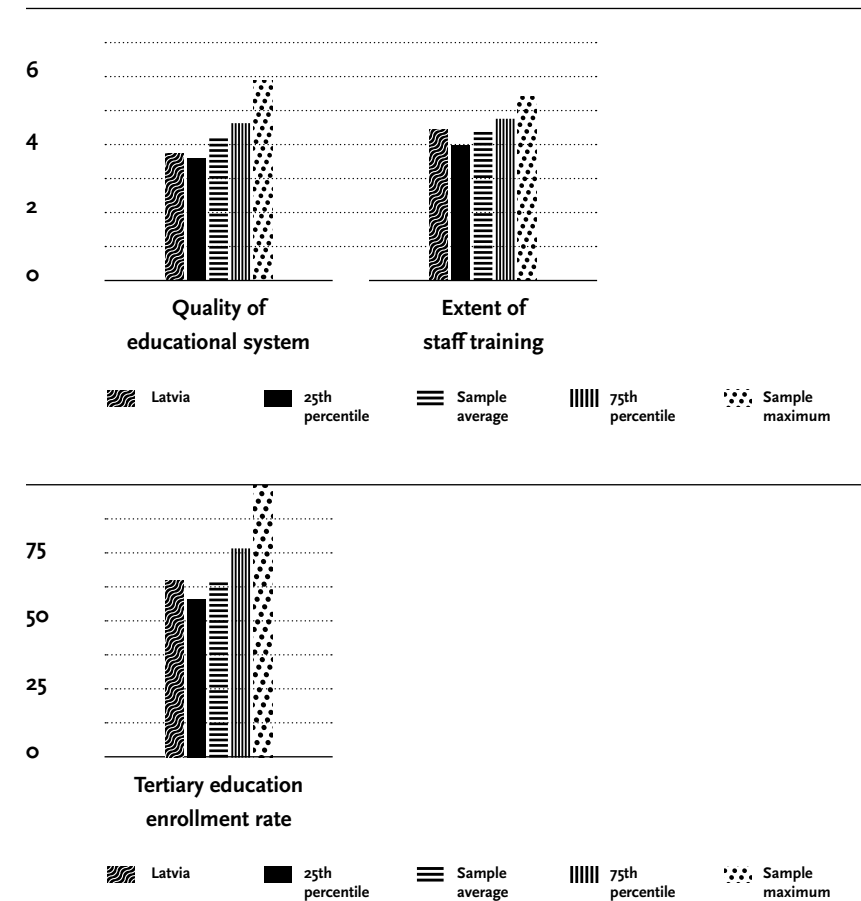**Figure 5. Scores assigned to GCI pillar 2 sub-variables in 2015**

(Created by authors, based on GCI database)

Figure 6. Scores assigned to GCI pillar 5 sub-variables in 2015

Quality of the education system and the extent of staff training are ranged from 1 to 7. Tertiary education enrolment rate is expressed in gross % of people after secondary education. Result above 100 % means that older people (exceeding ratio's target age group) are enrolling in tertiary education. (Created by authors, based on GCI database)

The results suggest that investing in the development of roads, ports or air infrastructure may increase efficiency. We suggest that policy makers should focus on the improvement of the roads in Latvia, as their current quality is substantially lower than the quality of port and air infrastructure, as evident by GCI, which ranks Latvia 108th (out of 144) according to road quality, while 35th and 31st, respectively, in air transport and port infrastructure (GCI, 2016). While the quality of air and port infrastructure in Latvia is above the sample average and not far from the 75th percentile, the quality of roads in Latvia is below the 25th percentile (see Figure 5). Thus, investing in roads might have a large potential to boost efficiency, especially in construction, trade and transportation.

Moreover, we find that higher national savings and lower government debt are associated with higher efficiency. This finding is supported by the World Bank (2011), which report that a higher national savings rate improves economic growth rates and productivity. Moreover, Ceccheti, Mohanty and Zampolli (2011) argue that higher government debt (above 85 % of GDP threshold) is associated with lower growth and damages efficiency in the economy. This is the case for 11 countries in our sample, hence, we believe it as applicable in this analysis. Although the savings rate in Latvia is broadly at par with the sample average and government debt is relatively low, our results imply that maintaining prudent fiscal policy is one of the necessary conditions for a fast catch-up with the world production frontier, and thus, TFP growth.

The quality of the education system in Latvia is below sample average (ranked 65th out of 108 in the latest GCI report). Thus, additional efforts

should be concentrated on improving quality in the education system to achieve higher efficiency. Furthermore, our results suggest that for the construction and transportation industries, the quality of the education system is important to a lesser extent than the staff training, and vice versa for trade industry. This result is supported by the papers of ILO (2001), stating that "[the construction industry] provides employment for those with little education or skill, many of them are from the poorer sections of society".

A similar evidence is recorded by US DL (2007) for the transportation industry. Thus, promoted staff training has the potential to improve efficiency in construction and transportation.

Conclusions
In this paper, we applied the Stochastic Frontier Analysis True Fixed Effects model with time-varying technical progress to the World Input-Output Database to establish, in which industries Latvia has caught up with the world production frontier over the past two decades, and which factors could foster this convergence in the future. A 2-stage Data Envelopment Analysis was employed as a robustness check.

Our results show that (given the amount of capital stock and labour) output of the agriculture, hospitality, trade and transportation industries in Latvia still substantially lags behind its peers. For the last 20 years, construction and private sector services like trade, transportation and hospitality experienced substantial efficiency gains, spurring Total Factor Productivity (TFP) growth well above the average in our country sample. In turn, manufacturing and agriculture have failed to increase efficiency and thus experienced rather low TFP growth. The result for agriculture is justified—the efficiency in this industry cannot be easily influenced, as it depends mainly on climate and soil quality. In turn, manufacturing in Latvia has been rather efficient already in 1995, hence, over the past 20 years this industry has managed to maintain its efficiency. These results answer the first research question: Latvia is more efficient (close to the world production frontier) in construction and manufacturing; and also support our first hypothesis: while technical and efficiency changes differed across industries, TFP growth in all the observed industries was positive.

We documented that the efficiency change in Latvia's agriculture and manufacturing industries was negative, –3.2% and –1.1%, respectively, whereas in construction, hospitality, trade and transportation industries it was significantly positive, 26.7%, 52.6%, 17.8% and 34.5%, respectively. For all industries in Latvia, the technical change was positive and greater than the efficiency change. Thus, our second hypothesis is rejected. This answers our second research question: the technical rather than the efficiency change is the main driver of TFP growth in the analysed industries in Latvia.

Our third hypothesis is partly supported, as we have identified significant and robust efficiency determinants. We find that R&D spending and trade openness are significant efficiency determinants for all industries, while foreign direct investments are not. Furthermore, we document a positive association between efficiency and several variables of the Economic Freedom Index and Global Competitiveness Report. We then perform an analysis on each of the factors to answer the third research question: *How can Latvia foster catching up with the world's production frontier?*

R&D expenditure in Latvia should be promoted in order for efficiency gains to appear in all of the analysed industries. Moreover, higher R&D expenditure in Latvia should positively affect efficiency in high-medium technology manufacturing and thus promote the growth of this industry. Trade openness is an important factor for certain industries: manufacturing, trade, and transportation, hence, export-friendliness should improve efficiency in these industries. We find that the following EFI sub-variables are significant determinants of efficiency: freedom from corruption is a significant determinant for efficiency in the construction, trade, and transportation industries, since international evidence is present that these industries are more associated with bribes than other industries. Monetary freedom: in manufacturing and transportation industries as price and exchange rate stability and predictability are important for export performance. Trade freedom: in trade and transportation, as trade barriers determine the ease of doing business in these industries; while financial freedom is in the construction and trade industries. Prudent reforms in these areas should improve efficiency, especially in the industries that are lagging behind the world production frontier. We also conclude that efficiency in trade, transportation and construction might be increased by improvements in infrastructure. In the context of Latvia's infrastructure, poor road quality is the main factor that is likely to harm efficiency of these industries. According to the results, better quality of higher education is associated with higher efficiency, so adapting the best international educational standards and practices should help Latvian industries in moving towards the world production frontier. Business-friendly institutional reforms, like judicial system improvements and stabilized macroeconomic environment, should raise labour productivity not only by promoting capital accumulation, but also through TFP gains.

We acknowledge the need for further research on the topic for the analysis to be exhaustive. Further research needs to be carried out in a more detailed breakdown of EFI and GCI variables, as well as a subdivision on how the economy of Latvia has developed and what further improvements can be made.

FOREWORD

Beņkovskis, K. (2012). Competitiveness of Latvia's exporters. *Bank of Latvia Working Paper 3/2012.*

Dunning, J. H., & Lundan, S. M. (2008). *Multinational enterprises and the global economy.* Edward Elgar Publishing.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry. productivity. *Econometrica*, 71(6), 1695–1725.

Putniņš, T. (2013). Exporting by Latvian companies: vitality, drivers of success, and challenges. *Baltic Journal of Economics*, 13(2), 3–33.

Radulescu, M., Druica, E., & Omran, A. (2012). The impact of FDIs on exports in Central and Eastern European countries: Empiric evidence from Romania against Poland, Czech Republic and Bulgaria. *International Journal of Academic Research,* 4(6).

Türkcan, K. (2006). Foreign outward direct investment and intermediate goods exports: evidence from USA. Paper presented on the ETSG (2006). Available at: *http://www.etsg.org/ETSG2006/papers/Turkcan.pdf* [Accessed January 22, 2018].

Vanags, A. (2013). Latvia's exports: the real 'success story'. *Baltic Development Forum:* State of the Region Report 2013. Available at: http://www.bsr2013.eu/wp-content/uploads/BDF_SotRR_2013_web.pdf [Accessed January 22, 2018].

The World Bank (2015). Glossary. Available at: http://wits.worldbank.org/glossary.html [Accessed November 1, 2015].

1 DETERMINANTS OF COMPETITIVENESS AND PROPENSITY TO EXPORT

1.1 COMPARISON OF EXPORTING AND NON-EXPORTING ENTERPRISES IN LATVIA

Bellone, F., Musso, P., Nesta, L., & Schiavo, S. (2009). *Financial Constraints and Firm Export Behavior.* Available at: SSRN: https://ssrn.com/abstract=1342342 or http://dx.doi.org/10.2139/ssrn.1342342 [Accessed January 22, 2018].

Eurostat (2015). *Statistics comparing enterprises which trade internationally with those who do not.* Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_comparing_enterprises_which_trade_internationally_with_those_who_do_not#Characteristics_of_exporters [Accessed January 4, 2017].

Girma, S., Greenaway, D., & Kneller, R. (2004). Does Exporting Increase Productivity? A Microeconometric Analysis of Matched Firms. *Review of International Economics*, 12(5), 855–866.

Greenaway, D., Guariglia, A., & Kneller, R. (2007). Financial factors and exporting decisions. *Journal of International Economics*, 73(2), 377–395.

Love, J. H., & Roper, S. (2015) SME innovation, exporting and growth: a review of existing evidence. *International Small Business Journal,* 33(1), 28–48, ISSN 0266–2426.

Putniņš, T. J. (2013). Exporting by Latvian companies: vitality, drivers of success, and challenges. *Baltic Journal of Economics,* 13(2), 5–35. DOI: 10.1080/1406099X.2013.10840531.

Schank, T., Schnabel, C., & Wagner, J. (2010). Higher wages in exporting firms: self-selection, export effect, or both? First evidence from linked employer-employee data. *Review of World Economics*, Springer Verlag, 146(2), 303–322. Available at: https://hal.archives-ouvertes.fr/hal-00578276/document [Accessed January 22, 2018].

Wagner, J. (2007). Exports and productivity: a survey of the evidence from firm-level data. *The World Economy,* 30, 60–82.

1.2 EUROPEAN FUNDING: DOES IT INDUCE EXPORTING?

Aitken, B., Hanson, G., & Harrison, A. (1997). Spillovers, foreign investment, and export behavior. *Journal of International Economics,* 43(1–2), 103–132.

Becker, S., & Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *The Stata Journal,* 2(4), 358–377.

Bernard, A., & Jensen, B. (2004). Why some firms export. *The Review of Economics*, 86(2), 561–569.

Bernard, A., & Jensen, B. (2007). Firm structure, multinationals, and manufacturing plant deaths. *The Review of Economics and Statistics*, 89(2), 193–204.

Card, D., & Kreuger, A. B. (1995). Myth and measurement—The new economics of the minimum wage. *Journal of Economics,* 62(1), 97–100.

Criscuolo, C., Martin, R., Overman, H., & Van Reenen, J. (2012). *The causal effects of an industrial policy.* Cambridge: National Bureu of Economic Research.

Das, S., Roberts, M., & Tybout, J. (2007). Market entry costs, producer heterogeneity, and export dynamics. *Econometrica,* 75(3), 837–873.

Durand, M., & Giorno, C. (1987). Indicators of international competitiveness: Conceptual aspects and evaluation. *OECD Journal: Economic Studies*, 147–182.

The European Commission (2017a). *Agriculture and rural development.* Available at: http://ec.europa.eu/agriculture/rural-development–2014–2020_en [Accessed January 22, 2018].

The European Commission (2017b). *European Regional Development Fund.* Available at: http://ec.europa.eu/regional_policy/en/funding/erdf/ [Accessed January 22, 2018].

European Structural and Investment Fund (2016, April). *Accepted criteria.* Available at: https://komitejas.esfondi.lv/_layouts/15/start.aspx#/Saistoie%20dokumenti/Forms/visi.aspx?RootFolder=%2FSaistoie%20dokumenti%2FApstiprin%C4%81tie%20krit%C4%93riji&View=%7B8C9DF280%2DDFFC7%2D4659%2D93C7%2D143EFC7A47F4%7D [Accessed January 22, 2018].

The European Union (2017). *EU Funding.* Available at: https://europa.eu/european-union/about-eu/funding-grants_en [Accessed January 22, 2018].

Girma, S., Gorg, H., & Strobl, E. (2007). The effects of government grants on plant survival: A micro-econometric analysis. *International Journal of Industrial Organization,* 25, 701–720.

Girma, S., Greenaway, D., & Kneller, R. (2004). Does exporting increase productivity? A microeconomic analysis of matched firms. *Review of International Economics,* 12(5), 855–866.

Greenaway, D., & Kneller, R. (2004). Exporting and productivity in the United Kingdom. *Oxford Review of Economic Policy,* 20(3), 358–371.

Johnsson, J., Rothman, A., & Wishart, I. (2016). *Boeing received illegal tax subsidy for 777X, WTO panel says.* Available at: http://www.bloomberg.com/news/

articles/2016–11–28/boeing-received-illegal-tax-subsidy-for–777x-wto-panel-finds [Accessed January 22, 2018].

Kangahsharju, A. (2005). Do wage subsidies increase employment in subsidized firms? *Econometrica,* 74, 51–67.

Kneller, R., & Pisu, M. (2007). Industrial linkages and export spillovers from FDI. *The World Economy,* 30(1), 105–134.

Latvian Ministry of Finance (2013). 2007–2013 *EU fund planning period financing distribution.* Available at: http://esfondi.lv/finansejuma-sadalijums [Accessed January 22, 2018].

Latvian Ministry of Finance (2017). *ESIF Activities.* Available at: http://www.esfondi.lv/aktivitates [Accessed January 22, 2018].

Masso, J., & Vahter, P. (2015). Exporting and productivity: The effects of multi-product and multi-market export entry. *Scottish Journal of Political Economy,* 325–350.

Republic of Latvia Ministry of Agriculture (2017). EU *produce promotion policy.* Available at: https://www.zm.gov.lv/zemkopibas-ministrija/statiskas-lapas/es-produktu-veicinasanas-politika?id=1551#jump [Accessed January 22, 2018].

Republic of Latvia Ministry of Finance (2015). *European Regional Development Fund.* Available at: http://www.esfondi.lv/eiropas-regionalas-attistibas-fonds [Accessed January 22, 2018].

Republic of Latvia Ministry of Finance (2016). *Report on the horizontal priority "Macroeconomic Stability", its execution and results in 2015.* Riga: Latvian Ministry of Finance.

Rosenbaum, P., & Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika,* 41–55.

Rural Support Department (2013). *Operative information regarding EAFRD financed projects.* Available at: http://www.lad.gov.lv/files/elfla_2007_2013.pdf [Accessed January 22, 2018].

Rural Support Department (2017). *Financing recipients.* Available at: https://eps.lad.gov.lv/payment_recipients [Accessed January 22, 2018].

Vit Būve (2017). *A new home in a week.* Available at: http://vitbuve.lv/jauns-majas-projekts/ [Accessed January 22, 2018].

World Trade Organization (2016). *Export competition/subsidies.* Available at: https://www.wto.org/english/tratop_e/agric_e/ag_intro04_export_e.htm [Accessed January 22, 2018].

1.3 NOTE ON EXPORTING FIRMS AND SHADOW ECONOMY IN LATVIA: DATA MINING INVESTIGATION

Angrist, J. D., & Pischke, J.-S. (2008). *Almost Harmless Econometrics: An Empiricist's Companion.* Princeton University Press.

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2011). *The empirics of firm heterogeneity and international trade* (No. w17627). National Bureau of Economic Research.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695–1725.

The World Bank (2015). Glossary. Available at: http://wits.worldbank.org/glossary.html [Accessed January 22, 2018].

1.4 HOW DOES PARTICIPATING IN SHADOW ECONOMY AFFECTS THE GROWTH OF LATVIAN FIRMS

Aidis, R., & Praag, M. (2004). Illegal Entrepreneurship Experience. *Tinbergen Institute Discussion Papers 04–105/3.* Tinbergen Institute.

Amaral, P., & Quintin, E. (2006). A competitive model of the informal sector. *Journal of Monetary Economics*, 53(7), 1541–1553.

Bamford, C., Dean, T., & McDougall, P. (1997). Initial Strategies and New Venture Growth: An Examination of the Effectiveness of Broad vs. Narrow Breadth Strategies. *Frontiers of Entrepreneurship Research 1997.*

Becchetti, L., & Trovato, G. (2002). The determinants of growth for small and medium sized firms. The role of the availability of external finance. *Small Business Economics*, 19(4), 291–306.

Bhattacharyya, D. (1999). On the Economic Rationale of Estimating the Hidden Economy. *Economic Journal* 109(3), 348–359.

Bigsten, A., & Gebreeyesus, M. (2007). The small, the young, and the productive: Determinants of manufacturing firm growth in Ethiopia. *Economic Development and Cultural Change*, 55(4), 813–840.

Cagan, P. (1958). The demand for currency relative to total money supply. In *The Demand for Currency Relative to Total Money Supply.* NBER.

Clotfelter, C. (1983). Tax evasion and tax rates: An analysis of individual returns. *The review of economics and statistics*, 65(3), 363–373.

Contini, B. (1981). Labor Market Segmentation and the Development of the Parallel Economy-The Italian Experience. *Oxford economic papers*, 33(3), 401–412.

De Soto, H. (1989). *The Other Path.* New York, NY: Basic Books.

De Soto, H. (2000). *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else.* New York, NY: Basic Books.

Del Boca, D. (1981). Parallel economy and allocation of time. *Quarterly Journal of Microeconomics*, 4(2), 13–18.

Dreher, A., Kotsogiannis, C., & McCorriston, S. (2008). *How do institutions affect corruption and the shadow economy?* International Tax and Public Finance.

Dreher, A., & Schneider, F. (2010). Corruption and the shadow economy: an empirical analysis. *Public Choice*, 144(1–2), 215–238.

Dunne, P., & Hughes, A. (1994). Age, size, growth and survival: UK companies in the 1980s. *The Journal of Industrial Economics*, 42(2), 115–140.

Farrell, D. (2004). The Hidden Dangers of the Informal Economy. *McKinsey Quarterly,* 3, 27–37.

Feige, E. (1986). A Re-examination of the "Underground Economy" in the United States: A Comment on Tanzi. *International Monetary Fund*, 33(4), 768–781.

Feige, E. (1990). Defining and estimating underground and informal economies: The new institutional economics approach. *World development*, 18(7), 989–1002.

Feige, E. (1994). The underground economy and the currency enigma. *Public Finance*, 49(Suppl.), 119–36.

Feinstein, J. (1991). An econometric analysis of income tax evasion and its detection. *Journal of Economics*, 22(1), 14–35.

Feld, L., & Schneider, F. (2010). Survey on the shadow economy and undeclared earnings in OECD countries. *German Economic Review*, 11(2), 109–149.

Franz, A. (1985). Estimates of the hidden economy in Austria on the basis of official statistics. *Review of Income and Wealth*, 31(4), 325–333.

Friedman, E., Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of public economics*, 76(3), 459–493.

Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2013). Human Capital and Regional Development. *The Quarterly Journal of Economics,* 128(1), 105–164.

Gërxhani, K. (2007). "Did you pay your taxes?" How (not) to conduct tax evasion surveys in transition countries. *Social Indicators Research*, 80(3), 555–581.

Gershuny, J. (1979). The informal economy: Its role in post-industrial society. *Futures,* 11, 3–15.

Giles, D. (1999). Measuring the hidden economy: Implications for econometric modelling. *The Economic Journal*, 109(456), 370–380.

Giles, D., Tedds, L., & Werkneh, G. (2002). The Canadian underground and measured economies: Granger causality results. *Applied Economics*, 34(18), 2347–2352.

Goddard, J., Wilson, J., & Blandon, P. (2002). Panel tests of Gibrat's law for Japanese manufacturing. *International Journal of Industrial Organization*, 20(3), 415–433.

Golovko, E., & Valentini, G. (2011). Exploring the complementarity between innovation and export for SMEs' growth. *Journal of international business Studies*, 42(3), 362–380.

Gomory, R. (1994). A Ricardo Model with Economies of Scale. *Journal of Economic Theory*, 62, 394–419.

Harding, P., & Jenkins, R. (1989). *The myth of the hidden economy: Towards a new understanding of informal economic activity.* Philadelphia: Open University Press, Milton Keynes.

Hibbs, D., & Piculescu, V. (2005). *Institutions, corruption and tax evasion in the unofficial economy.* Göteborg, Department of Economics.

Hindriks, J., Muthoo, A., & Keen, M. (1999). Corruption, extortion and evasion. *Journal of Public Economics*, 74, 395–430.

Hsieh, C., & Olken, B. (2014). The missing "missing middle". *The Journal of Economic Perspectives*, 28(3), 89–108.

Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (1998). Regulatory discretion and the unofficial economy. *The American Economic Review*, 88(2), 387–392.

Kazemier, B., & Van Eck, R. (1992). Survey investigations of the hidden economy: Some methodological results. *Journal of Economic Psychology*, 13(4), 569–587.

La Porta, R., & Shleifer, A. (2008). The Unofficial Economy and Economic Development. *Brookings Papers on Economic Activity*, Fall, 275–352.

La Porta, R., & Shleifer, A. (2014). Informality and Development. *Journal of Economic Perspectives*, 28(3), 109–126.

Lipsey, R., Sjöholm, F., & Sun, J. (2010). Foreign ownership and employment growth in Indonesian manufacturing. *National Bureau of Economic Research.*

Loayza, N. (1996). The economics of the informal sector: a simple model and some empirical evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy*, 45(1), 129–162.

Love, J., & Ganotakis, P. (2013). Learning by exporting: Lessons from high-technology SMEs. *International business review*, 22(1), 1–17.

McPherson, M. (1996). Growth of micro and small enterprises in southern Africa. *Journal of development economics*, 48(2), 253–277.

Muller, P., Conlon, G., Lewis, M., & Mantovani, I. (2013). *From Shadow to Formal Economy: Levelling the Playing Field in the Single Market.* Policy Department: Economic and Scientific Policy.

Pedersen, S. (2003). *The shadow economy in Germany, Great Britain and Scandinavia: a measurement based on questionnaire surveys.* Rockwool Foundation Research Unit.

Putniņš, T., & Sauka, A. (2015). Measuring the shadow economy using company managers. *Journal of Comparative Economics*, 43(2), 471–490.

Queiro, F. (2015). *Essays on Entrepreneurship and Innovation.* Doctoral dissertation.

Rauch, J. (1991). Productivity Gains from Geographic Concentration of human Capital: Evidence from the Cities. *NBER Working Papers,* 3905.

Reichstein, T., & Dahl, M. (2004). Are firm growth rates random? Analyzing patterns and dependencies. *International Review of Applied Economics*, 18(2), 225–246.

Renooy, P. (1990). *The informal economy: Meaning, measurement and social significance.* Netherlands Geographical Studies.

Robson, P., & Bennett, R. (2000). SME growth: The relationship with business advice and external collaboration. *Small business economics*, 15(3), 193–208.

Sauka, A., & Putniņš, T. (2011). *Shadow economy index for the Baltic countries 2009 and 2010.* Report, Stockholm School of Economics in Riga.

Schneider, F. (1998). *Further Empirical Results of the Size of the Shadow Economy of 17 OECD-Countries over Time.* Congress of the IIPF Cordowa, Argentina and discussion paper, Department of Economics, University of Linz, Linz, Austria.

Schneider, F., & Enste, D. (2000). Shadow Economies around the World Size, Causes, and Consequences. *IMF Working Paper No. 00/26.* Available at: https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Shadow-

Economies-Around-the-World-Size-Causes-and-Consequences–3435 [Accessed January 22, 2018].

Sexton, D. L., & Bowman-Upton, N. (1991). *Entrepreneurship: Creativity and growth.* Macmillan Pub Co.

Smith, J. (1985). Market motives in the informal economy. In *The economics of the shadow economy.* Springer, Berlin, Heidelberg.

Tanzi, V. (1982). *Underground Economy and Tax Evasion in the United States: Estimates and Implications.* The Underground Economy in the United States and Abroad, Lexington Books.

Torgler, B. (2007). *Tax compliance and tax morale: a theoretical and empirical analysis.* Edward Elgar Publishing.

Virta, H. (2007). Corruption and Shadow Economy: Differences in the Relationship between Countries. *Discussion Paper No. 171.* Helsinki Center of Economic Research.

Zienkowski, L. (1996). The Polish Experience in Estimates of the Hidden Economy. *Research Bulletin*, 5(1), 3–8.

2   EFFICIENCY AND COMPETITIVENESS

2.1   IMPACT OF MANAGERIAL OWNERSHIP ON ENTERPRISE PERFORMANCE IN THE BALTIC STATES

Al Farooque, O., Van Zijl, T., Dunstan, K., & Waresul Karim, A. K. M. (2007). Ownership structure and corporate performance: Evidence from Bangladesh. *Asia-Pacific Journal of Accounting and Economics,* 14(2), 127–49. Available at: https://www.cb.cityu.edu.hk/research/apjae/document/14–2/127–150%20Ownership%20Structure%20andCorporate%20Performance%20%20Evidence%20from%20Bangladesh.pdf [Accessed January 22, 2018].

Baltic Institute of Corporate Governance (2011). Corporate governance guidance and principles for unlisted companies in the Baltics. Available at: http://www.corporategovernance.lt/uploads/docs/Corporate%20Governance%20Guidance%20and%20Principles%20for%20Unlisted%20Companies%20in%20the%20Baltics%20ENG.pdf [Accessed January 22, 2018].

Baltic Legal (n. s.). Estonia company formation and registration. Available at: http://www.baltic-legal.com/estonia-company-formation-and-registration-eng.htm [Accessed January 22, 2018].

Bebchuk, L., Kraakman, R., & Triantis, G. (2000). Stock pyramids, cross-ownership, and dual class equity: the creation and agency costs of separating control from cash flow rights. In R. Morck (ed.), *Concentrated Corporate Ownership*, 445–460. Available at: http://www.law.harvard.edu/faculty/bebchuk/pdfs/2000.Bebchuk-Kraakman-Triantis.Stock.Pyramids.pdf [Accessed January 22, 2018].

Beiner, S., Drobetz, W., Schmid, M. M., & Zimmermann, H. (2004). An integrated framework of corporate governance and firm valuation — evidence from Switzerland. *SSRN Electronic Journal,* 34. Available at: https://www.researchgate.net/publication/228945458_An_Integrated_Framework_of_Corporate_Governance_and_Firm_Valuation_-_Evidence_from_Switzerland [Accessed January 22, 2018].

Berle, A. A., & Means, G. C. (1932). Property in Transition. In M. L. Weidenbaum, & M. Jensen (eds.), The Modern Corporation and Private Property. New Brunswich, NB, London, LDN: Transaction Publishers.

Bohren, O., & Odegaard, B. A. (2005). Governance and performance revisited. *ECGI — Finance Working Paper No. 28/2003.* Available at: http://ssrn.com/abstract=423461 [Accessed January 22, 2018].

Börsch-Supan, A., & Köke, J. (2002). An applied econometricians' view of empirical corporate governance studies. *German Economic Review,* 3, 295–326. Available at: ftp://ftp.zew.de/pub/zew-docs/dp/dp0017.pdf [Accessed January 22, 2018].

Burgstahler, D. C., Hail, L., & Leuz, C. (2006). The importance of reporting incentives: Earnings management in European private and public firms. *The Accounting Review,* 81(5), 983–1016. Available at: http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=4dd2620a–3306–43d5-bcb1–912f96401564%40sessionmgr4002&vid=5&hid=4206 [Accessed January 22, 2018].

Cheng, P., Nancy Su, L., & Kevin Zhu, X. (2012). Managerial ownership, board monitoring and firm performance in a family-concentrated corporate environment. *Accounting and Finance,* 52(4), 1061–1081. Available at: http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=7&sid=4dd2620a–3306–43d5-bcb1–912f96401564%40sessionmgr4002&hid=4206 [Accessed January 22, 2018].

Cho, M. H. (1998). Ownership structure, investment, and the corporate value: An empirical analysis. *Journal of Financial Economics,* 47(1), 103–121. Available at: http://web.a.ebscohost.com/ehost/command/detail?sid=4dd2620a–3306–43d5-bcb1–912f96401564%40sessionmgr4002&vid=10&hid=4206 [Accessed January 22, 2018].

Daskalakis, N., & Psillaki, M. (2008). Do country of firm factors explain capital structure? Evidence from SMEs in France and Greece. *Applied Financial Economics*, 18, 87–97.

Dauksaite, V. (2009). *Akcijų opcionas kaip darbuotojo skatinimo priemonė* [Stock option as a tool for motivating an employee]. Vilnius University. Available at: http://vddb.laba.lt/fedora/get/LT-eLABa 0001:E.02~2009~D_20101125_190644–95173/DS. 005.1.01.ETD [Accessed January 22, 2018].

Demsetz, H., & Villalonga, B. (2001). Ownership structure and corporate performance. *Journal of Corporate Finance,* 7(3), 209–233. Available at: http://people.stern.nyu.edu/bvillalo/DemsetzVillalonga_JCF2001.pdf [Accessed January 22, 2018].

EBRD (2004). *Corporate governance sector assessment project.* Available at: http://www.ebrd.com/downloads/legal/corporate/report04.pdf [Accessed January 22, 2018].

Estonian Investment Agency (n. d.). Establishing a company. Available at: http://www.investinestonia.com/en/investment-guide/establishing-a-company [Accessed January 22, 2018].

European Commission (2012). Impact assessment of costs and benefits of improving the gender balance in the boards of companies listed on stock exchanges. Available at: http://ec.europa.eu/justice/gender-equality/files/womenonboards/impact_assesment_quotas_en.pdf [last viewed on January 22, 2018].

The European Commission (2014). Proposal for a Directive of the European Parliament and of the Council amending Directive 2007/36/EC as regards the encouragement of long-term shareholder engagement and Directive 2013/34/EU as regards certain elements of the corporate governance

statement. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/HT
ML/?uri=CELEX:52014PC0213&from=EN [Accessed January 22, 2018].

The European Commission (2015). What is an SME. Available at: http://ec.europa.eu/
growth/smes/business-friendly-environment/sme-definition/index_en.htm
[Accessed January 22, 2018].

Evidence from China's civilian-run firms. *Australasian Accounting, Business and
Finance Journal*, 5(3), 73–92.
Available at: http://ro.uow.edu.au/cgi/viewcontent.
cgi?article=1210&context=aabfj [Accessed January 22, 2018].

Fama, E.F. (1980). Agency problems and the theory of the firm. *Journal of political
economy,* 88(2), 288–307. Available at: https://business.illinois.edu/josephm/
BA549_Fall%202010/Session%205/Fama%20(1980).pdf [Accesssed January 22,
2018].

Fama, E.F., & French, K.R. (1992). The cross-section of expected stock returns. *The
Journal of Finance,* 47(2), 427–465.
Available at: http://www.bengrahaminvesting.ca/Research/Papers/French/
The_Cross-Section_of_Expected_Stock_Returns.pdf [Accessed January 22,
2018].

Fare, R., Grosskopf, S., & Knox Lovell, C.A. (1985). *Introduction. The measurement of
efficiency of production.* New York, NY: Kluwer-Nijholf Publishers, 11–12.

Foerster, S.R., & Sapp, S.G. (2005). Valuation of financial versus non-financial firms:
A global perspective. *Int. Fin. Markets, Inst. and Money,* 15, 1–20. Available at:
http://ejournal.narotama.ac.id/files/Valuation%20of%20financial%20vs%20
non-financial%20firms.pdf [Accessed January 22, 2018].

Gbadamosi, A. (n.d.). *Understanding the developed/developing country taxonomy.*
Available at: http://www.a4id.org/blog/understanding-developeddeveloping-
country-taxonomy [Accessed January 22, 2018].

Government of the Republic of Lithuania (2003). Dėl juridinių asmenų registro
įsteigimo ir juridinių asmenų registro nuostatų patvirtinimo [Due to
the establishment of commercial register and the commercial register
regulations]. (National news: No. 107–4810). Vilnius. Available at: http://www3.
lrs.lt/pls/inter3/dokpaieska.showdoc_e?p_id=221119&p_tr2=2 [Accessed
January 22, 2018].

Gulamhussen, M.A., Pinheiro, C., & Sousa, R. (2012). The Influence of Managerial
Ownership on Bank Market Value, Performance, and Risk: Evidence
from Banks Listed on the Stoxx Global Index. *Journal of International
Financial Management & Accounting,* 23(2), 121–153. Available at: http://
web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=4dd2620a–3306–
43d5-bcb1–912f96401564%40sessionmgr4002&vid=16&hid=4206 [Accessed
January 22, 2018].

Himmelberg, C.P., Hubbard, R.G., & Palia, D. (1999). Understanding the
determinants of managerial ownership and the link between ownership

and performance. *Journal of Financial Economics,* 53(3), 353–384. Available
at: https://www0.gsb.columbia.edu/faculty/ghubbard/Articles%20
for%20Web%20Site/Understanding%20the%20Determinants%20of%20
Managerial%20Ownership%20and%20t.pdf [Accessed January 22, 2018].

IMF (2015a). *World Economic Outlook.* Available at: http://www.imf.org/external/
pubs/ft/weo/2015/01/pdf/text.pdf [Accessed January 22, 2018].

IMF (2015b). *Frequently Asked Questions. World Economic Outlook (WEO).* Available at:
https://www.imf.org/external/pubs/ft/weo/faq.htm#q4b [Accessed January
22, 2018].

Jensen, M. (1993). The modern industrial revolution, exit and the failure of internal
control systems. *Journal of Finance,* 48(3), 831–880. Available at: https://fdp.
hse.ru/data/084/482/1225/Sept%2016%20The%20Modern%20Industrial%20
Revolution..ure%20of%20Internal%20Control%20Systems.pdf [Accessed
January 22, 2018].

Jensen, M.C., & Meckling, W.H. (1976). Theory of the firm: Managerial behavior,
agency costs and ownership structure. *Journal of Financial Economics,* 3(4),
305–360. Available at: http://uclafinance.typepad.com/main/files/jensen_76.
pdf [Accessed January 22, 2018].

Joh, S.W. (2003). Corporate governance and firm profitability: Evidence from
Korea before the economic crisis. *Journal of Financial Economics,* 68(2),
287–322. Available at: http://down.cenet.org.cn/upfile/39/2005629160025.pdf
[Accessed January 22, 2018].

Kalemli Ozcan, S., Sorensen, B., & Yesiltas, S. (2012). Leverage across firms, banks,
and countries. *Journal of International Economics,* 88(2), 284–298. Available at:
http://www.sciencedirect.com/science/article/pii/S0022199612000529

Kaserer, C., & Moldenhauer, B. (2008). Insider ownership and corporate perfor-
mance—evidence from Germany. *Review of Managerial Science,* 2(1), 1–35.
Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=891899
[Accessed January 22, 2018].

Klauberg, T., Muravska, T., Mygind, N., & Rezepina, I. (2006). *Financial participation
of employees in Latvia.* Available at: http://openarchive.cbs.dk/bitstream/
handle/10398/7114/wp61%20financial%20participation%20of%20employee%20
in%20latvia.pdf?sequence=1 [Accessed January 22, 2018].

KPMG International. (2015). Corporate tax rates tables. Available at: https://home.
kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-
online/corporate-tax-rates-table.html [Accessed January 22, 2018].

Kreston International. (2016). Doing business in Estonia. Available at: http://www.
kreston.com/content/doing-business/estonia.ashx [Accessed January 22,
2018].

Laitinen, E.K., & Suvas, A. (2013). International Applicability of Corporate Failure
Risk Models Based on Financial Statement Information: Comparisons across
European Countries. *Journal of Finance & Economics,* 1(3), 01–26. Available at:

http://www.todayscience.org/JFE/article/jfe.v1i3p01.pdf [Accessed January 22, 2018].

Lipton, M., & Lorsch, J. W. (1992). A modest proposal for improved corporate governance. *Business Lawyer,* 48(1), 59–77.

Loderer, C., & Martin, K. (1997). Executive stock ownership and performance: Tracking faint traces. *Journal of Financial Economics*, 45(2), 223–255. Available at: http://www.sciencedirect.com/science/article/pii/S0304405X97000172 [Accessed January 22, 2018].

Mandaci, P., & Gumus, G. (2010). Ownership concentration, managerial ownership and firm performance: Evidence from Turkey. *South East European Journal of Economics and Business,* 5(1), 57–66. Available at: http://web.a.ebscohost. com/ehost/pdfviewer/pdfviewer?vid=24&sid=4dd2620a–3306–43d5-bcb1– 912f96401564%40sessionmgr4002&hid=4206 [Accessed January 22, 2018].

Mazanti-Andersen, K. J., & Partnere in cooperation with Sorainen (2008). Business guide Lithuania. Available at: http://www.danskebank.se/sv-se/Foretag/ Stora-foretag/Internationell-verksamhet/Internationell-etablering/ Documents/Business_Guide_Lithuania.pdf [Accessed January 22, 2018].

McConnell, J. J., & Servaes, H. (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics,* 27(2), 595–612. ..Available at: http://faculty.london.edu/hservaes/jfe1990.pdf [Accessed January 22, 2018].

McGahan, A. M., & Porter, M. E. (1997). How much does industry matter, really? *Strategic Management Journal,* 18, 15–30. Available at: http://www.wiley.com/college/man/saloner380717/cases/ mcgahan.pdf [Accessed January 22, 2018].

Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics,* 38(2), 163–184. Available at: http://www.sciencedirect.com/science/article/pii/0304405X9400809F [Accessed January 22, 2018].

Miguel, A., Pindado, J., & Torre C. (2004). Ownership structure and firm value: New evidence from Spain. *Strategic Management Journal,* 25(12), 1199–1207. Available at: http://web.a.ebscohost.com/ehost/ pdfviewer/pdfviewer?vid=27&sid=4dd2620a–3306–43d5-bcb1– 912f96401564%40sessionmgr4002&hid=4206 [Accessed January 22, 2018].

Morck, R., Shleifer, A., & Vishny, R. W. (1987). Management ownership and market valuation: an empirical analysis. *Journal of Financial Economics,* 20, 293–315. Available at: http://scholar.harvard.edu/files/shleifer/files/mgt-own-mkt-val. pdf [Accessed January 22, 2018].

Mueller, E., & Spitz, O. A. (2006). Managerial ownership and company performance in German small and medium-sized private enterprises. *German Economic Review,* 7(2), 233–47. Available at: http://web.a.ebscohost.com/ ehost/pdfviewer/pdfviewer?vid=29&sid=4dd2620a–3306–43d5-bcb1– 912f96401564%40sessionmgr4002&hid=4206 [Accessed January 22, 2018].

Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance,* 39(3), 574–592. Available at: http://ecsocman.hse.ru/data/851/126/1231/myers_-_ cs_puzzle_1983.pdf [Accessed January 22, 2018].

Mygind, N. (2007). The development of corporate governance in the Baltic countries. *CEES Working Paper No. 64, CBS.* Available at: http://openarchive. cbs.dk/bitstream/handle/10398/7090/wp64%202007.pdf?sequence=1 [Accessed January 22, 2018].

Noreika, M. (2014). *Geriausių biržos bendrovių sąraše — daugiau lietuviškų pavadinimų* [Baltic Corporate Excellence Award 2014 in Lithuanian news]. Available at: http://www.ceams.ch/en/press-media-centre/ an-introduction-to-the-world-of-quality–9/ [Accessed January 22, 2018].

Rimas, J. (2009). *Akcijų opcionai kaip privataus kapitalo investuotojo ir bendrovės vadovų interesų derinimo priemonė* [Stock options as a means to align the interests of the private equity investor and target managers]. Available at: http://www.zurnalai.vu.lt/teise/article/download/267/217 [Accessed January 22, 2018].

Ruan, W., Tian, G. G. & Ma, S. (2009). Managerial ownership, capital structure and firm value. *Corporate Ownership and Control, 7 (2),* 71–82. Available at: http:// ro.uow.edu.au/commpapers/690/ [Accessed January 22, 2018]

Rumelt, R. P. (1991). How much does industry matter? *Strategic Management Journal,* 12, 167–185. Available at: http://www.wiggo.com/mgmt8510/ Readings/Readings4/rumelt1991smj.pdf [Accessed January 22, 2018].

Schmalensee, R. (1985). Do markets differ much? *The American Economic Review,* 75, 341–351. Available at: http://kendlevidian.pbworks.com/f/ Schmalensee–1985.pdf [Accessed January 22, 2018].

Seimas of the Republic of Lithuania (2014). *Law on companies (13 July 2000 No. VIII–1835, as last amended on 14 October 2014 — No XII–1224)*, Vilnius.

Severin, É. (2001). Ownership Structure and the Performance of Firms: Evidence from France. *European Journal of Economic and Social Systems,* 15(2), 85–107. Available at: http://ejess.edpsciences.org/articles/ejess/ pdf/2001/02/severin.pdf [Accessed January 22, 2018].

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance,* 52(2), 737–783. Available at: http://scholar.harvard.edu/files/ shleifer/files/surveycorpgov.pdf [Accessed January 22, 2018].

Short, H., & Keasey, K. (1999). Managerial ownership and the performance of firms: Evidence from the UK. *Journal of Corporate Finance*, 5, 79–101. Available at: http://www.sciencedirect.com/science/article/pii/ S0929119998000169 [Accessed January 22, 2018].

Siems, M., & Cabrelli, D. (eds.) (2013). *General case on directors' duties.* Comparative Company Law *(*pp. n. s.). The United Kingdom, UK: Hart Publishing Ltd.

Simoneti, M., & Gregoric, A. (2004). Managerial ownership and corporate performance in Slovenian post-privatisation period. *The European Journal*

of Comparative Economics, 1(2), 217–241. Available at: https://www.cerge-ei.cz/pdf/gdn/rrc/RRCIV_35_paper_01.pdf [Accessed January 22, 2018].

Stefano, T. F. (2008). *Should a private company have a board of directors?* Available at: http://www.ecommercetimes.com/story/61536.html [Accessed January 22, 2018].

Steyn, R. (2013). *5 key differences between a private and public company*. Available at: http://ventureburn.com/2013/06/thinking-of-going-public-heres–5-key-things-you-should-know/ [Accessed January 22, 2018].

Stulz, R. M. (1988). On takeover resistance, managerial discretion, and shareholder wealth. *Journal of Financial Economics*, 20, 25–54.

Summers, N. (2013). *A new way to trade shares in private companies*. Available at: http://www.bloomberg.com/bw/articles/2013–03–06/a-new-way-to-trade-shares-in-private-companies [Accessed January 22, 2018].

Vasiliou, D., Eriotis, N., & Daskalakis, N. (2009). Testing the pecking order theory: the importance of methodology. *Qualitative Research in Financial Markets*, 1(2), 85–96.

Verseckas, D. (2015). *Pasirinkimo sandorių nesudaro dėl didelių mokesčių ir reglamentų stygiaus* [Stock options are not widely used due to high taxes and lack of regulation]. Available at: http://vz.lt/smulkusis-verslas/2015/09/22/pasirinkimo-sandoriunesudaro-del-dideliu-mokesciu-ir-reglamentu-stygiaus#ixzz43NKwoX2X [Accessed January 22, 2018].

Viale, A. M., James, K. W., & Donald, F. R. (2009). Common risk factors in bank stocks. *Journal of Banking & Finance*, 33, 464–472. Available at: http://www.cfr-cologne.de/download/workingpaper/cfr–10–01.pdf [Accessed January 22, 2018].

Zakaria, Z., Purhanudin, N., & Rani Palanimally, Y. (2014). Ownership structure and firm performance: evidence from Malaysian trading and services sector. *European Journal of Business and Social Sciences*, 3(2), 32–43. Available at: http://www.ejbss.com/Data/Sites/1/vol3no2may2014/ejbss–1375–14-ownershipstructureandfirmperformance.pdf [Accessed January 22, 2018].

Zeimantas, V. V. (2013). *Lietuvoje opcionai labiau baido nei motyvuoja* [In Lithuania the usage of stock options cause a fear rather than motivate]. Available at: http://vz.lt/archive/article/2013/7/6/lietuvoje-opcionai-labiau-baido-nei-motyvuoja#ixzz43NI7zR1I [Accessed January 22, 2018].

2.2 FOREIGN DIRECT INVESTMENT: BOOST OR HINDRANCE TO LATVIAN INTERNATIONAL TRADE

Aizenman, J., & Noy, I. (2006). FDI and atrade — Two-way linkages? *The Quarterly Review of Economics and Finance,* 46(3), 317–337.

Alguacil, M. T., & Orts, V. (2002). A multivariate cointegrated model testing for temporal causality between exports and outward foreign investment: the Spanish case. *Applied Economics,* 34(1), 119–132.

Aml, I., Cakir, O., Canel, C., & Porterfield, R. (2011). A Comparison of Inward and Outward Foreign Direct Investment Determinants in Turkey. *International Journal of Business and Social Science,* 2(20).

Baldwin, R. E., & Ottaviano, G. I. (2001). Multiproduct multinationals and reciprocal FDI dumping. *Journal of International Economics*, 54(2), 429–448.

Baltagi, B. H., Egger, P., & Pfaffermayr, M. (2007). Estimating models of complex FDI: Are there third-country effects? *Journal of Econometrics*, 140(1), 260–281.

BalticExport (2016). Foreign investment in Latvia. Available at: http://balticexport.com/?article=arvalstu-investiciju-vide-latvija&lang=en [Accessed January 22, 2018].

Bank of Latvia (2015). FDI data (stock) by countries, tables. Available at: http://statdb.bank.lv/lb/Data.aspx?id=129 [Accessed January 22, 2018].

Barrel, R., & Pain, N. (1997). Foreign direct investment, technological change, and economic growth within Europe. *The Economic Journal,* 107, 1770–86.

Bems, R., & Schellekens, P. (2007). Finance and Convergence: What's Ahead for Emerging Europe? *IMF Working Paper WP/07/244.*

Blonigen, B. A. (2001). In search of substitution between foreign production and exports. *Journal of International Economics*, 53(1), 81–104.

Brainard, S. L. (1993). *A simple theory of multinational corporations and trade with a trade-off between proximity and concentration* (No. w4269). National Bureau of Economic Research.

Bronzini, R. (2010, July 15). Does investing abroad reduce domestic activity? Evidence from Italian manufacturing firms. Bank of Italy. *Working Paper No. 769.*

Bureau of Economic Analysis (2008). Frequently Asked Questions. How is average annual growth calculated? Available at: http://www.bea.gov/faq/index.cfm?faq_id=463 [Accessed January 22, 2018].

Cambridge Dictionaries Online (2016). Intermediate goods. Available at: http://dictionary.cambridge.org/dictionary/english/intermediate-goods [Accessed January 22, 2018].

Carr, D. L., Markusen, J. R., & Maskus, K. E. (1998). *Estimating the knowledge-capital model of the multinational enterprise*. National Bureau of Economic Research.

Central Statistical Bureau of Latvia (2015). Foreign trade. Detailed Statistics at 4-digit level. Available at: http://data.csb.gov.lv/pxweb/en/atirdz/atirdz__detalizeta__4zim/?tablelist=true&rxid=a79839fe–11ba–4ecd–8cc3–4035692c5fc8 [Accessed January 22, 2018].

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20, 249–272.

Clausing, K. A. (2000). Does multinational activity displace trade? *Economic Inquiry*, 38(2), 190.

DistanceCalculator.net (2015). Distance Calculator. Available at: http://www.distancecalculator.net/ [Accessed January 22, 2018].

Dritsaki, C., & Stiakakis, E. (2014). Foreign Direct Investments, Exports, and Economic Growth in Croatia: A Time Series Analysis. *Procedia Economics and Finance,* 14, 181–190.

Dunning, J. H., & Lundan, S. M. (2008). *Multinational enterprises and the global economy*. Edward Elgar Publishing.

Engle, R. F., & Granger, C. J. (1987). Cointegration and error-correction-representation, estimation and testing. *Econometrica*, 55, 251–278.

European Commission (2015). Agricultural statistics. Definitions of Agricultural commodities, intermediate, and final products as defined in the Combined Nomenclature. Available at: http://ec.europa.eu/agriculture/agrista/tradestats/annexes/annex4.htm [Accessed January 22, 2018].

Eurostat (2016). Nominal GDP in current prices. Eurostat Database. Available at: http://ec.europa.eu/eurostat/data/database [Accessed January 22, 2018].

Falk, M., & Hake, M. (2008). *A panel data analysis on FDI and exports*. Austrian Institute of Economic Research. FIW Research Report No. 012.

Feenstra, R. C. (2003). *Advanced international trade: theory and evidence*. Princeton University Press.

Ferragina, A. M., & Colacurcio, C. (2015). Italian FDI and Exports at Sectoral Level: Substitutes or Complements? *Global Economy Journal,* 15(2), 277–310.

Fidrmuc, J., & Martin, R. (2011). FDI, trade and growth in CESEE countries. *Focus on European Economic Integration Q, 1,* 70–113.

Franco, C. (2013). Exports and FDI motivations: empirical evidence from US foreign subsidiaries. *International Business Review,* 22(1), 47–62.

Giles, D. (2011). *VAR or VECM When Testing for Granger Causality? Econometrics Beat: Dave Giles' Blog*. Available at: http://davegiles.blogspot.com/2011/10/var-or-vecm-when-testing-for-granger.html [Accessed January 22, 2018].

Globerman, S., & Chen, V. Z. (2010, October). *Best policy practices for promoting inward and outward foreign direct investment*. The Conference Board of Canada Report. Available at: https://www.researchgate.net/publication/228305421_Best_Policy_Practices_for_Promoting_Inward_and_Outward_Foreign_Direct_Investment [Accessed January 22, 2018].

Goh, S. K., Tham, S. Y., & Wong, K. N. (2013). Trade linkages of inward and outward FDI: Evidence from Malaysia. *Economic Modelling,* 35, 224–230. Available at: http://www.sciencedirect.com /science /article /pii/S0264999313002538 [Accessed January 22, 2018].

Goswami, C., & Saikia, K. K. (2012). FDI and its relation with exports in India, status and prospect in northeast region. *Procedia-Social and Behavioral Sciences,* 37, 123–132.

Grubert, H., & Mutti, J. (1991). Taxes, Tariffs, and Transfer Pricing in Multinational Corporate Decision Making. *Review of Economics and Statistics*, 73(2), 285–293.

Helpman, E. (1984). A simple theory of international trade with multinational corporations. *The Journal of Political Economy*, 92(3), 451–471.

Helpman, E., & Krugman, P. R. (1985). *Market structure and foreign trade: Increasing returns, imperfect competition, and the international economy*. MIT Press.

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2003). *Export versus FDI* (No. w9439). National Bureau of Economic Research.

ICAEW (2016). *Double tax treaties*. Available at: http://www.icaew.com/en/library/key-resources/double-tax-treaties [Accessed January 22, 2018].

International Monetary Fund (2015). Inflation, average consumer prices. Available at: http://www.imf.org/ external/ pubs/ft/weo/2015/02/weodata/index.aspx [Accessed January 22, 2018].

Investopedia (2015). Linder Hypothesis. Investopedia. Available at: http://www.investopedia. com/terms/l/linder-hypothesis.asp [Accessed January 22, 2018].

Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review,* 94(3), 605–627.

KPMG (2016). *Corporate tax rates table*. Available at: https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html [Accessed January 22, 2018].

Lane, P. R., & Milesi-Ferretti, G. M. (2006). Capital Flows to Central and Eastern Europe. *IMF Working Paper WP/06/188*.

Lee, H. Y., Lin, K. S., & Tsui, H. C. (2009). Home country effects of foreign direct investment: From a small economy to a large economy. *Economic Modelling*, 26(5), 1121–1128.

Levin, A., Lin, C.-F., & Chu, C.-S. J. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108, 1–24.

LIAA (2016). *Investor Business Guide. Foreign Direct Investment*. Available at: http://www.liaa.gov.lv/invest-latvia/investor-business-guide/foreign-direct-investment [Accessed January 22, 2018].

Lipsey, R. E., & Weiss, M. Y. (1984). Foreign production and exports of individual firms. *The Review of Economics and Statistics*, 66(2), 304–308.

Loungani, P., & Razin, A. (2001). How Beneficial Is Foreign Direct Investment for Developing Countries? *Finance & Development. A quarterly magazine of the IMF,* 38(2).

Marchant, M.A., Manukyan, T., & Koo, W. (2002). International Trade and Foreign Direct Investment: A Focus on the Free Trade Area of the Americas. *Journal of Agricultural and Applied Economics,* 34, 289–302.

Markusen, J.R. (1995). The boundaries of multinational enterprises and the theory of international trade. *The Journal of Economic Perspectives*, 169–189.

Markusen, J.R. (2004). *Multinational firms and the theory of international trade.* MIT Press.

Markusen, J.R., & Venables, A.J. (1998). Multinational firms and the new trade theory. *Journal of International Economics*, 46(2), 183–203.

Ministry of Finance of the Republic of Latvia (2016). Tax conventions signed by Latvia. Available at: http://www.fm.gov.lv /en/s/taxes/conventions/status/ [Accessed January 22, 2018].

Ministry of Foreign Affairs of the Republic of Latvia (2016). Latvia's accession to the Organisation for Economic Cooperation and Development. Available at: http://www.mfa.gov.lv/en/policy/economic-affairs/oecd/latvia-s-accession-to-the-oecd [Accessed January 22, 2018].

Mitze, T., Alecke, B., & Untiedt, G. (2009). Trade-FDI linkages in a system of gravity equations for German regional data. *Ruhr Economic Paper,* 84.

Mundell, R. (1957). International Trade and Factor Mobility. *American Economic Review,* 47(3), 321–335.

Oberhofer, H., & Pfaffermayr, M. (2007). FDI versus exports. Substitutes or complements? A three nation model and empirical evidence (No. 2007–28). *Working Papers in Economics and Statistics.*

Oberhofer, H., & Pfaffermayr, M. (2012). FDI versus exports: multiple host countries and empirical evidence. *The World Economy,* 35(3), 316–330.

OECD (2006). *Benefiting from globalization. Transport sector contribution and policy challenges.* 17th International Symposium on Transports Economics and Policy, Berlin.

OECD (2008). *Tax Effects on Foreign Direct Investment.* Policy Brief. OECD Observer. Available at: http://www.oecd.org/investment/investment-policy/40152903. pdf [Accessed January 22, 2018].

OECD (2011). *Revision of the Classification by Broad Economic Categories (*BEC*).* Proposal by UNSD and OECD. Expert Group meeting on International economic and social classifications, New York.

OECD, FSF-IMF & TJN. (2007) *Identifying tax havens and offshore finance centers.* Available at: http://www.taxjustice.net/cms/upload/pdf/Identifying_Tax_ Havens_Jul_07.pdf [Accessed January 22, 2018].

Pfaffermayr, M. (1994). Foreign Direct Investment and Exports: A Time Series Approach. *Applied Economics*, 26(4), 337–35.

PMLP (2016). *The Office of Citizenship and Migration Affairs. Information on Residence Permits.* Available at: http://www.pmlp.gov.lv/en/home/services/ residence-permits/how-long-may-the-residence-permit-be-issued-for.html [Accessed January 22, 2018].

Radulescu, M., Druica, E., & Omran, A. (2012). The impact of FDIs on exports in Central and Eastern European countries: Empiric evidence from Romania against Poland, Czech Republic and Bulgaria. *International Journal of Academic Research,* 4(6).

Ramezzana, P. (2000). *Per capita income demand for variety, and international trade: Linder reconsidered.* Centre for Economic Performance, London School of Economics and Political Science.

Ricotta, F. (2008). Esportazioni e investimenti diretti esteri: sostituti o complementi? Il caso italiano. *Economia e Politica Industriale.*

Swenson, D.L. (2004). Foreign investment and the mediation of trade flows. *Review of International Economics,* 12(4), 609–629.

Tadesse, B., & Ryan, M. (2004). Host market characteristics, FDI, and the FDI — trade relationship. *The Journal of International Trade & Economic Development,* 13(2), 199–229.

Tadesse, B., & Shukralla, E.K. (2013). The impact of foreign direct investment on horizontal export diversification: empirical evidence. *Applied Economics,* 45(2), 141–159.

Turkcan, K. (2006). *Foreign outward direct investment and intermediate goods exports: evidence from USA.* Paper presented on the ETSG (2006). Available at: http://wwwetsg.org/ETSG2006/papers/Turkcan.pdf [Accessed January 22, 2018].

UNCTAD (2013). *Foreign Direct Investment (FDI).* Available at: http://unctad.org/en/ Pages/DIAE/Foreign-Direct-Investment-(FDI).aspx [Accessed January 22, 2018].

Wagner, J. (2006). Exports, foreign direct investment, and productivity: Evidence from German firm level data. *Applied Economics Letters,* 13(6), 347–349.

World Trade Organization (2013). Trade in global value chains. International Trade Statistics. Available at: https://www.wto.org/english/res_e/statis_e/its2013_e/ its13_highlights4_e.pdf [Accessed January 22, 2018].

Zarotiadis, G., & Mylonidis, N. (2005). *FDI and Trade in the UK: Substitutes or Complements?* ETSG Conference, Dublin.

2.3 LATVIA: CATCHING UP WITH THE WORLD PRODUCTION FRONTIER. AN INDUSTRY-LEVEL ANALYSIS

Aigner, D., Lovell, C. K., & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1), 21–37.

Aleksandrovics, A., & Smilts, S. (2015). *Measuring the EU structural fund impact on Latvia's Agricultural sector: Malmquist Index approach*. SSE Riga Bachelor Thesis Database.

Alston, J. M. (2010). The Benefits from Agricultural Research and Development, Innovation, and Productivity Growth. *OECD Food, Agriculture and Fisheries Papers No. 31*. OECD Publishing.

Alston, J. M., Chan-Kang, C., Marra, M. C., Pardey, P. G., & Wyatt, T. J. (2000). A meta-analysis of rates of return to agricultural R&D: Ex pede Herculem? *Intl. Food Policy Res. Inst.*, Vol. 113.

Amann, E., & Virmani, S. (2015). Foreign direct investment and reverse technology spillovers. *OECD Journal: Economic Studies*, 2014(1), 129–153.

ATAG (2005). *The economic and social benefits of air transport*. Available at: http://www.icao.int/Meetings/wrdss2011/Documents/JointWorkshop2005/ATAG_SocialBenefitsAirTransport.pdf [Accessed January 22, 2018].

Attar, A. A., Gupta, A. K., & Desai, D. B. (2009). A Study of Various Factors Affecting labour Productivity and Methods to Improve It. *Journal of Mechanical and Civil Engineering*, 11–14. ISSN: 2278–1684.

Badunenko, O., Henderson, D., & Zelenyuk, V. (2008). Technical Change and Transition: Relative Contributions to Worldwide Growth during the 1990s. *Oxford Bulletin of Economics and Statistics*, 70(4), 461–492.

Baier, S. L., Dwyer, G. P., & Tamura, R. (2006). How important are capital and total factor productivity for economic growth? *Economic Inquiry*, 44(1), 23–49.

Baltabaev, B. (2013). *FDI and Total Factor Productivity Growth: New Macro Evidence* (No. 27–13). Monash University, Department of Economics.

Battese, G., Heshmati, A., & Hjalmarsson, L. (2000). Efficiency of labour use in the Swedish banking industry: a stochastic frontier approach. *Empirical Economics*, 25, 623–640.

BCG (2011). *Making your company inflation ready*. Available at: http://www.bcg.com/documents/file72671.pdf [Accessed January 22, 2018].

Beintema, N., & Elliott, H. (2009). Setting meaningful investment targets in agricultural research and development: challenges, opportunities and fiscal realities. *How to feed the World in 2050. Proceedings of a technical meeting of experts, Rome, Italy, 24–26 June 2009* (pp. 1–29). Food and Agriculture Organization of the United Nations (FAO).

Belotti, F., & Ilardi, G. (2012). Consistent Estimation of the 'True' Fixed-Effects Stochastic Frontier Model. *CEIS Research Papers*, 10(5).

Bhattacharjee, A., Higson, C., Holly, S., & Kattuman, P. (2009). Macroeconomic instability and corporate failure: the role of the legal system. *Review of Law & Economics*, 5(1), 1–32.

Blinder, A., & Yellen, J. (2002). The Fabulous Decade: Macroeconomic Lessons from the 1990s. In A. B. Krueger, & R. M. Solow (eds.), *The Roaring 1990s: Can Full Employment Be Sustained?* New York: Russel Sage Foundation.

Bloch, H., & Tang, S. H. K. (2007). The effects of exports, technical change and markup on total factor productivity growth: Evidence from Singapore's electronics industry. *Economics Letters*, 96(1), 58–63.

Bloom, D. E., Canning, D., & Chan, K. (2006). *Higher education and economic development in Africa*, Vol. 102. Washington, DC: World Bank.

Børing, P. (2012). The impact of manufacturing firms' use of academic workers on their productivity level. *Bulletin of Economic Research*, 66(2), 4.

Bragagnolo, C., Spolador, H. F., & Barros, G. S. C. (2010). Regional Brazilian agriculture TFP analysis: a stochastic frontier analysis approach. *Revista Economia*, 11, 217–242.

Carroll, J., Newman, C., & Thorne, F. (2007). *A comparison of stochastic frontier approaches to estimating inefficiency and total factor productivity: an application to Irish dairy farming* (No. tep0907). Trinity College Dublin, Department of Economics.

Cavalcanti, T., Mohaddes, K., & Raissi, M. (2012). Commodity Price Volatility and the Sources of Growth. *IMF Working Paper, WP/12/12*.

CBO (2005). *R&D and Productivity Growth: A Background Paper*. Washington, DC: The Congress of the United States.

Ceccheti, S. G., Mohanty, M. S., & Zampolli, F. (2011). *The real effect of debt*. Available at: http://www.bis.org/publ/othp16.pdf [Accessed January 22, 2018].

Chanda, A., & Dalgaard, C. J. (2008). Dual economies and international total factor productivity differences: Channelling the impact from institutions, trade, and geography. *Economica*, 75(300), 629–661.

Corrado, C., Hulten, C., & Sichel, D. (2005). Measuring capital and technology: an expanded framework. In: *Measuring capital in the new economy*, 11–46. University of Chicago Press.

CSB (2015). *Structural business indicators in industry*. Available at: http://www.csb.gov.lv/en/statistikas-temas/metodologija/structural-business-indicators-industry–37406.html [Accessed January 22, 2018].

Dragomir, L., & Tanasie, A. (2010). The Importance of Labor Productivity for the Romanian Industry for the Growth of its Competitiveness. In: *Proceedings of the 5th WSEAS International Conference on Economy and Management Transformation*, Vol. 2, 837–842.

Erumban, A., Gouma, R., de Vries, G., de Vries, K., & Timmer, M. (2012). *WIOD Socio-Economic Accounts (SEA): Sources and Methods*. Groningen.

Escribano, Á., & Stucchi, R. (2008). Catching up in total factor productivity through the business cycle: evidence from Spanish manufacturing surveys. *Journal of Productivity Analysis*, 41(3), 339–349.

Espinoza, R. (2012). *Government Spending, Subsidies and Economic Efficiency in the GCC (No. 095)*. Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.

Fadejeva, L., & Melihovs, A. (2010). Measuring Total Factor Productivity and Variable Factor Utilization: Sector Approach, the Case of Latvia. *Eastern European Economics*, 48(5), 63–101.

Färe, R., Grosskopf, S., Norris, M., & Zhang, Z. (1994). Productivity growth, technical progress, and efficiency change in industrialized countries. *The American Economic Review*, 66–83.

Felipe, J., & Adams, F. G. (2005). "A theory of production" the estimation of the Cobb-Douglas function: A retrospective view. *Eastern Economic Journal*, 31(3), 427–445.

Fernald, J. (2014). *Productivity and Potential Output before, during, and after the Great Recession (No. w20248)*. National Bureau of Economic Research.

Ferreira, P. C., & Trejos, A. (2011). Gains from trade and measured total factor productivity. *Review of Economic Dynamics*, 14(3), 496–510.

Filippetti, A., & Peyrache, A. (2013). Is the convergence party over? Labour productivity and the technology gap in Europe. *JCMS: Journal of Common Market Studies*, 51(6), 1006–1022.

Fox, L., Gardaphe, F., Nagpal, Z., Unger, M., & Zaklouta, H. (n. d.). *The Italian Economy: Obstacles and Recommendations for Growth*. Available at: http://www.stern.nyu.edu/sites/default/files/assets/documents/con_047349.pdf [Accessed January 22, 2018].

GCI (2016). *Competitiveness ranking*. Available at: http://reports.weforum.org/global-competitiveness-report–2014–2015/rankings/ [Accessed January 22, 2018].

Gornall, J., Betts, R., Burke, E., Clark, R., Camp, J., Willett, K., & Wiltshire, A. (2010). Implications of climate change for agricultural productivity in the early twenty-first century. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 365(1554), 2973–2989.

Granér, M., & Isaksson, A. (2009). Firm efficiency and the destination of exports: evidence from Kenyan plant-level data. *The Developing Economies*, 47(3), 279–306.

Greene, W. (2005). Fixed and random effects in stochastic frontier models. *Journal of Productivity Analysis*, 23(1), 7–32.

Grosso, M. G., Jankowska, A., & Gonzales, F. (2008). Trade and regulation: the case of construction services. In *OCED Experts Meeting on Construction Services*. Paris.

Haghighi, H. K., Sameti, M., & Isfahani, R. D. (2012). The effect of macroeconomic instability on economic growth in Iran. *Research in Applied Economics*, 4(3), 39–61.

Heckman, J. J. (1981). The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process. In C. F. Manski, & D. McFadden, *Structural Analysis of Discrete Data with Econometric Applications*. MIT Press.

Hicks, M. J. (2013). *Manufacturing Productivity Through the Great Recession: What Does It Mean for the Future?* Center for Business and Economic Research, Ball State University.

Hu, B. A., & Cai, L. A. (2004). Hotel Labour Productivity Assessment. *Journal of Travel & Tourism Marketing*, 16(2–3), 27–38.

Hwang, I., & Wang, E. C. (2004). Does openness to trade affect total factor productivity growth: evidence from 45 Japanese manufacturing industries. *Journal of Economic Research*, 9(2), 147–173.

IISD (n. d.). *The effect of subsidies*. Available at: https://www.iisd.org/GSI/effects-subsidies [Accessed January 22, 2018].

Ikhsan-Modjo, M. (2006). Total factor productivity in Indonesian manufacturing: a stochastic frontier approach. *ABERU Discussion Paper 28*. Monash University.

Ilbuodo, P. S. (2014). *Foreign Direct Investment and Total Factor Productivity in the Mining Sector: the Case of Chile*. Available at: http://digitalcommons.conncoll.edu/cgi/viewcontent.cgi?article=1015&context=econp [Accessed January 22, 2018].

ILO (2001). The construction industry in the twenty first century: Its image, employment prospects and skill requirements. *International Labour Office*. Available at: http://www.ilo.org/public/english/standards/relm/gb/docs/gb283/pdf/tmcitr.pdf [Accessed January 22, 2018].

Javorcik, B., Fitriani, F., & Iacovone, L. (2012). Productivity performance in Indonesia's manufacturing sector. *Indonesia PREM policy note, No. 5*. Washington, DC: World Bank.

Jondrow, J., Lovell, C. K., Materov, I. S., & Schmidt, P. (1982). On the estimation of technical inefficiency in the stochastic frontier production function model. *Journal of Econometrics*, 19(2), 233–238.

Jorgenson, D. W., & Stiroh, K. J. (2000). Raising the speed limit: U. S. economic growth in the information age. *Brookings Papers on Economic Activity*, iss. 1, 125–211.

Kato, A., & Sato, T. (2014). The effect of corruption on the manufacturing sector in India. *Economics of Governance*, 15(2), 155–178.

Khan, T. S. (2006). *Productivity Growth, Technological Convergence, R&D, Trade, and Labor Markets: Evidence From the French Manufacturing Sector (No. 6–230)*. International Monetary Fund.

Kong, X., Marks, R. E., & Wan, G. H. (1999). Technical Efficiency, Technological Change and Total Factor Productivity Growth in Chinese State-Owned Enterprises in the Early 1990s. *Asian Economic Journal*, 13(3), 267–282.

Krasnopjorovs, O. (2012). Measuring the sources of economic growth in the EU
        with parametric and non-parametric methods. *Journal of Economics and
        Management Research (University of Latvia)*, 1, 106–122.

Kumbhakar, S. C., & Lovell, C. K. (2003). *Stochastic frontier analysis*. Cambridge
        University Press.

Mankiw, N. G., Romer, D. & Weil, D. N. (1992). A contribution to the empirics of
        economic growth. *Quarterly Journal of Economics*, 107(2).

Manyika, J., Mendonca, L., Remes, J., Klubmann, S., Dobbs, R., Karkun, K., &
        Tormanen, A. (2010). *How to compete and grow: A sector guide to policy*.
        McKinsey Global Institute.

Mitra, A., Sharma, C., & Varoudakis, M. A. (2011). Total Factor Productivity and
        Technical Efficiency of Indian Manufacturing: The Role of Infrastructure
        and Information & Communication Technology. *CERDI, Etudes et
        Documents*, E 2011.15.

MTI (2014). *A sectoral examination of Singapore's productivity growth*. Available
        at: https://www.mti.gov.sg/ResearchRoom/SiteAssets/Pages/Economic-
        Survey-of-Singapore-Second-Quarter–2014/BA_2Q14.pdf [Accessed January
        22, 2018].

Neyman, J., & Scott, E. L. (1948). Consistent estimates based on partially consistent
        observations. *Econometrica*, 16, 1–32.

Nishimizu, M., & Page, J. M. (1982). Total factor productivity growth, technical
        progress and technical efficiency change: dimensions of productivity
        change in Yugoslavia, 1965–78. *The Economic Journal*, 92(386), 920–93.

OECD (2010). *OECD Tax Policy Studies Tax Policy Reform and Economic Growth*.
        OECD publishing.

OECD (2014). *OECD Foreign Bribery Report: An Analysis of the Crime of Bribery of
        Foreign Public Officials*. OECD Publishing.

Perelman, S. (1995). R&D, technical progress and efficiency change in industrial
        activities. *Review of Income and Wealth*, 41(3), 349–366.

Pilat, D. (1996). Competition, productivity and efficiency. *OECD Economic Studies*,
        27(2), 107–46.

Puharts, A., & Kloks, P. (2015). *Sources of TFP Growth in the Baltic States: The
        Frontier Approach*. Retrieved from SSE Riga student BSc thesis database.

Razak, M. I. M., Idris, O., Mohd, Y. M. A., Nasni, N. R. N., & Nazri, A. M. (2014). Factors
        affecting labour productivity in Malaysia: an overview. *International Journal
        of Economics, Commerce and Management*, 2(10).

Sabasi, D., & Shumway, C. R. (2014). Technical Change, Efficiency, and Total Factor
        Productivity in US Agriculture. In *2014 Annual Meeting, July 27–29, 2014,
        Minneapolis, Minnesota* (No. 170225). Agricultural and Applied Economics
        Association.

Selim, S. (2012). Labour productivity and rice production in Bangladesh: a
        stochastic frontier approach. *Applied Economics*, 44(5), 641–652.

Singh, N., & Trieu, H. (1996). *The Role of R&D in Explaining Total Factor Productivity
        Growth in Japan, South Korea, and Taiwan*. University of California.

Stiglitz, J. E. (1996). Some lessons from the East Asian miracle. *The World Bank
        Research Observer*, 11(2), 151–177.

Stiroh, K. J. (2001). What drives productivity growth? *Economic Policy Review*, 7(1).

Sunding, D., & Zilberman, D. (2001). The agricultural innovation process: research
        and technology adoption in a changing agricultural sector. *Handbook of
        Agricultural Economics*, 1, 207–261.

Tanna, S. (2009). The impact of foreign direct investment on total factor
        productivity growth: International evidence from the banking industry.
        Managerial Finance, 35(3), 297–311.

Thomson, M., & Rushing, F. W. (1999). An Empirical Analysis of the Impact of
        Patent Protection on Economic Growth: An Extension. *Journal of Economic
        Development*, 24(1).

Toby, A. J., & Peterside, D. B. (2014). Analysis of the Role of Banks in Financing the
        Agriculture and Manufacturing Sectors in Nigeria. *International Journal of
        Research in Business Management (IMPACT: IJRBM). ISSN (E)*.

Trick, M. A. (1998). *Strengths and Limitations of DEA*. Available at: http://mat.gsia.
        cmu.edu/classes/QUANT/NOTES/chap12/node7.html [Accessed January 22,
        2018].

Tu, H. J., & Wan-Chu, Y. (2013). Measuring the operating efficiency of internet
        channels using the two-stage DEA approach. *Asia Pacific Management
        Review*, 18(3).

US DL (2007). *Identifying and Addressing Workforce Challenges in America's
        Transportation Industry. The U. S. Department of Labour*. Available at: https://
        www.doleta.gov/brg/pdf/Transportation%20Report_final.pdf [Accessed
        January 22, 2018].

Voutsinas, I., & Tsamadias, C. (2014). Does research and development capital affect
        total factor productivity? Evidence from Greece. *Economics of Innovation
        and New Technology*, 23(7), 631–651.

Wright, B. D., & Douglas, G. (1976). Better procedures for sample-free item analysis.
        Research memorandum 20. Statistical Laboratory, Department of Education,
        University of Chicago.

World Bank (2011). Turkey — Country Economic Memorandum (CEM): Sustaining
        High Growth — The Role of Domestic savings: Synthesis Report. Washington,
        DC. World Bank.

Worthington, A. C. (2000). Technical Efficiency and Technical Change in Australian
        Building Societies. *Abacus*, 36(2), 180.

Znotina, D., & Jermolajeva, E. (2011). Labour productivity in the regions of Latvia.
        European Integration Studies, No. 5.

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Latvijas ilgtspējīga attīstība ir atkarīga no valsts spējas turpināt veiksmīgu eksportu pasaules tirgos. Tādējādi Latvijai ir jāturpina attīstīt kopš ekonomikas lejupslīdes uzsākto veiksmīgo darbību eksporta tirgos (skatīt Vanags, 2013). Latvijas konkurētspēju šajā periodā ir raksturojuši tādi faktori kā spēcīga izaugsme gan attiecībā uz eksportējamo produktu skaitu, gan attiecībā uz eksporta tirgu skaitu (skatīt Beņkovskis, 2012). Beņkovskis norādījis arī uz līdz šim nenovērtēto ārpuscenu konkurētspējas ietekmējošo faktoru nozīmību. Putniņa pētījumā (2013) pirmoreiz aprakstīti Latvijas eksportējošie uzņēmumi atkarībā no to lieluma, ražīguma, īpašuma formas utt.

Šīs monogrāfijas mērķis ir paplašināt un turpināt šos pētījumus, lai labāk saprastu faktorus, kas veicina eksportēšanu, kā arī šķēršļus, ar kuriem uzņēmumi var saskarties, ieejot eksporta tirgos.

Eksporta un eksportētāju analīzei, īpaši uzņēmumu līmenī, ir jābalstās uz plašu datu kopu. Valsts pētījumu programmas SUSTINNO projekta ietvaros Baltijas Starptautiskais ekonomikas politikas studiju centrs (BICEPS) 2015. gadā pasūtīja īpaši izveidotu apsekojumu par uzņēmumiem Latvijā. Šī apsekojuma mērķgrupa bija vidēji lieli, Latvijā reģistrēti ekonomiski aktīvi uzņēmumi. Tika aptaujāti uzņēmumu īpašnieki, vadītāji un uzņēmumu vadošie speciālisti. Balstoties uz T. J. Putniņa metodoloģiju (2013), BICEPS izveidoja Latvijā reģistrētu uzņēmumu izlases kopu. Ar pētījumu centra SKDS palīdzību BICEPS izstrādātā aptaujas anketa tika telefoniski izplatīta starp atlasītu uzņēmumu grupu, rezultātā izveidojot 800 uzņēmumu izlasi. Anketā bija sešas sadaļas: 1) uzņēmuma raksturojums; 2) eksportēšana; 3) produktivitāte; 4) finansējums; 5) inovācijas; 6) nodokļi un attieksme. Četri monogrāfijas pirmajā daļā apkopotie raksti balstās uz šīs aptaujas datiem.

Lielākajā daļā ekonomisko pētījumu ir secināts, ka eksportējoši un neeksportējoši uzņēmumi atšķiras pēc vairākiem ekonomiskiem parametriem. Eksporta barjeru identificēšana un atšķirību noskaidrošana starp eksportētājiem un neeksportētājiem var palīdzēt izstrādāt tādu valsts politiku, kas iedrošinātu neeksportējošus uzņēmumus uzsākt veiksmīgu eksportu. BICEPS pētniece ANNA PĻUTA savā pētījumā «LATVIJAS EKSPORTĒJOŠO UN NEEKSPORTĒJOŠO UZŅĒMUMU SALĪDZINĀJUMS» (2017) pētī atšķirības starp Latvijas eksportējošiem un neeksportējošiem uzņēmumiem no dažādiem aspektiem, tie ir eksporta iespējas, produktivitāte, finansējuma piesaistīšanas iespējas un atvērtība inovācijām. Lai atrastu statistiski nozīmīgas atšķirības starp dažādiem eksportējošu un neeksportējošu uzņēmumu raksturlielumiem, ir izmantota vidējo vērtību salīdzināšanas metode. Analīze parāda, ka eksportētāji daudzējādā ziņā atšķiras no neeksportētājiem: eksportētājiem vidēji ir lielāks apgrozījums, tie nodarbina vairāk cilvēku, maksā augstākas algas, uzrāda augstāku produktivitāti, kā arī straujāku darbinieku skaita un algu pieaugumu. Turklāt eksportējošo uzņēmumu vadītāji

vidēji ir labāk izglītoti. Eksportējošie uzņēmumi parasti ir atvērtāki inovācijām. Trešā daļa iegulda ievērojamus resursus pētījumos un jaunu produktu attīstībā, turpretī starp neeksportētājiem tādu ir tikai 14 %. Tādu ražošanas metožu meklēšana, kuras samazina izmaksas, motivē pētījumos un attīstībā ieguldīt 30 % eksportētāju, salīdzinot ar 14 % starp neeksportētājiem. Attiecībā uz uzņēmumiem, kuri neizskata iespējas eksportēt, galvenais šādas rīcības iemesls ir to preču vai pakalpojumu nepiemērotība eksportam. Galvenais šķērslis jau eksportējošu uzņēmumu eksporta paplašināšanai ir sīvā cenu konkurence ārvalstu tirgū. Tas ir arī viens no galvenajiem šķēršļiem, ko līdztekus sākotnējām eksporta izmaksām un grūtībām atrast informāciju par ārvalstu tirgiem min uzņēmumi, kas nav iesaistīti eksportā, bet apsver iespēju eksportēšanu uzsākt. Tie uzņēmumi, kas pārtrauca eksportēšanu, to darīja galvenokārt konkurences spiediena, kā arī juridisku un ar muitu saistītu problēmu dēļ. Saskaņā ar pētījuma rezultātiem 43 % eksportētāju un 20 % neeksportētāju pēdējo trīs gadu laikā ir piesaistījuši finansējumu sava biznesa attīstīšanai. Rezultāti rāda arī, ka eksportējošie uzņēmumi parasti piesaista lielāku finansējumu no citiem, ar uzņēmuma peļņu nesaistītiem avotiem. Vidēji vairāk nekā puse piesaistītā finansējuma tiek iegūta no banku overdraftiem, aizdevumiem un kredītiem. Otru lielāko ieguldījumu kopējā finansējuma apjomā deva ES programmas.

Rīgas Ekonomikas augstskolas absolventi Reinis Beķeris un Vents Vīksna savā pētījumā «Eiropas finansējums: vai tas veicina eksportu?» (2017) dziļāk pēta Eiropas strukturālo un investīciju fondu (ESIF) ietekmi uz Latvijas uzņēmumu vēlmi eksportēt. Autori konstatē pozitīvu sakarību starp ES finansējuma saņemšanu un lēmumu eksportēt. Autori parāda, ka viens ESIF programmas investēts eiro pētītās datu kopas vidējā uzņēmuma gadījumā piecu gadu periodā radīs 17,9 eiro eksporta apgrozījuma. Autori pēta šo ietekmi sadalījumā starp maziem un lieliem uzņēmumiem, pieredzējušu un nepieredzējušu vadību un starp dažādiem ESIF fondiem (Eiropas Reģionālās attīstības fondu un Eiropas Lauksaimniecības fondu lauku attīstībai). Viņi secina, ka mazi uzņēmumi no šīs kapitāla ieplūdes jutīs lielāku efektu; vadība ar lielāku pieredzi efektīvāk izmantos naudu, un lauksaimniecības investīciju fonda finansējums izteiktāk ietekmēs lēmumu eksportēt nekā reģionālā attīstības fonda finansējums. ESIF finansējumam patiešām ir būtiska nozīme Latvijas ekonomikas un tās konkurētspējas veicināšanā.

Aktuālos ekonomistu pētījumos pievērsta liela uzmanība ietekmei, kādu tirdzniecība atstāj uz kopējo ekonomikas izaugsmi apstākļos, kad novērojama uzņēmumu neviendabība. Melica (*Melitz*) pētījums (2003) atklāj nozares iekšējā ražīguma pieauguma mikroekonomikas pamatus saistībā ar resursu, piemēram, darbaspēka, pārdali no mazāk ražīgiem uzņēmumiem uz ražīgākiem saistībā ar to iesaistīšanos eksporta tirgos un sekojošu uzņēmuma apjoma pieaugumu. Galvenais veids, kā tirdzniecība ietekmē kopējo

ražīgumu, ir ražīgāko uzņēmumu izvēle kļūt par eksportējošiem uzņēmumiem, jo eksports ražīgākiem uzņēmumiem nodrošina lielāku peļņu. Pieaugoša konkurence par nepieciešamajiem resursiem spiež mazāk ražīgus uzņēmumus beigt darbību. Šāds pārdales radītais nozares ražīguma kopējais pieaugums veicina arī labklājības celšanos. Vēl viena šādas sakarības izpausme ir eksportējošu uzņēmumu spēja absorbēt augstākas ražošanas izmaksas, vienlaikus saglabājot spēju gūt peļņu. Juridisko noteikumu un nodokļu likumdošanas ievērošana no uzņēmuma peļņas saglabāšanas viedokļa rada mazāk problēmu, ja uzņēmums ir ražīgāks par konkurentiem. Tādējādi eksportējoši uzņēmumi, kas spēj izturēt gan iekšēju, gan ārēju konkurenci, var būt potenciāli mazāk tendēti izvairīties no nodokļiem un kukuļot nekā uzņēmumi, kas nav eksportētāji. BICEPS asociētais pētnieks Sergejs Gubins (2015) savā rakstā «Piezīme par eksportējošiem uzņēmumiem un ēnu ekonomiku Latvijā: datizraces sākotnējs vingrinājums» izvirza hipotēzi, ka eksportējoši uzņēmumi varētu būt mazāk iesaistīti tādās ēnu ekonomikas jomās kā korupcija un nodokļu nemaksāšana salīdzinājumā ar neeksportējošiem uzņēmumiem. Vēlēdamies izpētīt sakarību starp eksportu un ēnu ekonomiku Latvijā uzņēmumu līmenī, viņš apkopo sākotnējos datus. Izrādās, ka nav statistiski nozīmīgu atšķirību starp eksportējošiem un neeksportējošiem uzņēmumiem attiecībā uz likumu ievērošanu. Tomēr pastāv statistiski nozīmīgas atšķirības starp eksportējošiem uzņēmumiem, kas savā ziņā atbalsta iepriekš izvirzītu hipotēzi. Uzņēmumiem, kas eksportē lielos apjomos, ir pozitīvāks viedoklis par likumu ievērošanu kopumā.

Nino Kokašvili (*Nino Kokashvili*), Ketevani Kapanadze (*Ketevani Kapanadze*), Iraklijs Barbakadze (*Irakli Barbakadze*) rakstā «Kā iesaistīšanās ēnu ekonomikas aktivitātēs ietekmē Latvijas uzņēmumu izaugsmi» (2017) šo tēmu attīsta tālāk un pēta sakarību starp Latvijas uzņēmumu izaugsmi un to iesaisti ēnu ekonomikā 2015. gadā. Pētījums par saistību starp iesaisti ēnu ekonomikā un uzņēmumu izaugsmi rāda, ka uzņēmumi, kuru iesaiste ēnu ekonomikā ir līdz 10 % no uzņēmuma kopējās ekonomiskās aktivitātes, uzrāda augstāku izaugsmi. Pētījums atklāj, ka darbība ēnu ekonomikā paaugstina izaugsmi tikai uzņēmumiem, kuriem ir negatīva izaugsme. Šie uzņēmumi krīžu gadījumā ir elastīgāki. Vienlaicīgi 10 % līmenis darbībai ēnu ekonomikā neizslēdz tos no finanšu tirgus. Turklāt šādā veidā uzņēmumi gūst labumu arī no sabiedriskajām precēm un pakalpojumiem. Šāds rezultāts atbalsta pieņēmumu, ka uzņēmumiem ar sliktiem darbības rezultātiem ēnu ekonomika dod iespēju izdzīvot. Šajā rakstā secināts arī, ka pastāv pozitīva saistība starp korupcijas uztveri un darbības ēnu ekonomikā līmeni.

Nākamā monogrāfijas daļa balstās uz Rīgas Ekonomikas augstskolas absolventu pētījumiem. Tiek izmantoti dažādi dati no Pasaules Bankas, Starptautiskā Valūtas fonda (SVF) un *Eurostat* datubāzēm. Informācija par

visu aktīvo Baltijas uzņēmumu darbību, īpašniekiem un vadību ņemta no *Bureau van Dijk* (BvD) *Orbis* datubāzes; dati par Latvijas divpusējām eksporta un importa plūsmām ņemti no Latvijas Centrālās statistikas pārvaldes; datus par ienākošajiem un izejošajiem ārvalstu tiešo investīciju (ĀTI) apjomiem sniegusi Latvijas Banka, un izmantoti Pasaules Ienākošo un izejošo datu bāzes (*World Input Output Database*, WIOD) dati.

Kā jau atceramies no monogrāfijas pirmās daļas, eksportējošu uzņēmumu vadītāji vidēji ir izglītotāki, turklāt vairāk pieredzējuši vadītāji efektīvāk izmanto ES finansējumu. Goda Gaušaite (*Goda Gaušaitė*) un Arns Vedeckis (*Arnas Vedeckis*) savā rakstā «Vadītāju īpašumtiesību ietekme uz uzņēmumu darbības rezultātiem Baltijas valstīs» (2016) pēta dziļāk un aplūko Baltijas uzņēmumu korporatīvo pārvaldību un analizē, kā vadītāju īpašumtiesības (VĪ) ietekmē privāto uzņēmumu darbības rezultātus, kas tiek mērīti kā aktīvu atdeve (ROA), kapitāla atdeve un pirmsnodokļu peļņa. Pie zemiem un augstiem VĪ līmeņiem kā ROA izteiktie uzņēmuma darbības rādītāji uzlabojas, turpretī tie samazinās pie vidēja līmeņa. Autori secina, ka profesionālu vadītāju iesaiste un motivācijas sistēma, kas paredz, ka vadītājiem pieder līdz vienai piektdaļai no kapitāla, var būt īpaši piemērota Baltijas uzņēmējiem, it īpaši augoša uzņēmuma gadījumā.

Nākamā raksta autori pievēršas ārvalstu tiešo investīciju analīzei. Par spīti plašajai teorētisko pētījumu bāzei, ka ĀTI aizstāj starptautisko tirdzniecību, empīriski pētījumi bieži konstatē to papildinošo ietekmi. Diāna Karhu (*Diana Karhu*) un Aļesja Nikalaičika (*Alesia Nikalaichyk*) savā rakstā «Ārvalstu tiešās investīcijas: Latvijas starptautiskās tirdzniecības stimuls vai kavēklis» (2016) turpina Turkcana (*Türkcan*) ideju (2006) un mēģina izskaidrot savstarpējo ietekmi starp ĀTI un starptautisko tirdzniecību. Tiek pieņemts, ka Latvijas gadījumā ĀTI ir dažāda ietekme uz gala preču tirdzniecību un starpproduktu tirdzniecību. Pieņēmums balstās uz atšķirīgu ĀTI motivāciju — horizontālo un vertikālo ĀTI (Türkcan, 2006). Autori secina, ka gan ienākošās, gan izejošās ĀTI papildina kopējo eksportu, kā arī atsevišķu gala izstrādājumu un starpproduktu eksportu. Viņi daļēji atbalsta Turkcana (2006) secinājumus, ka izejošās ĀTI papildina starpproduktu tirdzniecību, bet viņi negūst pierādījumus tam, ka izejošās ĀTI aizvieto tirdzniecību ar gala izstrādājumiem. Kopumā autori secina, ka izejošo ĀTI apjoma kā % daļas no IKP pieaugums par 1% atbilst eksporta pieaugumam par 0,10% (kā % daļai no IKP) un līdzvērtīgs ienākošo ĀTI apjoma pieaugums var izraisīt eksporta pieaugumu par 0,13% (kā % daļu no IKP). Tādējādi Latvijai būtu izdevīgi vēl vairāk veicināt ĀTI plūsmas. Ir vajadzīgi apmēram pieci ceturkšņi, lai abu veidu ĀTI sāktu pozitīvi ietekmēt Latvijas tirdzniecību.

Edgars Kokins un Valentīns Lavrinovičs savā rakstā «Latvija: tuvojoties pasaules ražošanas iespēju robežai, analīze nozaru griezumā» (2016) pēta, kurās nozarēs Latvija pēdējās divās desmitgadēs ir

tuvojusies pasaules ražošanas iespēju robežai, t. i., kurās nozarēs Latvija ir visefektīvākā un kādi faktori var nākotnē sekmēt šo tuvināšanos. Autori analizē galveno Latvijas privātā sektora nozaru — lauksaimniecības, celtniecības, viesnīcu un viesmīlības, ražošanas, tirdzniecības un transporta — efektivitāti noteicošos faktorus periodā no 1995. līdz 2014. gadam, t. i., ieskaitot periodu pēc krīzes. Analīze aptver šādus faktorus: ieguldījumus pētniecībā un izstrādē (P&I), valsts atvērtību tirdzniecībai, ārvalstu tiešo investīciju apjomu, kā arī dažādus rādītājus no Ekonomiskās brīvības indeksa (*Economic Freedom Index*, EFI) un Globālā konkurētspējas indeksa (*Global Competitiveness Index*, GCI). Rezultāti rāda, ka (ņemot vērā izmantotā kapitāla un darbaspēka daudzumu) Latvijas lauksaimniecības, viesmīlības, tirdzniecības un transporta nozares ražīgums vēl arvien būtiski atpaliek no salīdzināmajām valstīm. Pēdējo 20 gadu laikā celtniecība un tādi privātā sektora pakalpojumi, kā tirdzniecība, transports un viesmīlība ir uzrādījuši būtisku efektivitātes pieaugumu, veicinot pētītās kopas kopējās faktoru produktivitātes (KFP) izaugsmi krietni virs vidējā rādītāja. Savukārt ražošana un lauksaimniecība nespēja kāpināt ražīgumu un tādējādi uzrādīja diezgan lēnu KFP izaugsmi. Visām nozarēm Latvijā bija pozitīvas tehniskās izmaiņas, un tās bija arī lielākas nekā ražīguma izmaiņas. Šis atklājums ļauj autoriem secināt: analizētajām Latvijas nozarēm galvenais KFP izaugsmi nosakošais dzinējspēks ir tehniskās, nevis ražīguma izmaiņas. Autori konstatē, ka izdevumi P&I un atvērtība tirdzniecībai ir būtiski ražīgumu noteicošie faktori visās nozarēs, turpretī ārvalstu tiešās investīcijas tādas nav. Turklāt konstatējama pozitīva sakarība starp ražīgumu un vairākiem Ekonomiskās brīvības indeksa un Globālās konkurētspējas ziņojuma mainīgajiem. Tādējādi biznesam draudzīgas institucionālās reformas, tādas kā korupcijas apkarošana un tiesu sistēmas uzlabošana, var kāpināt darba ražīgumu, veicinot ne tikai kapitāla uzkrāšanu, bet arī ar KFP pieaugumu.

Kolektīvās monogrāfijas autori izsaka pateicību visiem, kuri veicināja šī darba tapšanu.

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Competitiveness of Latvian
enterprises in external markets