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Determinants of FDI inflows into the Baltic countries: Empirical evidence from a gravity model*

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Abstract

The article analyzes FDI inflows into Baltic countries using a gravity approach. The results of the empirical estimation allow us to explain how difference in corporate taxation between countries, geographical and cultural distance, institutions such as regulations and the size of the economy as well as its economic development affect FDI inflows into the Baltic countries. The influence of corporate taxation on FDI flows, expressed as corporate tax rate differences between investor and host countries is statistically significant. Larger geographical distance between the countries reduces FDI flows, and institutional variables such as the economic freedom index have significant impact and affect positively FDI into the Baltics. Finally, the size of economy, measured by GDP, impacts positively the FDI flows into Baltic countries.

Journal of Economic Literature Classification numbers: E2, F2, H2

Keywords: gravity model, foreign direct investments, corporate tax, Baltic countries

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1. Introduction

The objective of this paper is to evaluate the determinants of bilateral FDI flows to Baltic countries and particularly the effects of changes of regulation of credit, labour and businesses, including changes of corporate tax rate in both the investor and the host country on bilateral FDI flows. The period under examination is 2000-2008. We use a gravity equation to evaluate the importance of differences between corporate tax rates in the investor country and the host country as well as other determinants of bilateral FDI flows such as distance, market size measured by gross-domestic products, the index of economic freedom, different levels of inflation, infrastructure development and cultural similarities.

The present paper differs from previous studies by using a concept of the law of gravitation to explain regional integration in the field of capital flows, in particular inflows into the Baltics, and including an important aspects of economic development of the Baltics, namely the level of economic freedom and corporate tax rate. Not many attempts have been made to explain FDI flows using a gravity approach. Frenkel et al (2004), Brainard (1997) have implemented a gravity equation used more than fifty years for the explanation of trade flows (Czarny et al. 2010) to describe FDI flows. In recent years, some comprehensive analyses of the influence of corporate taxation policy on foreign direct investments have been done. One of them is Bellak and Leibrecht (2009), who examine the impact of taxation on FDI empirically with the help of a gravity model and found that FDI flows are positively related to the size of the investor and host country markets respectively and negatively related to the distance between the countries and to the corporate tax burden. We employ their idea for the Baltic countries, which is motivated by the following facts: (1) the success of Baltic countries in economic development was generally remarkable during the last two decades; (2) the interest for low tax policy has been growing in the world during the same time; (3) the openness of the Baltic economies is higher than in many developed countries; (4) the FDI flows to the Baltic countries have increased considerably during the time span covered in this study, and (5) the study covers the period from 2000 to 2008, including two economic crises.

The paper is organized as follows: section two gives a short overview about theoretical drivers of FDI, focusing on the role of taxation. We will present four hypotheses about the drivers of FDI inflows into the Baltic countries. In section three we review the systems of corporate taxation in the Baltic countries and section four describes the gravity model, explains the empirical examination and presents the main results of the estimations. Section five is dedicated to a number of robustness test and the last section concludes.

2. Theoretical considerations

Firms have different motives for investing abroad, which makes it complicated to derive a clear and straightforward theory. The enormous width of motives is very difficult to handle in a concise approach. Dunning's eclectic approach can be seen as the origin of the theoretical debate on FDI. The OLI-paradigm (Dunning 1977) states that a firm usually has a competitive ownership (O) advantage (e.g. tangible asset like natural resources, intangible assets like technology, brand name, and innovation) in its home market that can be transferred abroad. Second, the firm may see the location (L) as an advantage, e.g. market size, cheap inputs and low transportation cost etc., political advantages like policies attracting foreign firms, social and cultural advantages like the low physical and psychic distance between two countries. It may also include low corporate taxes. Finally, the internalization (I) advantages of superior commercial benefits in intra-firm transactions as against arm's length transactions may also motivate FDI.

These incentives are difficult to operationalize for an empirical analysis. Thus, we generalize these thoughts and distinguish four general motivations for an FDI: (1) resource seeking FDI (natural resources and labor), (2) market seeking FDI, (3) efficiency seeking FDI, and (4) asset seeking FDI. Given the small market size and low abundance of natural resource, it seems plausible that neither the market seeking motive nor the resource seeking motivation for FDI in the Baltic countries are very relevant. Rather, the abundance of well qualified labour (assets), the quality of institutions and policies, and the efficiency of processes can generate a motivation for an investment in Estonia, Latvia or Lithuania. Thus, we concentrate on differences in taxation, cultural similarity and spatial distance.

As for taxation, we look at the tax rate differentials between host and investor countries. Benassy-Query, Fontangne and Lahreche-Revil (2005) evaluate the influence of taxation on FDI, with a special focus on the impact of corporate tax variables and found a negative relationship between taxation burden and foreign direct investments flows to OECD countries. Hartman (1994), Grubert and Mutti (1991), Hines and Rice (1994), Boskin and Gale (1987) find that corporate income tax has a significant negative effect on attracting FDI flows. However, Root and Ahmed (1979), Porcano and Price (1996) conclude that taxes do not have a significant effect on FDI. Swenson (1994) reports a positive effect, which is surprising indeed. Based on the expectation that higher taxes reduce investment, we expect the negative effect of tax burden on foreign direct inflows that will be investigated by the empirical evidence for Baltic countries. To be sure, this analysis cannot be used to distinguish pull-effects from push effects, i.e. we are not able to give evidence of whether the Baltics attract foreign capital because they have so attractive tax regimes or the investor countries deter investment and drive capital out of their countries because their location is rather unattractive. Given the manifold motives of FDI and given that the Baltics are rather small, we do not consider this distinction further.

Despite dealing with small countries, we still assume that the larger host county has the greater potential for FDI. The coefficient of market size variable (GDP) is expected to be positive. The positive sign is also expected for the estimated investor market size (GDPI). In similarity to the previous research (Egger et al. 2009) we use real GDP in EUR. The distance between host and investor country is expected to be important in bilateral FDI flows. Larger distance reduces FDI due to high costs,

discrepancy in culture, lack of information concerning local legislation, investor climate and other factors. This variable is thus expected to have a negative effect on FDI.

Next, we consider cultural similarities. Here, the argument is that investors from Europe and other OECD countries seek host countries that are similar with respect to their language, religion and other aspect.

Close to cultural aspect, we see the institutional setting, e.g. economic freedom, the rule of law and other governance aspects. Investors want to invest in a secure environment with reasonably priced factors of production. Thus, we also include the degree of economic freedom as an explanatory variable, expecting a positive influence of economic freedom on FDI.

As a consequence of the theoretical thoughts and in relation to the existing empirical research, we derive four hypotheses:

- the first hypothesis claims that differences in corporate tax rates of investor and host country affect the size of foreign direct investment flowspositively.
- Secondly, geographical distance between investor and host country is deterring FDI. Baltic countries have developed more active relations with foreign investors from neighbouring countries.
- Our third hypothesis is that high economic freedom and other institutions in the Baltic countries promote the inflow of foreign direct investments from other developed countries.
- finally, according to the basic assumptions of the gravity model Baltic countries promote more active relations with investors from countries with bigger GDP.

3. Corporate taxation in the Baltic countries

The Baltic countries have a quite similar history of corporate taxation, since all of them are post socialistic countries that after the collapse of Soviet Union had re-created governmental institutions, including tax authorities and tax legalisation. However, the basics of taxation remained almost the same in the three countries. Later on the taxation systems became different.

According to the Latvian tax law, corporate income tax was reduced in 2003 from 25 percent to 19 percent and to 15 percent in 2004. As of January 1st, 2001, if a foreign investment plan approved by the government exceeds more than Ls 10 million within three years it may be eligible to corporate income tax holiday of 40 per cent of the amount invested. There is a withholding tax rate of 10 per cent for dividends, 10 per cent for interest, 10 per cent for management (consultation) fee and 15 or 5 per cent for royalties. For resident companies tax is imposed upon their worldwide income; for non-resident it is limited only to Latvian-source income. The corporate tax in Latvia in 2008 still was 15 per cent.

Corporate tax in Lithuania was also 15 per cent in 2008. Companies that are specialized in rendering services to agriculture and producing agricultural products have special incentives – they are exempt from income tax. For non-residents withholding tax from dividends is 15 per cent, 10 per cent from

interest, 10 per cent from royalties and 10 per cent from payments for leased and sold immovable properties. In general in Lithuania income tax is levied and withheld at a rate of 20 per cent from interest and 29 per cent from the dividends. As in Latvia, assets imported by foreign investors for incorporation or development of a company are exempted from customs duties.

The Estonian corporate income tax system was changed in 2000. Since then, companies pay income tax only in the case of profit distribution. According to the Estonian Income Tax Act, the income tax should be paid on distributed profits, including gifts, donations and costs of entertaining guests, profit distributions, and expenses and other payments not related to business. The tax rate of the mentioned subjects is specified 26 per cent in 2000 and as result of reducing policy the corporate income tax was 21 per cent in 2008. This is a special incentive for legal persons to reinvest earned profits. Reinvested profits are tax free. The subject of taxation includes distributed profit as dividends and other profit distributions that will be paid to shareholders of the company, except the provision of EU subsidiary directive that is common for all EU countries.

4. Empirical application

4.1 The model

The aim of empirical part of the study is to test the four hypotheses, namely that the bilateral FDI inflows into the Baltic States are influenced by corporate tax policy (in particular differences in tax rates), the geographical and cultural distance between investor and host countries, institutional quality in the Baltic States, including the level of economic freedom, and finally the size of the economy in the investor country.

Our theoretical hypotheses will be tested with a gravity model, which is based on Newton's law. It explains the gravitation force (GF_{ij}) between two objects *i* and *j* that is expressed by equation

$$GF_{ij} = \frac{M_i M_j}{D_{ij}}, i \neq j \qquad (1),$$

where M is representing mass and D stands for distance,

The model, estimated in terms of natural logarithms, is expressed as:

$$\ln GF_{ij} = \ln M_i + \ln M_j - \ln D_{ij} + \varepsilon_{ij} \qquad (2)$$

Economists have used the concept of the gravitation force to explain the volume of trade, capital flows and migration issues between different countries in the world. Tinbergen (1962) has introduced the gravity model and has shown the importance of "border effect" in trade theory.

There are some empirical papers dealing with FDI flows. Only recently, bilateral FDI flows have been explained with the help of gravity models. Frenkel et al (2004) and Brainard (1997) were the first authors to apply the gravity equation to FDI flows. According to the model, the investment flow from one country to another is explained by economic development of the countries, their market size, direct geographical distances and other variables determining common economic development. In case of capital flow from country *i* to country *j*, equation 2 of gravity model changes into:

$$\ln FDI_{ij} = \alpha + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln D_{ij} + \varepsilon_{ij} \quad (3)$$

The mass (M) in equation 2 is measured by the gross domestic product (GDP) of the countries. Distance between two objects (D) is measured by the geographical distance between the countries.

Bilateral FDI flows of the Baltic countries are estimated over the period 2000-2008. In our sample the host countries are Estonia, Latvia, and Lithuania. The investor countries are selected from the investor partners listed in the statistics and they are mostly developed EU countries plus United States and Norway. Poland, Malta, Latvia, Lithuania, Estonia are transition countries belong to the sample of investor countries. This group accounted for more than 80 per cent of the FDI inflows to the Baltics during the time span covered.

The estimated gravity equation is specified as:

$$\ln FDI_{ijt} = \alpha + \beta_1 \ln GDP_{it} + ß_2 GDP_{jt} + \beta_3 \ln D_{ij} + A_{ijt} + u_{ijt} \quad (4),$$

where

FDI_{ijt} is representing FDI flows from country *i* to country *j* in period t,

GDP_{it} and GDP_{jt} denote the GDP of countries *i* and *j* respectively in period t,

D_{ij} indicates geographic distance between capitals of countries *i* and *j*, and

A_{ijt} represents other factors adding or preventing FDI flows between countries (for example inflation, corporate taxation, development of infrastructure, dummy variable of common language).

Because of the correlation problem the variables of unemployment, IT development variable, measured as number of internet users, inflation, the development of infrastructure are not included into the basic equation. These variables are controlled for in the robustness analysis, which is presented in Table 4.

Additional variables in our specification encompass variables linked with cultural similarities, in particularly measured as common language variable, economic freedom and corporate taxation. Some of them are dummy variables (Table A1).

$$\ln FDI_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln D_{ij} + \beta_4 DCIT_{ijt} + \beta_5 EFW5_{ijt} + \beta_6 COMLANG_{ij} + u_{ijt} \quad (5),$$

where

$DCIT_{ijt}$ indicates the differential of corporate tax rate between countries i and j in period t,

$EFW5_{jt}$ indicates the degree of economic freedom (EFW, Gwartney et al. 2010) in area 5 of regulation in country j period t, and

$COMLANG_{ij}$ - (dummy variable) indicates the situation when the languages of countries i and j belong to common language family.

4.2 Methodical issues

Some of the variables have time effects and some of them only cross-section effects. In this situation the choice of proper estimation method is the next issue. Adoption of a typical panel data based approach, such as fixed or random effect is the usual way. However, the main problem for the data we use is including time invariant variables – for example distance that is one fundamental variable for the gravity model. The random effect approach is available also for models with time invariant variables. In this situation the Hausmann-Taylor (1981) estimation method is appropriate. It allows for the use of both time-varying and time invariant variables, according to the mentioned method a few of them can be endogenous in the sense of correlation with individual effects but still stay exogenous with respect to error term as it was done in study of Czarny et al. (2010).

4.3 Data sources

The worldwide direct investment in Baltic countries amounts to 1,282 million EUR in 2000, consisting of 425 million EUR of Estonian inflow, 447 million EUR of Latvian inflow and 410 million EUR of Lithuanian inflow (Table 1). In 2008 the inflow of foreign direct investment to Baltic countries increased 2.7 times in comparison with 2000. Large jumps were made in 2004, 2005 and 2007. The lion's share of total FDI inflow is from the countries of the current sample, which includes Austria, Cyprus, Germany, Denmark, Spain, Finland, France, Ireland, Italy, Luxemburg, Netherlands, Portugal, Sweden, Malta, Poland, Estonia, Lithuania, Latvia, United Kingdom, United States, Norway (Table A2). According to the data the sample covers approximately by 80 percent of the whole foreign direct investments into the Baltic countries.

Table1. FDI flows to Baltic countries from all countries of the world and countries under examination

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total inflows World (MEUR)									
Estonia	425	603	307	822	771	2 307	1 432	1 991	1 180
Latvia	447	148	270	272	517	573	1 339	1 704	862
Lithuania	410	498	771	160	623	826	1 448	1 473	1 396
Total inflows Sample countries (MEUR)									
Estonia	373	585	224	733	677	2 218	1 339	1 982	1 016
Latvia	286	114	198	180	393	334	1 067	1 528	685
Lithuania	374	468	572	111	412	490	2 472	1 146	1 153

Most importantly, we assess the relevance of the difference in nominal corporate income tax rate (*CIT*) between host countries and investor countries. The data are extracted from the intermediate report of the European Commission published in October 2009 in cooperation with consultants of the Oxford University Centre for Business Taxation, the Centre for European Economic Research (ZEW) and PricewaterhouseCoopers. The tax parameters of nominal corporate tax rates were extracted for the period 2000 – 2008. The sample consists of a limited number of investor countries including the EU countries plus Norway and United States. According to the data the lowest corporate tax rate was in Ireland. Four countries have a corporate tax rate below 20 per cent, namely Cyprus, Ireland, Latvia and Lithuania. The corporate tax rate of four countries is over 30 per cent, these are Austria, Spain, France and the Netherlands. The corporate tax rates of other countries are between 25 and 30 per cent. These tax parameters form the basis of the computations of tax rates that are presented in Table 2. In 2008 the average corporate income tax rate in the Baltic countries was 17 per cent; that is approximately 8 percentage points less than in 2000. Statutory corporate income tax rate in investor countries under examination decreased during the period under examination by 6.7 percentage points. The biggest fall in corporate tax rate can be observed in Germany, Poland and Cyprus. During the period of examination, Ireland has increased the statutory corporate tax rate from 10 to 12.5 per cent. France, United States, Norway, Sweden did not change the tax rate during the period in question. Finland has decreased tax rate only by percentage points. The increase of differences in corporate income tax rate between investor and host country is expected to have positive impact on the FDI. However, we cannot distinguish pull-effects due to tax decline in host countries from push-effects, which may be rooted in smaller tax decreases or even tax increases in the investor countries.

Besides the nominal corporate income tax rate, the effective statutory profit tax rate influence to FDI is also tested. This tax rate is extracted from an Intermediate Report (2009), where the tax rate is calculated on the base of nominal corporate income tax rate taking into consideration local profit tax rate (nominal) and surcharge used the methodology of Devereux and Griffith (Intermediate Report 2009). The main question is whether the effective tax rate affected the investment decision in the same manner as nominal corporate tax rate.

Data of bilateral flows of foreign direct investments are obtained from the database of Eurostat and missing data were collected from the databases of central banks. Data concerning tax rates are extracted from reports by the European Commission's Directorate-general for Taxation and Customs Union. Indexes of economic freedom are available on the website of the Economic Freedom Network of Fraser Institute. Data of GDP per capital is extracted from the OECD Statistics database, other economic variables are derived from the database of Eurostat. Table A1 provides the descriptive statistics of all variables used in the empirical analysis.

Table 2. Nominal corporate tax rate in 2000-2008.

Country	2000	2003	2005	2008	Change
Host countries					
Estonia	26	26	24	21	-5
Lithuania	24	15	15	15	-11
Latvia	25	19	15	15	-10
Average	**25.00**	**20.00**	**18.00**	**17.00**	**-8**
Investor countries					
Austria	34	34	25	25	-9
Cyprus	25	15	10	10	-15
Germany	40	26.5	25	15	-25
Denmark	32	30	28	25	-7
Spain	35	35	35	30	-5
Finland	29	29	26	26	-3
France	33.33	33.33	33.33	33.33	0
Ireland	10	12.5	12.5	12.5	2.5
Italy	37	34	33	27.5	-9.5
Luxemburg	30	22	22	22	-8
Netherlands	35	34.5	31.5	25.5	-9.5
Portugal	32	30	25	25	-7
Sweden	28	28	28	28	0
Malta	35	35	35	35	0
Poland	30	27	19	19	-11
Estonia	26	26	24	21	-5
Lithuania	24	15	15	15	-9
Latvia	25	19	15	15	-10
United Kingdom	30	30	30	28	-2
Unites States	NA	NA	35	35	0
Norway	NA	NA	28	28	0
Average	**30.02**	**27.15**	**25.49**	**23.85**	**-6.16**

Source: European Commission (author's calculation).

The economic development of the countries in the sample has been different during the examination period. In comparison with investor countries the average gross-domestic product in the host countries was small with 15,270 Euro per capita. However, GDP per capita of the host countries have increased by approximately 2.7 times. The degree of economic freedom increased in Estonia by 13 per cent, in Latvia by 11 per cent, and in Lithuania by 18 per cent. The development of the infrastructure took place in the opposite direction, the length of highways and railways decreased in total in 2001 by 236

kilometres in the Baltic countries in comparison with 2000. The renewal the infrastructure was not so successful and the level of development still has not achieved the scale of 2000.

In countries in transition the changes in regulations, inefficiency of the money market, barriers to international trade will influence foreign investors' choice of location abroad. For this reason we include the degree of economic freedom in the list of independent variables. We chose it from the components of economic freedom that in our opinion seem to be more important. These are the index of the area 3 (access to sound money), index of the area 5 (general regulatory questions) as well as its subcomponents 5a (regulation of credit) and 5b (regulation of labor), indexes 4A (taxes on international trade) and 4E (international capital market controls) and the indexes belonging to the area 4D (black market exchange rates). The data concerning the degree of freedom was calculated by Fraser Institute until 2000 in interval of 5 years, before it became available annually (Gwartney et al. 2010). For this reason the data is extracted for this study from 2000 until 2008. We expect a positive relationship between economic freedom and FDI flows. Economic freedom slightly increased between 2000 and 2008 with a peak in 2005 The highest rank in overall economic freedom can be observed in Estonia (top 20), whereas the other Baltic countries rank between 40 and 50.

4.4. The results

We have analyzed different models including the basic model (equation 5) described previously. The estimated parameters on variables derived from the basic version of the gravity equation are statistically significant and have the expected signs (see Table 3). Our hypotheses cannot be rejected.

To start with the fourth hypothesis: the positive sign behind the variable of investor country's GDP shows that FDI inflows increase with the size of the investor country. Investor country's GDP is statistically significant at the 5% level. The sign of the parameter for home country's GDP is also positive, while it is bigger than for the investor country's GDP. This difference may be related to the fast economic development of Baltic countries attracting FDI inflows. The positive sign of home country's GDP can then be interpreted as larger interest of investors in countries with fast economic development.

Next, we have tested six different components of the economic freedom index, which include the access to sound money, taxes on international trade, international capital market controls and general regulatory questions as well as its subcomponents 5a (regulation of credit) and 5b (regulation of labor). Access to sound money, taxes on international trade and international capital market controls are insignificant[1]. All three variables connected with economic freedom in the field of regulatory questions are significant and have a positive sign. The higher the degree of economic freedom regarding regulation (component 5 as well as subcomponents 5a and 5b of the Fraser index respectively), the higher the FDI inflows into the Baltic countries are.

Third, the distance between investor and home countries has a significant negative coefficient. Distance reduces the attractiveness of a country for foreign investors. When measuring institutional and cultural

[1] We do not report the results for the subcomponents 3, 4a and 4b in Table 3

distance, we find that the common language variable is also statistically significant at the 1% level. This does not hold true for other measures of cultural distance. The impact of the language similarities as a control variable is cross-checked via a language dummy (*COMLANG*). The language dummy through language similarities is calculated on base of following methodology. The countries are divided into subgroups according to the language family, to which the official language of the country belongs (see Table A3 in Appendix). The dummy variable is equal to one if both states belong to the same group and zero otherwise. The method used is very similar to the approach used by Folfas (2011). This variable linked with cultural similarities has no positive impact on FDI inflows. This may suggest that individual characteristics of host and investor countries are specified wrongly and the mentioned dummy variables do not reflect the real situation in culture similarities. According to the descriptive statistics we have only five countries with similarities in language family. The dummy variable of language similarities has a quite marginal effect to FDI flows that shows the coefficient equal to -2.03. The size of coefficient means that if in the pair of countries dominates same language the FDI inflow will decrease to 2.03 percentage point otherwise the FDI remain unchanged.

Finally difference in corporate tax rates appears the most important factor in the investment process. Therefore, a larger difference between tax rates of investor and host countries attract bigger investment into the Baltic countries. As the estimation results in Table 3 document, we cannot reject this important hypothesis: the difference in corporate tax rates between investor and host country is statistically significant. The coefficient of the differential in corporate tax rate is 0.033. In general, the study suggests that an increase of the differential between the statutory corporate tax rate of the investor and the host countries raises foreign direct investment flows by 0.033%. The impact of the effective profit tax rate differential is bigger than the role of the nominal corporate tax rate. The empirical calculations show that the effective tax rate affects FDI in the same manner.

To sum up: the basic model describes the relationship between the inflow of foreign direct investments into the Baltic states, the host and investor countries' GDP, geographical distance between the countries, the degree of economic freedom of the host country, the difference in corporate tax rates and common language. The inflow of foreign direct investments from the investor country to the host country depends on the difference in corporate tax rates between investor and host countries that impact the level of investments. A high differential of tax rate affects FDI flows positively. The distance affects the investments negatively. Moreover the common language has a negative impact on bilateral FDI. Also the size of the investor country, measured by its GDP, has influenced the bilateral FDI inflows into the Baltics positively. In addition, a high level of economic freedom increases the potential to attract investors from partner countries: The index of economic freedom has a positive impact on FDI inflows.

On the base of these first results, we conclude that the gravity model explains the changes in FDI flows considerably well. In the next section, we perform some robustness tests.

Table 3. Model. Differences between tax rates. Regression results for the foreign direct investments (log FDI).

	Model 1 (language similarities)	Model 2 (language similarities)	Model 3 (regulation of credit, labor and business)	Model 4 (regulation of credit, labor and business)	Model 5 (credit market regulation)	Model 6 (credit market regulation)	Model 7 (labor market regulations)	Model 8 (labor market regulations)
Host country GDP (LGGDP)	1.9005*** (11.5084)	1.8903*** (11.50211	1.3940*** (6.5048)	1.3597*** (6.3638)	1.4985*** (6.8973)	1.4488 *** (6.6396)	1.5946*** (6.7782)	1.5801*** (6.7386)
Investor country GDP (LGGDPI)	0.1614** (2.0823)	0.1603** (2.0677)	0.1502** (2.0152)	0.1484** (1.9936)	0.1533** (2.0140)	0.1510** (1.9869)	0.1571** (2.0257)	0.1560** (2.0101)
Distance between countries (LGDIST)	-1.4105*** (-6.7669)	-1.4049*** (-6.7388)	-1.3882*** (-6.9179)	-1.3806*** (-6.8874)	-1.3960*** (-6.8164)	-1.3870*** (-6.7803)	-1.3953*** (-6.6867)	-1.3895*** (-6.6539)
Corporate tax rate differential between investor and host countries (DDCIT)	0.0332* (1.8982)	-	0.03662** (2.0878)	-	0.0428** (2.3947)	-	0.0329** (1.8754)	-
Effective tax rate differential (DDEATR)	-	0.0345* (2.0194)	-	0.0424** (2.4713)	-	0.0485** (2.7432)	-	0.03461** (2.0271)
Economic freedom index (EFW)	-	-	0.57036*** (3.5952)	0.6009*** (3.7688)	0.2961*** (2.8014)	0.3252*** (3.0275)	0.2167* (1.8258)	0.2202*** (1.8562)
Common language (COMLANG)	-2.1641*** (-3.5878)	-2.1586*** (-3.5577)	-2.0369*** (-3.5952)	-2.0219*** (-3.4904)	-2.0914*** (-3.5317)	-2.0756*** (-3.5087)	-2.1226*** (-3.5154)	-2.1162*** (-3.5016)
Constant	-7.3019*** (-3.5082)	-7.2291*** (-3.4806)	-6.4427*** (-3.1472)	-6.3589*** (-3.1175)	-6.1555*** (-2.9354)	-5.9787*** (-2.8588)	-5.6468*** (-2.4866)	-5.5539*** (-2.4507)
R-squared (unweighted)	0.3318	0.3328	0.3992	0.4025	0.3735	0.3778	0.3477	0.3488
DW statistic	0.7770	0.7749	0.8727	0.8750	0.8299	0.8323	0.7955	0.7925
Number of observations	371	371	371	371	371	371	371	371

Note: t-statistic in brackets. ***- significant at the 1% level, **- significant at the 5% level, *-significant at the 10% level.

5. Robustness and stability analysis

The goal of this section is to check the stability of the results received in the gravity estimation, in particular the impact of index of economic freedom and differences in corporate taxation on FDI flows. We check the robustness of the estimations and the impact of control variables. Testing of common language dummy variable done in the previous section shows that cultural similarities, in particular common language did not lead to stronger FDI relationships between host and investor countries,

Table 4. .Robustness: adding control variables.

	Model 1 (common religion)	Model 2 (labor cost)	Model 3 (inflation)	Model 4 (development of infrastructure)	Model 5 (GDP per capita)
Host country GDP (LGGDP)	1.4053*** (6.1507)	-	-	-	-
Investor country GDP (LGGDPI)	0.1757** (1.9948)	-	-	-	-
Distance between countries (LGDIST)	-1.0623*** (-5.1792)	-1.2102*** (-6.0004)	-1.2129*** (-6.0042)	-1.2294*** (-6.0308)	-1.2411 *** (-6.3326)
Corporate tax rate differential between investor and host countries (DDCIT)	0.0376** (2.1399)	0.0302* (1.6397)	0.0381** (2.0896)	0.0353* (1.9233)	0.03229* (1.8021)
Economic freedom in area of regulation (EFW5)	0.5517*** (3.2704)	0.7609*** (4.1994)	0.9359*** (6.5706)	1.0054*** (6.7195)	0.4339** (2.3436)
Common language (COMLANG)	-	-1.8290*** (-3.0439)	-1.8231*** (-3.0246)	-1.8972*** (-3.1115)	-1.8415*** (-3.1555)
Common religion (COMREL)	-0.2030 (-0.6004)	-			
Labor cost (LABCOST)		0.0370*** (3.9347)			
Inflation (INF)	-	-	0.0922*** (4.9739)	-	-
Development of infrastructure (LGLENGTH)	-	-	-	0.6812 (1.5284)	-
GDP per capita (GDPPC)		-			0.0002** (5.0448)
Constant	-9.1356*** (-4.4133)	5.8108*** (3.0828)	4.4866*** (2.5960)	-0.9465 (-0.2395)	7.0948*** (3.9339)
R-squared (unweighted)	0.2852	0.3504	0.3517	0.3575	0.3785
DW statistic	0.7333	0.8625	0.8531	0.8623	0.8434
Number of observations	371	371	371	371	371

Note: t-statistic in brackets. ***- significant at the 1% level, **- significant at the 5% level, *-significant at the 10% level.

This result may be driven by misspecification (see above). Thus, we test whether other cultural similarities such as religion could have an impact on the inflow of investments. A common culture dummy-variable (*COMREL*) is considered in addition to language and is expected to impact positively on the flow of foreign direct investments. Forms of Christianity have dominated religious life in the countries under examination. The largest religion in Estonia and Latvia is Evangelical Lutheranism, in

Lithuania 79% of the population belongs to the Roman Catholic Church. The dummy is equal to one when the host and investor countries have the same religion dominating in the country; otherwise it is zero. This variable of common religion is significant at the 5% level, however with negative marginal effect to FDI flows. Language and religion variables appeared to be correlated; thus we test in model (see column 1) common religion dummy variable instead common language variable and present the results of the religious variable in Table 4. The problems with cultural distance are not solved. We assign this to the fact that the Baltics and the investor countries are rather similar with respect to their cultural heritages.

Secondly, the level of inflation in the host country is checked, via annual change of the consumer price inflation (*INF*). The inflation has significant effect on foreign direct investment. Labour costs are also an important determinant for attracting new investments into the country. Results are presented in column 2 and 3 of Table 4. The positive sign behind variables of inflation and labour costs is an unexpected result. One explanation of the result may be that inflation and labour costs in investor countries has the same tendency as in host countries. Inflation is related to the level of GDP for that reason the both of variables have similar effect on FDI.

Thirdly, the impact of the infrastructure development as a control variable is assessed via an infrastructure variable (LENGTH). Infrastructure development that intuitively seems to have significant impact on FDI flows is examined through the length of railways and motor high way in the host country. It is expected to have a positive impact on bilateral flow. The results presented in column 4 of Table 4 show that the impact of infrastructure variable on FDI flow is not significant. Firstly it may suggest that other variables are more important for bilateral FDI into Baltic countries. Secondly it may suggest that the governmental expenditures into infrastructure development are not enough for the attraction of foreign investments and that the mentioned variable does not reflect the real situation of infrastructure, because the quality of infrastructure is more important than quantity. The impact of the tax and other variables remains unchanged.

In addition, variables of political freedom are examined. According to the methodology used by Freedom House (2008) the countries are assigned a numerical rating on a scale of 1 to7 for political rights; a rating of 1 indicates the highest degree of freedom and 7 the least amount of freedom. Political rights refer to the possibilities to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives. The political freedom in Baltic countries is on higher level. During the sample period the index remained nearly unchanged and equal to 1. By the end of examination period the index of Latvia changed from 1 to 2 that mean appearance in the country of such factors as political corruption, violence, political discrimination against minorities, and foreign or military influence on politics. In 2004 the index also was 2 in Lithuania, but this held only one year. Examination shows that political right index variable (POLRIGHT) is non-significant (not reported in the table), thus we do not present the results of estimation in Table 4.

The year dummy variable (YEARDUM) capturing deviations from the trend ("seasonal" fluctuations) has also been examined. According to the trend mentioned before the large jumps of FDI flows were made in 2004, 2005 and 2007, therefore the dummy variable has been added to the model. Examination shows that year dummy variable is statistically significant (not reported in the table) and designate the

more important periods in the economic development of Baltic countries, accession to EU and last year of economic growth period.

The stability of the coefficients on tax differential and economic freedom is checked by combining the independent variables with additional control variables. The checks show that the effect of the tax differential and the index of economic freedom of regulation are not significantly different from the basic model. In a nutshell, the gravity model is robust.

6. Conclusions

In this paper we have investigated the effect of tax differentials between investor and host counties and the degree of economic freedom on bilateral FDI of Baltic states using a gravity model. As expected and in line with the literature, it turns out that tax rate differentials are a strong driver of FDI inflows: Baltic countries are effective in attracting FDI due to differences in the tax rates between investor and host country. The Baltic example also shows that countries with a high level of economic freedom have a great potential to attract foreign investments. Business friendly incentives and liberal legislation provide more possibilities for businesses to invest. Domestic and foreign firms can make use of these opportunites.

The results of study also support the notion that the size of economy, which is expressed by the total GDP of investor country, is still relevant, even in the Baltics. FDI flows are bigger between larger economies and Baltic countries are preferable for the investors from larger countries.

The gravity approach of foreign direct investments between Baltic countries and their main investor partners also shows that indicators of distance between two countries and cultural differences have considerable influence on the bilateral flows. Interestingly, the cultural variables do not show the expected signs, which may hint to a problem with the specification of the model and/or to the problem that the cultural differences within the sample of OECD countries and the Baltics are too small. We leave the answer to these questions to further research.

In any account, for policymakers in the so-called European periphery the message of the results is rather clear. They should have a strong incentive to insist on tax competition within the European Union, rather than agree to ex-ante harmonization as advocated by big members, Apart from other advantages of tax competition such as that it forces governments to search for efficiency and welfare, tax policy can be instrumental to attract investment from abroad.

References:

Bellak, C. and M. Leibrecht, 2009. Do low corporate income tax rates attract FDI? – Evidence from Central - and East European countries. *Applied Economics*, 41,pp.2691-2703.

Bénassy-Quéré A., Fontagné, L., and A. Lahreche-Revil, 2005. How does FDI react to corporate taxation? *International Tax and Public Finance*, 12(5), pp. 583-603.

Boskin, M.J., & Gale, W.G. 1987. New Results on the Effects of Tax Policy on the International Location of Investment. Working paper No 1862, *National Bureau of Economic Research.*

Brainard S.L. 1997. An empirical assessment of the proximity–concentration trade–off between multinational sales and trade, *The American Economic Review*, 87, pp. 520–44.

Czarny E., Śledziewska K., Witkowski B. 2010. Does monetary integration affect EU's trade?, http://www.etsg.org/ETSG2010/ETSG2010Programme.html

Dunning, J.H. 1977. Trade, Location of Economic Activity, and the Multinational Enterprise: A Search for an Eclectic Approach. B. Ohlin, P.O. Hasselborn and P.M. Wijkman (eds.), The *International Allocation of Economic Activity*, London, pp. 289-336.

Eesti Pank, statistical indicators, External sector statistics, http://statistika.eestipank.ee/?lng=en#treeMenu/MAKSEBIL_JA_INVPOS; 4.09.2011

Egger, P, Loretz, S., Pfaffermayr, M., and H. Winner, 2009. Bilateral effective tax rates and foreign direct investment. *International Tax and Public Finance*, 16, pp. 822-849.

European Commission, 2009. Taxation trends in the European Union, 2009 edition. Luxembourg. ; 19.04.2010

European Central bank, Statistical Data Warehouse, http://sdw.ecb.europa.eu/,30.08.2011

European Commission, Taxation trends in the European Union, Annex A: tables, http://ec.europa.eu/taxation_customs/taxation/gen_info/economic_analysis/tax_structures/index_en.htm; 19.04.2010

Eurostat, Statistics Database, European Commission, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database; 29.08.2011

Freedom House. 2008. Freedom in the World 2008: The Annual Survey of Political Rights and Civil Liberties (http://www.freedomhouse.org/uploads/press_release/fiw07_charts.pdf). New York: Freedom House; 28.04.2012

Frenkel, M., K. Funke and G. Stadtmann. 2004. A panel analysis of bilateral FDI flows to emerging economies, *Economic Systems*, 28, pp. 281–300.

Grubert, H. and J. Mutti. 1991. Taxes, Tariffs and Transfer Pricing in Multinational Corporation Decision Making. *Review of Economics and Statistics* 73, pp. 285–293.

Gwartney, James D., Joshua C. Hall, and Robert Lawson, 2010 Economic Freedom Dataset, published in Economic Freedom of the World: 2010 Annual Report http://www.freetheworld.com/datasets_efw.html

Hartman, D.G. 1985. Tax Policy and Foreign Direct Investment. − *Journal of Public Economics* 26, 107-121.

Hausman J. A., Taylor W. E. 1981., Panel Data and Unobservable Individual Effects, *Econometrica*, Vol. 49, No. 6 , pp. 1377–1398

Hines, J.R. 1996. Altered States: Taxes and the Location of Foreign Direct Investment in America. − *The American Economic Review*, Vol. 86, No. 5 (Dec 1996), pp. 1076-1094.

Intermediate Report TAXUD /2008/CC/099, European Commission's Directorate-General for Taxation and Customs Union and Centre of European Economic Research, http://ec.europa.eu/taxation_customs/resources/documents/common/publications/studies/etr_company_tax.pdf ; 19.04.2010

Latvijas Banka, Foreign direct investment in Latvia (net flows) by investing country (quarterly data), http://www.bank.lv/LMB/LMB_en.php?table_level_0=25&table_level_1=&tables=11&lang=2&

period-f=2000&period-t=2011&periodiskums=2&period-q-1=on&period-q-2=on&period-q-3=on&period-q-4=on&currency=1&valsts_grupa=0; 29.08.2011

Lietuvos Bankas, Stattistic database, External statistics, http://www.lb.lt/external_statistics_1; 04.09.2011

Organisation for economic co/operation and development, OECD.Stat Extracts, http://stats.oecd.org/index.aspx ; 09.01.2012

Paweł Folfas M.A.2 FDI between EU member states: gravidity model and taxes, Warsaw School of Economics Institute of International Economics

Porcano, T. M., Price, C. E. 1996, The Effects of Government Tax and Non-Tax Incentives on Foreign Direct Investment, *Multinational Business Review*, 4, pp. 9-20

Root F.R and Ahmed A.A. 1978, The influence of policy instruments on manufacturing direct foreign investment in developing countries, *Journal of International Business Studies*, 9, winter, pp. 81-93.

Swenson, L. Deborah. 1994, The Impact of U.S. Tax Reform on Foreign Direct Investment in the United States, *Journal of Public Economics*, 54, pp. 243-266.

Appendix

Table A1. Data description for years 2000-2008.

Variable	Description of variable	Source	Expected sign	Mean	Max	Min	Std.Dev
FDI	Foreign Direct Investment flows (Net, MEUR)	Eurostat, Latvian Central Bank, Lithuanian Central Bank, Estonian Central Bank		40.77	1875	-248	146.18
GDP	Host country size measured as GDP (MEUR)	Eurostat	+	15270.81	32203	6160	6579.44
GDPI	Investor country size measured as GDP (MEUR)	Eurostat	+	777925	10654030	259.00	1611192
DIST	Distance between capitals of countries (in kilometres)	Own calculation	-	1568.12	8268	89	1302.41
CIT	Nominal corporate tax rate in host country (in percentage)	European Commission's Directorate-General for Taxation and Customs Union.	-	19.68	26	15	4.58
CITI	Nominal corporate tax rate in investor country (in percentage)	European Commission's Directorate-General for Taxation and Customs Union.	+	27.17	40	10	7.33
EATR	Effective statutory profit tax rate in host country (in percentage)	European Commission's Directorate-General for Taxation and Customs Union.	-	19.89	26	15	4.45
EATRI	Effective statutory profit tax rate in investor country (in percentage)	European Commission's Directorate-General for Taxation and Customs Union.	+	29.06	52.35	10	8.34
LENGTH	Infrastructure development (in kilometres)	Eurostat	+	1863.14	2331.0	1024.0	509.02
EFW5	Degree of economic freedom (regulations) in host country (index, scale from 0 to 10)	The Fraser Institute	+	6.91	7.83	5.65	0.58
POLRIGHT	Political right index	Freedom house	+	1.07	2	1	0.26
COMLANG	Common language family (dummy)	Own calculation, including groups of countries: 1) Scandinavian countries (SE, DK, NO) 2) Uralic (EE, FI) 3) Slavic (LT, LV, PL) 4) Others	+	0.087	1	0	0.28
COMREL	Common religion (dummy)	Own calculation, including main forms of Christianity have dominated in region: 1) Evangelical Luthernism; 2) Roman Catolic Church 3) Orthodox Church.	+	0.43	1	0	0.50

GDPPC	GDP per capita	OECD stat	+	6713.95	12200	2900	2589.34
LABCOST	Unit labor costs	OECD Stat	-	8.49	28.19	-7.31	9.07
YEARDUM	Year (dummy)	Own calculation, including years of large jumps: 2004, 2005 and 2007	+	0.35	1	0	0.48
INF	Inflation (annual change in CPI)	Eurostat	-	4.40	15.30	-1.10	3.60

Table A2. The share of the partner countries in total FDI net flow into Baltic States in 2000-2008, %.

Country	FDI 2000	FDI 2003	FDI 2005	FDI 2008
Austria	-1,79	1,52	1,11	0,12
Cyprus	0,00	0,88	-0,38	4,59
Germany	4,60	4,07	3,80	4,70
Denmark	6,08	0,48	6,21	3,91
Spain	0,08	0,56	0,16	0,26
Finland	16,85	41,15	12,06	-6,73
France	1,09	0,32	0,92	3,94
Ireland	0,16	0,72	0,40	-0,06
Italy	0,39	1,20	-1,40	0,26
Luxemburg	0,00	1,44	-1,30	3,32
Netherlands	2,89	-2,39	-0,11	7,29
Portugal	0,00	0,00	1,43	-0,06
Sweden	34,87	25,28	53,99	34,92
Malta	0,00	0,08	0,89	1,53
Poland	1,64	-0,72	0,43	1,03
Estonia	11,31	-5,42	4,21	13,20
Lithuania	-0,08	0,56	2,08	-0,56
Latvia	0,86	1,67	0,19	1,18
United Kingdom	1,95	2,79	0,24	0,94
United States	-3,59	4,70	-3,91	0,82
Norway	5,23	2,15	-0,13	4,59

Source: Eurostat. Authors' calculations

Table A3. Language family.

Language	Language family	Subdivision
Lithuanian	Indo-European	Balto-Slavic
Latvia	Indo-European	Balto-Slavic
Estonian	Uralic	Finnic
Swedish	Indo-European	Germanic
Slovenian	Indo-European	Slavic
English	Indo-European	Germanic
Portuguese	Indo-European	Italic
German	Indo-European	Germanic
Dutch	Indo-European	Germanic
French	Indo-European	Italic
Danish	Indo-European	Germanic
Maltese	Afro_asiatic	Semitic
Polish	Indo-European	Balcan-Slavic
Norwegian	Indo-European	Germanic
Finish	Uralic	Finnic
Italian	Indo-European	Italic
Greece	Indo-European	Hellenic
Luxembourgish	Indo-European	Germanic
Spanish	Indo-European	Italic