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Determinants for Foreign Direct Investment in the Baltic Sea Region

Nuutti Nikula* – Markku Kotilainen**

* National Emergency Supply Agency, nuutti.nikula@nesa.fi
** ETLA – The Research Institute of the Finnish Economy, markku.kotilainen@etla.fi

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Contents

Abstract

We have defined the Baltic Sea Region as consisting of the following countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden, and Russia. We investigate foreign direct investment (FDI) flows from 1995 to 2010 to these countries econometrically. We use two basic models: the first one treats aggregate FDI inflows by countries, and the second focuses on bilateral FDI flows between country pairs. Because of limitations in data availability, the second model is built for a smaller group of countries. In this model we take into account the origin country of the FDI. Our results show that macroeconomic factors such as corporate taxes are important determinants for FDI flows. We notice that these factors and their effects vary between the Baltic Sea Region countries. Foreign trade with the investing country is also a statistically significant determinant for FDI, i.e. the countries that have trade with each other also invest in each other. On the other hand distance between countries doesn't explain FDI flows. Institutional factors such as EU membership or a common currency are not statistically significant in our estimations but this could be because of data limitations and because of the fact that these changes in countries' international status are incorporated in the other variables and are also foreseen by the investors.

Key words: Foreign direct investment (FDI), Baltic Sea Region, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden, Russia

JEL: F21, F23, F13, F15

Tiivistelmä

Olemme määritelleet Itämeren alueeksi Tanskan, Viron, Suomen, Saksan, Latvian, Liettuan, Puolan ja Venäjän. Tutkimme ulkomaisia suoria sijoituksia näihin maihin aikavälillä 1995–2010 ekonometrisen analyysin menetelmin. Käytämme kahta erilaista mallia: ensimmäisessä mallissa tutkitaan suoria sijoituksia kokonaisuuksina ja toisessa mallissa huomioidaan maiden kahdenkeskeiset sijoitusvirrat. Tilastorajoitteiden takia jälkimmäistä mallia ei voida estimoida kaikille maille. Tuloksemme osoittavat, että makrotalouden tekijät, kuten yritysverotus, vaikuttavat suoriin ulkomaisiin sijoituksiin. Havaitsemme myös, että nämä tulokset vaihtelevat eri maiden kesken. Maiden keskinäinen kauppa on myös tilastollisesti merkitsevä tekijä. Toisaalta maiden välinen etäisyys ei vaikuta suorien sijoitusten määrään. Näiden tekijöiden suhteen maittaiset vaihtelut ovat kuitenkin suurempia. Institutionaaliset tekijät kuten euro- tai EU-jäsenyys eivät ole tilastollisesti merkitseviä tekijöitä, mutta tämä voi johtua tilastopuutteista tai siitä, että tällaiset muutokset maan kansainvälisessä asemassa ovat osana muita selittäviä tekijöitä.

Asiasanat: Ulkomaiset suorat sijoitukset, Itämeren alue, Tanska, Viro, Suomi, Saksa, Latvia, Liettua, Puola, Ruotsi ja Venäjä

JEL: F21, F23, F13, F15

1 Introduction

This study is a continuation for our previous paper on foreign direct investment (FDI) in the Baltic Sea Region (Kotilainen and Nikula, 2010). In that study our main focus was to understand and explain FDI from a company's point of view. In this paper we focus on macroeconomic factors that make some countries more attractive to foreign investors.

This study has two parts. First, we look at foreign investment flows to our target countries in the Baltic Sea Region (Sweden, Denmark, Finland, Estonia, Latvia, Lithuania, Poland, Germany and Russia[1]). In the second part we build two econometric models in order to explain investment flows with macroeconomic factors. The first model treats aggregate FDI inflows by countries, and the second focuses on bilateral FDI flows between country pairs. Because of limitations in data availability, the second model is built for a smaller group of countries. In this model we take into account the origin country of the FDI.

2 FDI in the Baltic Sea Region

For representative purposes we have divided the Baltic Sea Region to the three different country groups. The first group is the Nordic countries (Denmark, Sweden and Finland). This group is both geographically and culturally rather homogenous. All Nordic countries have quite high taxes but they also have stable and non-corrupt governments.

The second group is the Baltic Countries (Estonia, Latvia and Lithuania). These countries have all regained their independence in the beginning of the 90's (Estonia and Latvia 1991 and Lithuania 1990) and their economic growth has been very fast until the beginning of the financial crisis in 2008. Their corporate taxes are low but there has been some evidence of corruption. These countries have the lowest population in the Baltic Sea Region, so it is natural that they are heavily influenced by the global economy. Because of their "youth" they are also dependent on resources from abroad.

The third group is "the rest" (Germany, Poland and Russia). Germany is the economic engine of the whole Europe so it has always been a lucrative destination for foreign direct investment. Because of its size and wealth it isn't as dependent from FDI as the smaller countries in the Baltic Sea Region. Poland became a market economy in 1990 after the collapse of the Soviet Union, and it has experienced steady economic growth ever since. As a large country it can rely on domestic demand more than the smaller Baltic Sea Region countries. For example in 2009 it was the fastest growing EU economy while other EU members were suffering more from the decline in the foreign demand. Russia is a giant on its own and its huge natural resources make it a potential destination for foreign investment.

For our study this "third group" is the most difficult to understand because all our data is from the country level. This means that treating these large countries as parts of the Baltic Sea Region is a bit misleading. For example Russia is a part of the Baltic Sea Region but it is also a part of the Pacific Sea Region.

[1] We are particularly interested in the parts of Russia that are a part of the Baltic Sea Region (Leningrad Oblast and Kaliningrad). Because of data limitations we, however, have to examine Russia as a whole.

2.1 FDI in the Nordic countries

Figure 2.1 shows the FDI flows to Denmark, Sweden and Finland from 1990 to 2010. The dotted part of each country line is from the time period when they were not members of the EU. Because one of the main principles of the EU is free capital mobility, membership in the EU could potentially be a big factor for FDI.

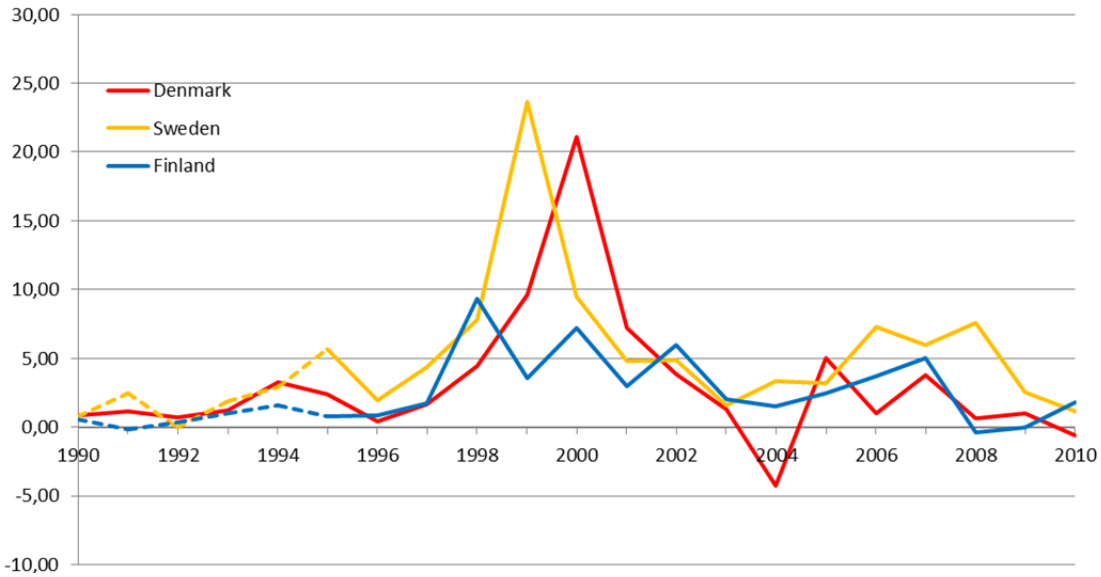
We can see that the FDI into the Nordic Countries peaked in the turn of the millennium. In Finland the best year was 1998 when FDI as a percentage of GDP was almost 10 percent. Sweden has lured more FDI than Denmark and Finland. In Sweden the best year was 1999 when FDI as a percentage of GDP was almost 25 percent. Denmark performed almost as well in 2000 when FDI was over the 20 percent level of the GDP. These high numbers are due to the so called dot-com bubble during the end of the 1990's, and due to the big mergers of firms at that time.

What we can see from Figure 2.1 is that Denmark and Sweden performed much better than Finland during the period of high economic growth. This is a bit strange and we hope to see reasons for this later on when we test our model.

Figure 2.2 shows the stock of FDI in the Nordic countries. We can see from the figure that FDI has grown to a new level in the Nordic Countries after 1997. It looks like that the EU membership of Sweden and Finland hasn't been the deciding factor for their FDI flows. This is something that we can better analyze with our econometric model.

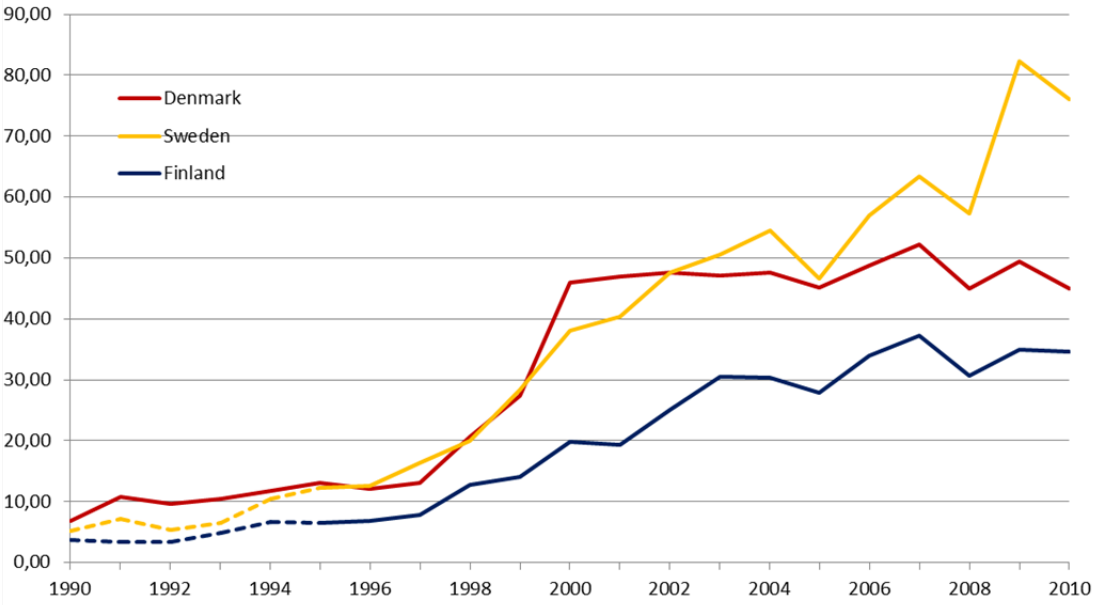
From Figure 2.2 we can also see that the level of FDI in Finland is much lower than in Denmark or in Sweden. Sweden particularly has had great success in luring FDI to the country. Sweden's example also shows that the most important reason for FDI flows are not low taxes. So-called welfare countries can gain a lot of FDI if other economic factors are favourable.

Figure 2.1 FDI flows to the Nordic Countries, percent of GDP



Source: Calculated from the UNCTAD and IMF data.

Figure 2.2 FDI stock in the Nordic countries, percent of GDP



Source: Calculated from the UNCTAD and IMF data.

What is somewhat unexpected is the fact that the financial crisis doesn't seem to have affected the stock of FDI (in relation to GDP) very much. This can, however, be explained by the fact that the GDPs have also declined a lot.

Table 2.1 shows from where FDI flows have come to Denmark. During the last decade the largest investor country has on average[2] been Sweden. In 2008 and 2009 Germany was a large in-

Table 2.1 FDI flows to Denmark from the ten largest investor countries and from the Baltic Sea Region, percent of total FDI flows

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Germany	0	4	3	6	-7	3	-9	8	36	61	1
Sweden	20	25	19	16	22	30	99	26	87	36	32
United States	5	16	32	27	29	7	-17	8	39	26	14
Switzerland	0	1	6	10	-4	8	-28	-14	-54	21	-3
United Kingdom	4	8	16	6	-10	-3	10	4	70	15	4
France	3	5	4	0	13	45	-180	7	39	9	-13
Finland	1	-1	2	12	0	-4	13	1	-7	8	3
Italy	1	0	0	-1	-3	0	-5	1	8	7	-1
Ireland	0	0	-2	-1	-6	2	-20	-2	-53	7	-4
Austria	1	0	1	1	0	10	-5	0	1	5	1
Baltic Sea Region	**23**	**28**	**25**	**36**	**15**	**30**	**109**	**35**	**123**	**109**	**38**

Source: Calculated from the OECD data.

[2] We calculate the average from the years 2000–2007. We do not use data from the years 2008 and 2009 because of the financial crisis. We do this for the other countries too (Tables 2.2, 2.3, 2.4, 2.5 and 2.6).

vestor. From year 2005 to 2009 the role of the Baltic Sea Region countries increased and in 2009 they made 109 percent of the investments (share of FDI flows can exceed 100 percent because some FDI flows are negative).

There are some odd numbers in Table 2.1. For example FDI flows from France decreased so much in 2006 that they represent -180 percent of the total FDI flows. Observations like this would mean very large disinvestments. According to business sectors, the FDI has flown especially to financial intermediation and to real estate, renting and business activities (Table 2.2).

As we have noticed before, Sweden has received larger FDI flows than the other Nordic countries. Table 2.3 shows that Sweden is less dependent on its neighbors. It has received on average 25 percent of its FDI flows from the United Kingdom. This is much more than the four percent that was the case with Denmark. Also the role of the Baltic Sea Region is smaller in Sweden than it was in Denmark.

Table 2.2 FDI flows to Denmark in different business sectors, percent of total FDI flows

Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	-1	0	-1	0	2	-1	-4	5	0
Electricity, gas and water	0	0	0	12	1	1	-4	-10	3
Financial intermediation	11	15	-9	11	59	11	4	5	16
Hotels and restaurants	0	0	0	0	1	0	2	0	0
Manufacturing	3	28	-5	7	-20	9	284	18	4
Mining and quarrying	4	-6	1	0	-15	2	2	20	-2
Real estate, renting and business activities	43	55	83	49	-59	36	-221	11	35
Transports and communication	4	-14	17	15	2	23	70	35	8

Source: Calculated from the OECD data.

Table 2.3 FDI to Sweden from the ten largest investor countries and the Baltic Sea Region, percent of total FDI flows

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Germany	10	21	21	58		1	0	20	30	10	19
Belgium		17	6	-27	-9	37	9	8	15	33	6
Ireland	0	-3	1	-32				6	0	29	-6
Netherlands	3	22	-4	36	27	11	2	-6	6	11	11
Finland	23	7	42	-66	-24	-5	5	12	-3	36	-1
New Zealand	0	0	0	0				0	0	1	0
Denmark	2	11	4	-5	0	11	0	3	19		3
Switzerland	5	1	-3	-15	3	-14	1	3	8	-3	-2
United Kingdom	8	-10	10	133	-2	12	36	10	13	15	25
Poland	0	0	0	-1			0	-1	-1		0
Baltic Sea Region	**35**	**38**	**67**	**-16**	**-24**	**7**	**5**	**32**	**44**	**46**	**18**

Source: Calculated from the OECD data.

According to business sectors, the role of manufacturing is much stronger than in the case of Denmark (Table 2.4). FDI flows to construction as well as to energy, transport and communication sectors have been strong, too.

Table 2.4 FDI flows to Sweden in different business sectors, percent of the total FDI flows

Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	0	46			-3		1		14
Electricity, gas and water	12	63	-15	-3	14	8	13	-2	13
Financial intermediation	16	-162	42	12	38	19	22	7	-6
Hotels and restaurants	0	0							0
Manufacturing	5	90	20	33	11	3	47	43	27
Mining and quarrying	0	22		2					8
Real estate, renting and business activities	19	-30	23	-1	14	20	11	9	7
Transports and communication	26	32	-8	-4	14	2	-3	10	10

Source: Calculated from the OECD data.

Table 2.5 shows the FDI flows to Finland from the ten largest investor countries. As we can see, the role of the Baltic Sea Region is largest in Finland among the Nordic countries. On average 73 percent of the FDI flows come from this region. The biggest investor is Sweden and its share is on average over 60 percent of the total FDI flows.

We can see from Table 2.5 that two years (2008 and 2009) have some very odd numbers. This is because during the global recession Finland's GDP dropped very heavily and there were a lot of disinvestments. These dramatic changes mean that observations from the years 2008 and 2009 should be read with caution.

Table 2.5 FDI flows to Finland from the ten largest investor countries and the Baltic Sea Region, percent of total FDI flows

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Germany	1	4	-1	24	16	-2	9	-1	-137	32145	6
Luxembourg			10	4	17	0	-1	-2	3	-30809	5
Sweden	73	89	73	52	52	99	39	7	-606	9007	61
Netherlands	10	-1	2	-19	3	3	17	15	-20	-49351	4
Ireland	0	1	0	8	1	-9	5	-3	10	683	0
Russia	0	1	0	0	2	1	0	1	4	-3354	1
Denmark	4	-4	1	-3	-7	-1	5	48	-1	-2236	5
Switzerland	0	-3	2	-9	10	-6	-2	1	36	6553	-1
China	0	0	0	1	0	0	0	0	9	-807	0
Canada	0	-1	1	-1	3	-1	2	2	31	217	1
Baltic Sea Region	**80**	**86**	**75**	**77**	**63**	**97**	**51**	**55**	**-719**	**34008**	**73**

Source: Calculated from the OECD data.

FDI has flown especially to transport and communication and to financial intermediation (Table 2.6). Also real estate, renting and business services are well represented.

Table 2.6 FDI flows to Finland in different business sectors, percent of total FDI flows

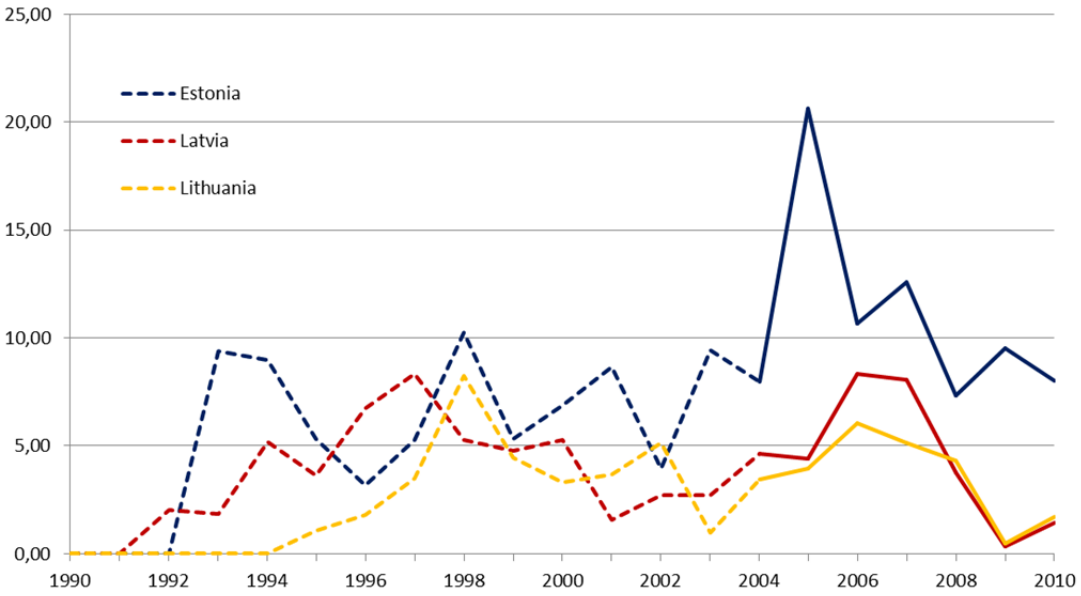
Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	-1	-4	-3	7	2	-3	-21	-10	0
Electricity, gas and water	5	-1	-6	-5	-6	0	-11	14	-2
Financial intermediation	22	30	8	38	17	28	-474	123	24
Hotels and restaurants	0	-3	-2	0	2	0	-3		0
Manufacturing	9	40	16	-33	2	44	699	-304	13
Mining and quarrying	0	2	1	6	1	-1	-11	-44	1
Real estate, renting and business activities	8	9	28	21	44	15	37	-14	21
Transports and communication	52	29	39	34	9	9	-158	-97	29

Source: Calculated from the OECD data.

2.2 FDI in the Baltic Countries

Figure 2.3 shows the FDI flows to Estonia, Latvia and Lithuania from 1990 to 2010. The dotted part of each country line is from the time period when they were not members of the EU. As we can see from Figure 2.3 especially Estonia experienced a surge of FDI after its EU membership.

Figure 2.3 FDI flows to the Baltic Countries, percent of GDP

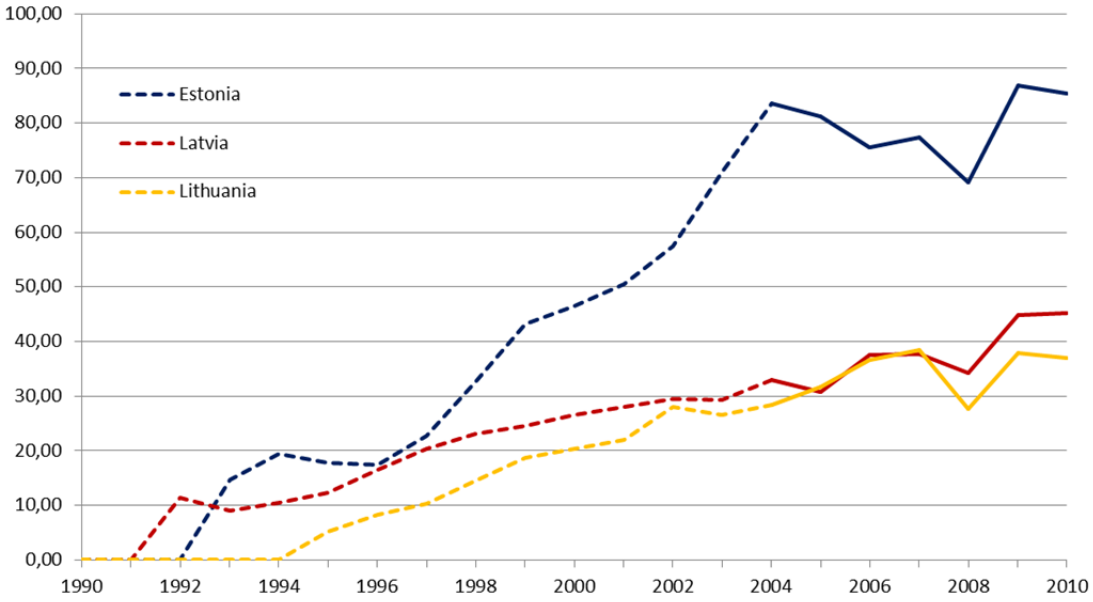


Source: Calculated from the UNCTAD and IMF data.

We can see from Figure 2.3 that all the Baltic Countries have received a lot of FDI. In Estonia the average level has been over 7 percent of GDP. In Latvia and Lithuania it has been almost five percent. This is more than in the Nordic Countries. It is probable that this high level of FDI flows is an important reason for the fast economic growth in these countries[3].

In Figure 2.4 we can see that the level (stock) of FDI in Estonia was over 80 percent of GDP in 2010. This is clearly higher than in the other Baltic countries. We can also see that EU membership has not affected the level of FDI flows much. This would imply that foreign investors are more interested in economic growth than legislative stability. Another possible interpretation is that the memberships of the Baltic countries were anticipated to happen with a high probability.

Figure 2.4 FDI stock in the Baltic Countries, percent of GDP



Source: Calculated from the UNCTAD and IMF data.

Because of data limitations, we cannot get data that shows investing countries in all Baltic countries. Table 2.7 shows from where FDI flows to Estonia have come. We can see that the majority of the FDI flows have come from Sweden and from the Baltic Sea Region. We can assume that the situation has been similar in the other Baltic countries, too.

This shows that distance can be a very important variable for low income countries. These countries offer high risks but also high rewards. This means that knowing the culture and the conditions in a country can be important for investors. The closer they are to the destination of the investment, the more they probably know about these issues.

[3] As always we have to be careful with our analysis because correlation doesn't mean causality. For example it is possible that the fast economic growth itself has also attracted FDI.

Table 2.7 FDI flows to Estonia from ten largest investor countries and the Baltic Sea Region, percent of total FDI flows

	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Sweden	35	24	81	61	50	56	77	50
Netherlands	-11	-3	-1	-2	10	28	9	-2
France	0	1	1	1	1	3	3	1
Russia	0	6	2	4	0	10	2	2
Finland	44	27	15	22	17	-13	2	25
Latvia	2	4	-1	3	-7	-2	2	0
Norway	1	9	0	3	-2	7	1	2
Austria	2	4	0	0	1	-1	1	1
Belgium	2	0	0	0	-3	1	1	0
China	0	0	0	0	0	0	0	0
Baltic Sea Region	**85**	**68**	**101**	**91**	**80**	**45**	**80**	**85**

Source: Calculated from the OECD data.

Financial intermediation (banking) and manufacturing are the most important business sectors for FDI in Estonia (Table 2.8).

Table 2.8 FDI flows to Estonia in different business sectors, percent of total FDI flows

Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	6	2	1	1	2	3	-4	-1	2
Electricity, gas and water	-11	1	-1	1	2	0	4	5	-1
Financial intermediation	38	15	21	88	69	53	63	65	47
Hotels and restaurants	0	2	1	-1	0	-1	6	-1	0
Manufacturing	18	12	23	8	18	8	2	2	15
Mining and quarrying	1	1	1	0	1	0	0	0	0
Real estate, renting and business activities	17	12	10	-7	-5	14	8	17	7
Transports and communication	9	7	2	0	7	-2	21	9	4

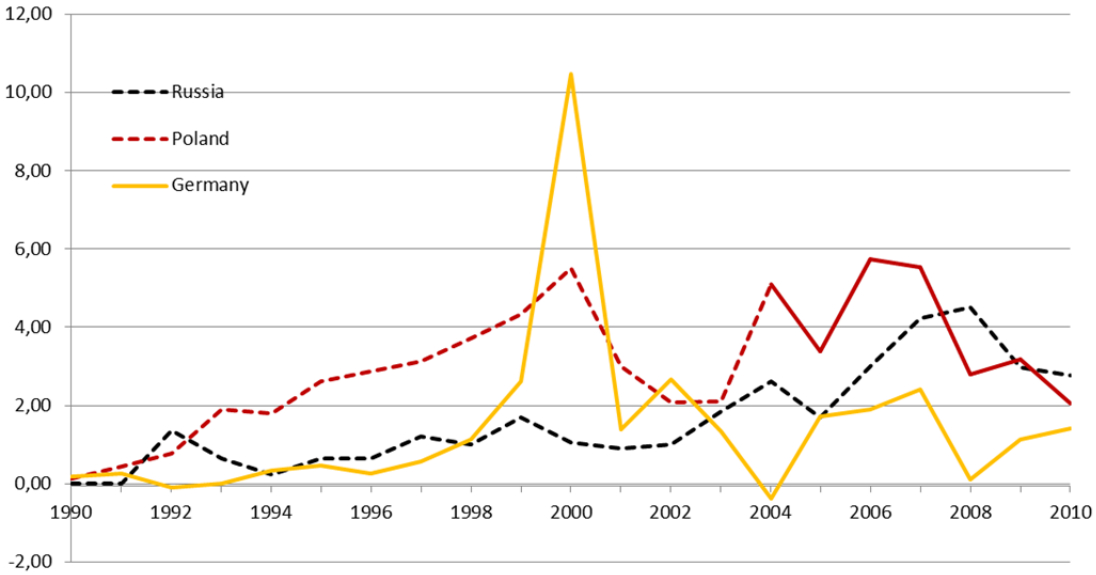
Source: Calculated from the OECD data.

2.3 FDI in the Large Baltic Sea Region Countries

Germany, Poland and Russia form our group "large Baltic Sea Region countries". Figure 2.5 shows[4] that FDI flows to these countries have been steady, and as was somewhat expected, have been larger to Poland and Russia which are economically poorer than Germany. An exception is year 2000 when the FDI flow to Germany was over 10 percent of its GDP (this is the same "dot-com effect" that we saw in the Nordic countries data). EU membership has not had a large effect on FDI flows to Poland.

[4] The dotted part of each countries line is from the time period that they weren't part of the EU.

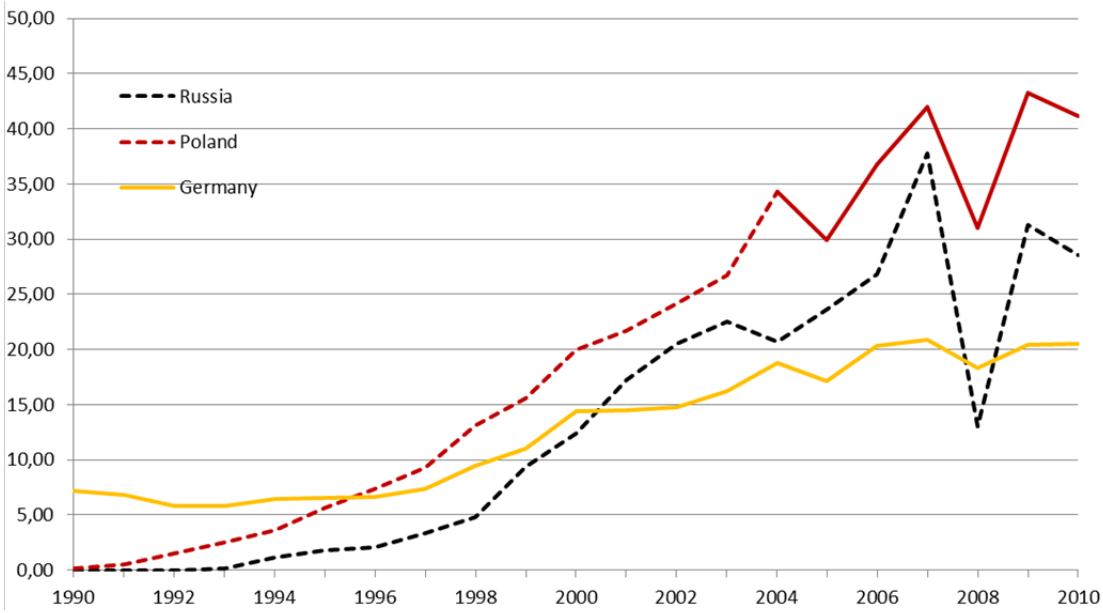
Figure 2.5 FDI flows to Germany, Poland and Russia, percent of GDP



Source: Calculated from the UNCTAD and IMF data.

There are a couple of interesting things in Figure 2.6. One is the effect of the financial crisis in 2008. Both Russia and Poland had a huge drop in the FDI stock (in relation to GDP). FDI bounced back in the next year but data from year 2008 show how a decline in the global economy can affect FDI. The fact that data from Germany does not have the same effect shows how the biggest losers on economic activity are often the ones that have the lowest level of GDP. FDI levels are highest in those countries where economic growth is high. In these kinds of

Figure 2.6 FDI stock in Germany, Poland and Russia, percent of GDP



Source: Calculated from the UNCTAD and IMF data.

economies the possible economic gains are large, but so are the risks. This means that when investors get scared, these are the investments that they will cut first.

Another interesting fact in Figure 2.6 is the relatively low level of FDI in Germany. As a large and wealthy economy it is not as dependent on FDI as smaller and economically poorer countries. It is not easy to make profitable investments in high income countries because it is hard to bring new economic knowledge to a market that is already specialized and rich. This makes the case of Sweden very interesting (and in part the other Nordic countries too, see Figure 2.2) because it has the same GDP per capita level as Germany but it is still able lure a lot of FDI. This difference can imply that one factor that affects FDI is the size of the economy.

Table 2.9 shows that the majority of FDI flows to Germany comes from countries that are not a part of the Baltic Sea Region. The biggest investor country is Luxembourg. This is obviously because of tax reasons. It is probable that German companies show their profits in Luxembourg and then reinvest them back to Germany. This is a factor that makes studying the origin of FDI

Table 2.9 FDI flows to Germany from ten largest investor countries and the Baltic Sea Region, percent of total FDI flows

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Luxembourg	44	42	12	29	203	31	7	0	582	32	46
Italy	0	12	1	-1	-11	54	3	20	229	18	10
Netherlands	13	-17	29	26	-82	23	8	31	-297	13	4
Switzerland	2	-5	3	18	-9	13	1	3	13	9	3
United States	2	24	7	24	58	4	4	6	187	7	16
United Kingdom	25	-35	16	-18	-44	-7	9	5	-186	4	-6
Austria	1	2	1	-1	-7	3	4	5	80	3	1
Belgium	4	27	9	-19	37	-7	-1	-4	271	3	6
Denmark	0	-2	1	3	-14	1	-2	0	24	2	-2
Sweden	1	6	1	1	-27	4	0	3	53	2	-1
Baltic Sea Region	**3**	**18**	**0**	**6**	**-39**	**5**	**2**	**4**	**51**	**-1**	**0**

Source: Calculated from the OECD data.

Table 2.10 FDI flows to Germany in to different business sectors, percent of total FDI flows

Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	0	0	0	0	0	0	5	0	0
Electricity, gas and water	1	4	2	1	1	1	14	3	2
Financial intermediation	26	-2	-21	50	32	32	-214	13	19
Hotels and restaurants	0	1	-3	0	0	0	0	0	0
Manufacturing	2	-6	-32	6	8	9	-133	28	-2
Mining and quarrying	1	1	-2	1	0	1	53	0	0
Real estate, renting and business activities	64	82	156	20	60	52	556	68	72
Transports and communication	10	15	-8	3	-1	3	208	5	3

Source: Calculated from the OECD data.

flows hard. Because capital can move without restrictions inside the EU, many companies maximize their profits by establishing companies in countries where corporate income taxation is low. This does not mean that they necessarily have actual production in those countries.

FDI flows to Germany have concentrated on real estate, renting and business activities as well as on financial intermediation (Table 2.10).

We can see from Table 2.11 that the Baltic Sea Region is quite an important origin of FDI flows to Poland. Poland's neighboring country Germany has been the biggest investor. Poland's case is similar to that of Estonia. Table 2.11 strengthens the hypothesis that for low income countries distance is a more important factor for investments than for high income countries.

According to business sectors, the FDI flows have mainly been directed to manufacturing, financial intermediation as well as to real estate, renting and business activities (Table 2.12).

Table 2.11 FDI flows to Poland from ten largest investor countries and Baltic Sea Region, percent of total FDI flows

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Germany	10	18	12	5	10	20	18	17	16	22	14
France	37	32	0	17	26	0	5	11	5	14	16
Luxembourg			3	5	2	20	23	8	13	13	10
United States	3	10	10	11	1	8	3	5	3	10	6
Sweden	6	0	-1	2	5	6	2	5	11	10	3
Netherlands	21	19	45	12	19	5	9	11	16	5	18
Austria	3	4	6	10	6	7	-3	5	5	5	5
Italy	4	2	2	1	4	2	9	2	3	5	4
Spain	4	-2	1	1	4	2	7	3	3	4	3
Denmark	1	5	3	3	2	6	1	3	2	2	3
Baltic Sea Region	**18**	**25**	**14**	**10**	**11**	**38**	**21**	**25**	**31**	**32**	**21**

Source: Calculated from the OECD data.

Table 2.12 FDI flows to Poland in different business sectors, percent of total FDI flows

Industry	2002	2003	2004	2005	2006	2007	2008	2009	Average 2000–2007
Construction	1	-1	2	1	3	2	3	4	1
Electricity, gas and water	17	7	6	2	1	3	10	9	6
Financial intermediation	36	11	18	29	11	15	30	16	20
Hotels and restaurants	1	1	0	0	0	1	0	0	0
Manufacturing	32	40	35	28	24	29	15	35	31
Mining and quarrying	0	0	0	0	0	0	0	0	0
Real estate, renting and business activities	10	12	9	16	33	25	26	20	18
Transports and communication	-19	-3	17	-4	6	4	-5	2	0

Source: Calculated from the OECD data.

3 An econometric model for FDI

In the previous chapter we looked at the FDI made in the Baltic Sea Region and presented some hypotheses about the reasons behind them. In this chapter we try to conduct a more specific analysis about the economic factors that affect the flow of FDI. There have been studies like this (for example Quazi, 2007 and de Mello-Sampayo, 2009) but not for these specific countries.

3.1 Model specification

We try to explain the flow of FDI by using different variables that could affect foreign investors' decisions. These variables consist of macroeconomic indicators, indices of government stability and different dummy variables. Below we present the model that we will test for FDI flows.

$$FDI_{i,t} = \alpha + \beta_1 FDI_{i.t-1} + \beta_2 MS_{i,t} + \beta_3 IL_{i,t} + \beta_4 TO_{i,t} + \beta_5 CT_{i,t} + \beta_6 HC_{i,t} + \beta_7 I_{i,t} + \beta_8 C_{i,t} + \beta_9 EF_{i,t} + \beta_{10} EU_{i,t} + \beta_{11} EURO_{i,t} + \beta_{12} RECESSION_{i,t}$$

$FDI_{i,t}$ is foreign direct investment flows to country i in period t. This is our dependent variable that we try to explain with the other variables. We measure FDI flows as a percentage of GDP, so that the countries' sizes do not affect our results. The data are from UNCTAD and we cover the years from 1995 to 2010.

The explanatory variables are as follows:

α is a constant.

$FDI_{i,t-1}$ is a lagged variable for FDI flows to country i in period t. Previous literature (Quazi, 2007) shows that investors are risk averse and a history of FDI is a factor that affects new FDI.

$MS_{i,t}$ is a variable for market size in country i in period t. This is simply measured as purchasing power parity corrected GDP. The bigger the market is, the more attractive it is for an investor. This is why most studies show that market size is an important factor for FDI (for example Chakrabarti, 2001). Market size can be interpreted as market potential. We obtain this data from the IMF and it covers the years 1990 to 2010.

$IL_{i,t}$ is a variable for income level in country i in period t. For this variable we use the purchasing power parity corrected GDP per capita. Income level also correlates with the overall labor productivity and research shows that this is important for foreign investors (Ozawa, 1992). A high income also means a high market potential. A country could be a good place to invest in high value production that is logistically expensive to be imported from a long distance. We obtain this data from the IMF and it covers the years 1990 to 2010.

$TO_{i,t}$ is a variable for trade openness in country i in period t. We measure this as the value of all imports as a percentage of GDP. For EU members there should not be severe obstacles to foreign trade. In exports to Russia there are several types of obstacles, and this can be a reason why a company needs to make an investment instead of just exporting products from another production location. Because our dataset begins from 1990, there are also other Baltic Sea Region countries that can have had complications with their obstacles to foreign trade. There

can also be some cultural reasons why trade openness could affect FDI (Cuadros, Orts and Alquacil, 2004). We calculate this variable on the basis of the data collected by the World Bank.

$CT_{i,t}$ is a variable for corporate taxes in country i in period t. Taxes are obviously a very important factor for companies when they are making their investment decisions. We measure corporate taxes as taxes on income, profits and capital gains as a percent of GDP. We gather these data from the World Bank.

$HC_{i,t}$ is a variable for human capital in country i in period t. Studies show that foreign investors appreciate educated workforce (Noorbakhsh, Paloni, and Youssef, 2001). In order to get as much coverage as possible we use research and development expenditure as a percentage of GDP as a proxy for human capital. Because our country group consists of developed countries this gives a better estimate for human capital than for example literacy rate that is often used in this kind of research. We obtain our data from the World Bank.

$I_{i,t}$ is a variable for infrastructure in country i in period t. Good infrastructure is important for investors because it means that they are able to transport their products cheaply, efficiently and safely. This is especially important for such investments that are made in order to produce goods. We obtain this indicator from the World Bank data and it is an index that shows the quality of port infrastructure.

$C_{i,t}$ is a variable for corruption in country i in period t. Because corruption can scare foreign investors, it is a natural variable for this study. We obtain this variable from Transparency International. Corruption is measured with an index ranging from 1 to 10 where 10 is the lowest level of corruption.

$EF_{i,t}$ is a variable for economic freedom in country i in period t. This index comes from Heritage Institute and it combines a lot of sub-indices. It is a good proxy for the business mindedness of a country. Studies show that it can affect FDI (Bengoa and Sanchez-Robles, 2003).

$EU_{i,t}$ is a dummy variable for EU membership in country i in period t. EU membership means, among others, free capital flows inside the region which should have increased FDI. This variable is 1 for all those data points when a country has been an EU member.

$EURO_{i,t}$ is a dummy variable for EMU membership in country i in period t. This dummy has a value of 1 for all those years when a country has been using euro as their currency.

$RECESSION_{i,t}$ is a dummy variable for the global recession that the financial crisis caused in country i in period t. This dummy variable has a value of 1 for all countries from 2008 to 2010.

3.2 Descriptive statistics

Before we estimate our model it is important to test the data for statistical problems. The biggest problem with this sort of econometric modeling is multicollinearity. Multicollinearity means that the explanatory variables correlate with each other. If this happens, the results can be biased. Some multicollinearity is expected and seen in all econometric studies so it is important to calculate the size of it.

Table 3.1 shows the correlation matrix for our variables. Normally multicollinearity is seen as a problem if correlation between variables is higher than 0.9. From Table 3.1 we see that we have one such observation (because of the rounding it looks like we had four such observations). This observation is correlation between the corruption index and GDP per capita. This is a logical and interesting finding because it shows that GDP per capita is actually a very good proxy for corruption in a given country.

Other high correlation data points are between the infrastructure index and the GDP per capita, the corruption index and R&D per GDP, the corruption index and the infrastructure index, the economic freedom index and the infrastructure index, the economic freedom index and the corruption index and the EU membership dummy and the economic freedom index.

These high correlations between the variables mean that we have to be careful when interpreting the results. In some cases we drop some of our explanatory variables in order to achieve more robust results.

Table 3.1 Correlation matrix of variables

		A	B	C	D	E	F	G	H	I	J	K	L	M
FDI flow per GDP	A	1.0												
Lagged FDI flow	B	0.6	1.0											
GDP	C	-0.3	-0.5	1.0										
GDP per capita	D	-0.3	-0.4	-0.1	1.0									
Trade openness	E	0.5	0.7	-0.6	-0.3	1.0								
Corporate tax	F	-0.3	-0.2	0.2	0.1	0.3	1.0							
R&D per GDP	G	-0.2	-0.3	0.0	1.0	-0.4	0.0	1.0						
Infra	H	-0.1	-0.1	-0.2	**0.9**	-0.1	0.3	0.8	1.0					
Corruption	I	-0.1	-0.1	-0.3	**0.9**	-0.1	0.2	**0.9**	**0.9**	1.0				
Economic freedom	J	0.1	0.3	-0.6	0.6	0.5	0.4	0.4	**0.8**	**0.8**	1.0			
EU	K	0.1	0.3	-0.7	0.4	0.5	0.5	0.2	0.4	0.6	**0.8**	1.0		
Emu	L	-0.4	-0.3	0.3	0.5	-0.3	0.6	0.5	0.5	0.4	0.2	0.2	1.0	
Recession	M	-0.3	0.2	-0.1	0.0	0.0	-0.2	0.0	-0.1	0.0	0.0	0.0	-0.1	1.0

3.3 Results

We estimate our models in a panel data form in a normal ordinary least squares regression. This is the most common method in estimating these kinds of models. We start by running the whole data in one regression with different explanatory variables. We continue by estimating the model for different countries separately. Because of dataset limitations and for multicollinearity reasons we are only able to do this with a smaller amount of explanatory variables.

From Table 3.2 we see the results of our model for different explanatory variables. As we have stated before there are a lot of differences between the Baltic Sea Region countries, so the regression coefficients for the whole group can be affected by these.

The first column shows the results for a model that is run with all the explanatory variables. As we can see none of the coefficients have statistical significance. This is mainly because the

Table 3.2 Regression results from our model for FDI flows, Baltic Sea Region

Dependent variable: FDI flow per GDP				
Number of obs.	17	85	85	116
Adjusted R-squared	0.577	0.344	0.304	0.254
Root MSE	0.020	0.032	0.033	0.035
	Coefficient	**Coefficient**	**Coefficient**	**Coefficient**
Lagged FDI flow	-0.323	0.151	0.101 *	0.341 ***
GDP	0.033	0.019 *	0.008	
GDP per capita	-0.006	-0.003 *	-0.001	
Trade openness	0.245	0.154 ***	0.177 ***	0.050 ***
Corporate tax	-0.055	-0.015 *	-0.010	-0.001 ***
R&D per GDP	-0.002	0.007	0.000	
Infra	0.025			
Corruption	0.021	0.011 **	0.012 **	
Economic freedom	-0.042	-0.019	-0.033 **	
EU dummy	0.075	0.032		
Emu dummy	0.001	-0.014		
Recession dummy	-0.017	-0.001		
Constant	0.142	0.077	0.140 **	0.02 **

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

number of observations drops too low. Because we have data for the infrastructure index only for three years we can use only 17 observations.

In the second column we show the results with a model that doesn't use the infrastructure variable. Now we have 85 observations and we have a better statistical significance. Market potential (GDP) and income level (GDP per capita) are both statistically significant with 10 percent confidence interval. Market potential has a positive effect on FDI flows. This is logical and expected. Income level on the other hand has a negative effect on FDI flows. This is somewhat unexpected but it is possible that the differences between our group countries explain this result. In the chapter two we saw that FDI inflows were the biggest in the Baltic countries and the income level is there lower than in the Nordic countries and in Germany. The economic reasoning behind this result can be that a country with a low GDP per capita has more catching up potential, and thus better growth prospects than a high-income country.

Trade openness is statistically significant with a one percent confidence interval which is a very strong result. The more open the country is for trade the more it receives FDI. This is intuitively understandable and shows that open economies receive more FDI. It is possible that companies that are used to doing business in some countries are more likely to invest in those countries.

High corporate taxes affect FDI flows negatively (this result is statistically significant with 10 percent confidence interval). This is an expected result and shows how tax competition affects

FDI flows in the Baltic Sea Region. Baltic countries have succeeded in attracting FDI flows with their low-tax policies. This result would probably have been even more significant, if we had used the effective tax rate as a tax variable instead of corporate taxes per GDP (de Mooij and Ederveen, 2006). The reason for our tax variable choice was the straightforward and reliable calculation of the used variable.

High corruption lowers the amount of FDI flows (statistically significant with 5 percent confidence interval). This is natural because corruption works like a tax for foreign companies. The more a company has to pay bribes the more expensive its business becomes. None of our dummy variables have statistical significance.

In the third column in Table 3.2 we have ran the model without infrastructure and dummy variables. The biggest difference with this model when compared with the previous version is that the economic freedom index becomes statistically significant with a five percent confidence interval.

In the fourth and last column we show the results that are achieved by running the model with only three variables. This way we are able to increase the number of observations to 116. We used the variables "lagged FDI flows", "trade openness" and "corporate taxes". All these explanatory variables are statistically significant with one percent confidence interval, so the results are very strong. The effect of these variables are as expected so that the FDI flows previous year predict the current years FDI flows. This shows that investors are more willing to invest, if they can see a track record of earlier investments. Trade openness has a positive effect and high corporate taxes a negative effect on FDI flows. This shows that low corporate taxes are a policy tool in attracting FDI.

As we mentioned before, the Baltic Sea Region consists of very different economies. In the next section we research these economies separately. Because of data limitations we try to use

Table 3.3 Regression results from our model for FDI flows, Nordic countries

Dependent variable: FDI flow per GDP		
Number of obs.	44	44
Adjusted R-squared	0.111	0.110
Root MSE	0.046	0.046
	Coefficient	**Coefficient**
Lagged FDI flow	0.350**	0.361**
GDP	-0.155	
GDP per capita	-0.002	
Trade openess	0.610	-0.081
Corporate tax	-0.066	-0.034
Recession dummy	-0.023	
Constant	0.097	0.100

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

the same country blocks that we used in chapter two. This works well for the Nordic and the Baltic countries because the groups are relatively homogenous. For the large Baltic Sea Region countries this does not work so well. So we have to study them as individual economies.

Table 3.3 shows the results of our model for the Nordic countries. We have used only those explanatory variables for which we could show some statistically meaningful results. Also multicollinearity is a big problem when we have a smaller sample size. Because all Nordic countries have very similar levels of corruption and economic freedom, there is no good reason to use these variables.

In the first column we see that the signs of the variables are in most cases as expected. Market potential and income level have both negative signs which is somewhat unexpected. This could be because FDI flows are measured as percentage of GDP. If GDP is very high in some year it means that the FDI flow is smaller in that year even if it would have stayed the same as in previous years. If we could have data for a longer period we could research this issue in more depth.

The only explanatory variable that is statistically significant is lagged FDI flows. The coefficient for this variable is positive which means that FDI flows to the Nordic countries can be best explained by the FDI flows from the previous years. The lack of strong results is problematic for the Nordic countries because it shows that attracting FDI flows to them is hard. The sign for the corporate tax variable is negative which shows that lowering corporate tax rates might increase FDI flows but this coefficient is not statistically significant.

Table 3.4 shows the regression results for the subsample of the Baltic countries. From the adjusted R squared indicator we can see that our model fits to the Baltic countries much better than for the full sample or for the Nordic countries. We see this effect also in a higher statistical significance for the coefficients than in the previous regressions.

Table 3.4 Regression results from our model for FDI flows, Baltic countries

Dependent variable: FDI flow per GDP		
Number of obs.	40	40
Adjusted R-squared	0.560	0.397
Root MSE	0.025	0.029
	Coefficient	**Coefficient**
Lagged FDI flow	-0.839	0.226
GDP	-1.073 **	
GDP per capita	0.007 ***	
Trade openness	0.051	0.107 ***
Corporate tax	-0.042 **	-0.044 ***
Recession dummy	-0.044 ***	-0.016
Constant	0.026 **	0.055 *

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

We test two models that are the same as in the regression for the Nordic countries. In the first case (first column in Table 3.4) we use the explanatory variables "lagged FDI flow", "market potential", "income level", "trade openness", "corporate tax" and dummy for a global recession. All these coefficients are statistically significant except "lagged FDI flow" and "trade openness". Even when the lagged FDI flow variable does not have statistical significance the result is revealing because for the Nordic countries it was the only variable that was statistically significant. This shows that the Baltic countries offer different types of investment motivations than the Nordic countries. Because the "lagged FDI flow" variable measures investors risk aversion, the fact that this variable does not have statistical significance indicates that the Baltic countries might attract investment from companies that prefer more risk in order to achieve more reward.

The coefficient of the market potential variable (GDP) has a negative sign which is counter-intuitive. This could mean that investments made in the Baltic countries are to a large extent made in order to produce goods and services for export. A high income level on the other hand increases FDI flows and this could mean that increasing productivity in the Baltic countries can attract more foreign investment in the future. It must be noticed, however, that GDP per capita correlates with infrastructure and corruption variables (see Table 3.1). The effect can thus come from all these factors.

The corporate tax variable is statistically very significant and the sign of this coefficient is, as expected, negative. This means that low corporate taxation is an important reason why foreign companies are investing in the Baltic countries. Also the dummy variable for global recession has a strong statistical significance which means that the Baltic countries suffered a lot from the financial crisis. This is logical because they are a preferred investment location for companies that are willing to take risk. When the global recession started, companies had to re-evaluate their possessions and the more risky investments were avoided. This lowered the amount of FDI flows to the Baltic countries.

Table 3.5 Regression results from our model for FDI flows, Germany

Dependent variable: FDI flow per GDP		
Number of obs.	15	15
Adjusted R-squared	0.487	-0.264
Root MSE	0.018	0.027
	Coefficient	**Coefficient**
Lagged FDI flow	-0.603**	0.031
GDP	-2.520	
GDP per capita	0.177	
Trade openness	2.504***	0.131
Corporate tax	-0.133**	0.000
Recession dummy	-0.009	-0.022
Constant	0.750	-0.013

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

In the following we present estimations by countries. In addition to a small sample of observations, a problem with country-wise estimations is that there is not much variation in some of the variables. These estimations must therefore be treated with special caution, and as checks of existence of differences between countries.

Table 3.5 shows the results from our two models for Germany. The only statistically significant results can be found in the first column. The first and strange result is that previous years' FDI flows affect current FDI flows negatively. This is especially strange in the case of Germany because it is a stable and large economy, so it should be one of those countries that attract companies that prefer stability over risks. This result might partly be affected by the large and volatile FDI inflows that happened around 2000 (see Figure 2.5).

The other statistically significant explanatory variables are "trade openness" and "corporate taxation". As in all other cases the signs of these coefficients are following the normal logic of FDI flows. The more the country is open to foreign imports the more it attracts FDI flows. On the other hand high corporate taxes decrease FDI flows.

In the case of Poland a large GDP tends to decrease FDI flows and a high income level tends to increase them. From Table 3.6 we can see that both of these findings are statistically significant. It is possible that the somewhat odd result is based on the fact that Poland's economic growth has been so fast in recent years. When Poland's economy was still small, the FDI was relatively large. Now when the economy has grown, its relative significance has decreased. This explanation would be consistent with a finding that FDI flows are smaller in large highly developed countries.

The fact that Poland is exceptional because of its size is seen also in the fact that corporate taxation is not statistically significant, like in the economically otherwise similar Baltic countries. Trade openness on the other hand has a positive and statistically significant effect. In the second column we can see that the global recession affected FDI flows to Poland negatively.

Table 3.6 Regression results from our model for FDI flows, Poland

Dependent variable: FDI flow per GDP		
Number of obs.	9	9
Adjusted R-squared	0.948	0.523
Root MSE	0.004	0.010
	Coefficient	**Coefficient**
Lagged FDI flow	-0.370 *	-0.018
GDP	-61.773 **	
GDP per capita	2.340 **	
Trade openness	0.498 **	0.513 *
Corporate tax	0.048	0.072
Recession dummy	0.018	-0.027 *
Constant	0.058	0.167

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 3.7 Regression results from our model for FDI flows, Russia		
Dependent variable: FDI flow per GDP		
Number of obs.	8	8
Adjusted R-squared	0.921	0.020
Root MSE	0.009	0.012
	Coefficient	**Coefficient**
Lagged FDI flow	-0.840	1.116
GDP	0.725	
GDP per capita	-0.092	
Trade openness	-0.621	0.304
Corporate tax	0.042	0.040
Recession dummy	0.014	-0.001
Constant	0.181	0.159

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 3.7 shows the regression results for Russia. As we can see none of the variables is statistically significant. This underlines the problem of estimating our model for individual countries.

4 Gravity model for FDI to the Baltic Sea Region

Our previous econometric model treated all FDI flows as aggregates. In this chapter we change this premise by taking into account the origins of the FDI flows. We do this by building a gravity model for FDI flows. Gravity models are often used in the international trade literature but they can also be used in the research of FDI (Brenton, Di Mauro and Lücke, 1999).

4.1 Model specification

Our gravity model for FDI flows is very similar to our previous model. The biggest difference is a distance variable which takes into account the origin of the FDI flow. Because data concerning the origin of the FDI is limited, we are able to test this model only for Denmark, Sweden, Finland, Estonia, Germany and Poland. Most variables are the same as in the previous model but the new and important variable is distance in kilometers between the capitals of the source and destination countries. We remove some variables that we used earlier because of multicollinearity reasons.

$$FDI_{i,j,t} = \alpha + \beta_1 FDI_{i.j,t-1} + \beta_2 MS_{i,t} + \beta_3 IL_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 MSpartner_{j,t} + \beta_6 ILpartner_{j,t} + \beta_7 D_{i,j,t} + \beta_8 IMP_{i,j,t} + \beta_9 EXP_{i,j,t} + \beta_{10} CT_{i,t} + \beta_{11} HC_{i,t} + \beta_{12} C_{i,t} + \beta_{13} RECESSION_{i,t}$$

$FDI_{i, t}$ is foreign direct investment flows to country i in period t. This is our dependent variable that we try to explain with the other variables. We measure FDI flows as a percentage of GDP so that the countries' sizes do not affect our results. The data are from UNCTAD and we cover the years from 1995 to 2010.

The explanatory variables are as follows:

α is a constant.

$FDI_{i, j, t-1}$ is is a lagged variable for FDI flows to country i from country j in period t. The only difference with this variable from our previous model is that it takes into account the origin of FDI.

$MS_{i, t}$ is is a variable for market size in a country i in period t. This is simply measured as purchasing power parity corrected GDP. This variable is the same as in the previous model.

$IL_{i, t}$ is a variable for income level in country i in period t. For this variable we use the purchasing power parity corrected GDP per capita. This variable is the same as in the previous model.

$GROWTH_{i, t}$ is the GDP growth in country i in period t. Fast economic growth attracts investors so we expect this variable to be positively correlated with FDI flows.

$MSpartner_{j, t}$ is a variable for market size in country j in period t. This is the GDP of the investing country.

$ILpartner_{j, t}$ is a variable for income level in country i in period t. This variable is the purchasing power parity corrected GDP per capita of the investing country.

$D_{i, j, t}$ is the distance between the source and destination countries. This is measured in kilometers between capitals. In foreign trade long distance decreases trade because it creates a cost.

$IMP_{i, j, t}$ is imports per GDP in country i from country j in period t.

$EXP_{i, j, t}$ is exports per GDP from country i to country j in period t.[5]

$CT_{i, t}$ is a variable for corporate taxes in country i in period t. This variable is the same as in the previous model.

$HC_{i, t}$ is a variable for human capital in country i in period t. This variable is the same as in the previous model.

$C_{i, t}$ is a variable for corruption in country i in period t. This variable is the same as in the previous model.

$RECESSION_{i, t}$ is a dummy variable for the global recession that the financial crisis caused in country i in period t. This variable is the same than in the previous model.

[5] In our previous analysis we used a variable for trade openness. In this section we have divided this variable in two variables (IMP and EXP).

4.2 Descriptive statistics

Table 4.1 shows the correlation matrix for our variables. Although we have abolished some variables that we used in our previous model, there are some multicollinearity problems. For example export and import variables have a strong correlation. As in our previous section we handle these problems by decreasing the number of variables in all of those cases when multicollinearity produces biased results.

Table 4.1 Correlation matrix of variables

		A	B	C	D	E	F	G	H	I	J	K	L	M	N
FDI flow per GDP	A	1.0													
Lagged FDI flow	B	0.4	1.0												
GDP	C	-0.1	-0.1	1.0											
GDP per capita	D	-0.1	-0.1	0.1	1.0										
GDP growth	E	0.1	0.0	-0.2	-0.5	1.0									
GDP partner	F	0.0	0.0	0.0	0.0	0.0	1.0								
GDP per capita partner	G	0.1	0.1	-0.1	0.0	0.1	0.1	1.0							
Distance	H	-0.1	-0.1	0.0	0.0	0.0	0.2	-0.1	1.0						
Imports per GDP	I	0.3	0.4	-0.1	-0.1	0.1	0.1	0.1	-0.3	1.0					
Exports per GDP	J	0.3	0.4	-0.1	0.0	0.1	0.2	0.1	-0.3	0.9	1.0				
Corporate tax	K	-0.1	-0.1	0.9	0.1	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	1.0			
R&D per GDP	L	0.0	0.0	0.0	0.8	-0.4	0.0	0.0	0.0	-0.1	0.0	0.0	1.0		
Corruption	M	0.0	0.0	-0.2	0.8	-0.4	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.8	1.0	
Recession	N	0.0	0.0	-0.2	0.1	-0.4	0.0	0.2	0.0	0.0	0.0	-0.2	-0.1	-0.1	1.0

4.3 Results

Although we have less countries in our sample because of the data limitations, we expect this gravity model to produce more robust results. This is because we have more data points for each country. Our model treats every FDI flow in every period as a unique observation.

Table 4.2 shows the results from our model for all countries as a whole. We can see that an increase in the number of observations has made our variables statistically more significant (compared to Table 3.2).

Our first and interesting finding is that the new distance variable doesn't have statistical significance. This can be explained by the fact that distance doesn't create such a cost as it does in international trade. Money can be transferred almost without cost, so investors can make investments as easily in neighboring countries as they make them in the other side of the world. It is also possible that the impact of distance is overshadowed by other variables.

The other new variable "GDP growth" has a strong statistical significance, which shows that a rapidly growing market attracts investors. The variable "lagged FDI flow" is statistically the most significant. This shows how important it is from the investors point of view to have established business relations.

Table 4.2 Regression results from our gravity model for FDI flows, Baltic Sea Region

Dependent variable: FDI flow per GDP		
Number of obs.	1526	1527
Adjusted R-squared	0.182	0.179
Root MSE	0.007	0.007
	Coefficient	**Coefficient**
Lagged FDI flow	0.285***	0.295***
GDP	1.268	1.267
GDP per capita	-0.161***	-0.149**
GDP growth	0.000**	0.000**
GDP partner	-0.179**	
GDP per capita partner	0.027*	
Distance	0.032	-0.008
Imports per GDP	0.039	0.040
Exports per GDP	0.096***	0.086***
Corporate tax	-0.001	-0.001
R&D per GDP	0.000	0.000
Corruption	0.001*	0.000*
Recession dummy	0.000	0.000
Constant	-0.001	0.000

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

One problem with interpreting the results in Table 4.2 is that it includes all available BSR countries. As we showed in Chapter 3, different factors are significant in different countries. This is why we test our model for individual BSR countries (Denmark, Sweden, Finland, Estonia, Germany and Poland). This on the other hand decreases the amount of observations. We again have to remove some variables in order to deal with multicollinearity problems.

Table 4.3 shows the results of our gravitation model for Sweden. We can quickly see that none of the coefficients is statistically significant. This means that we can hardly draw any conclusions from this data. However, absence of evidence is not evidence of absence. The coefficient for the tax rate is anyway negative and the coefficient for corruption is positive.

With Danish data (Table 4.4), we have more luck in having meaningful results. Variables "lagged FDI flow", "exports per GDP" and "corruption" are all statistically highly significant. These results are also in line with our earlier findings.

Also in the case of Finland (Table 4.5) we have some robust results. They indicate that lagged FDI flows and a high level of imports from the source country tend to attract FDI.

Our earlier modeling showed that corporate tax rates are a meaningful factor when deciding about FDI flows to the Baltic Countries (Table 3.4). Table 4.6 shows that our gravity model

doesn't show this result in Estonia. The coefficient is still negative but it isn't statistically significant. One reason for this might be that there is not enough variation in this variable during the estimation period.

Table 4.3 Regression results from our gravity model for FDI flows, Sweden

Dependent variable: FDI flow per GDP	
Number of obs.	274
Adjusted R-squared	0.070
Root MSE	0.010
	Coefficient
Lagged FDI flow	-0.018
GDP growth	0.000
Distance	-0.034
Imports per GDP	0.160
Exports per GDP	0.094
Corporate tax	-0.002
Corruption	0.003
Constant	-0.027

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 4.4 Regression results from our gravity model for FDI flows, Denmark

Dependent variable: FDI flow per GDP	
Number of obs.	411
Adjusted R-squared	0.130
Root MSE	0.004
	Coefficient
Lagged FDI flow	0.125***
GDP growth	0.000
Distance	-0.001
Imports per GDP	-0.034
Exports per GDP	0.129***
Corporate tax	0.004
Corruption	0.003***
Constant	-0.039***

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 4.7 shows that the only variable that has statistical significance in Germany is "imports per GDP". Like in the case of Sweden, we cannot interpret this result too much.

Table 4.5 Regression results from our gravity model for FDI flows, Finland

Dependent variable: FDI flow per GDP	
Number of obs.	289
Adjusted R-squared	0.192
Root MSE	0.007
	Coefficient
Lagged FDI flow	0.208***
GDP growth	0.000
Distance	-0.045
Imports per GDP	0.281***
Exports per GDP	-0.126
Corporate tax	0.000
Corruption	0.002
Constant	-0.017

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 4.6 Regression results from our gravity model for FDI flows, Estonia

Dependent variable: FDI flow per GDP	
Number of obs.	206
Adjusted R-squared	0.360
Root MSE	0.012
	Coefficient
Lagged FDI flow	0.461***
GDP growth	0.000
Distance	-0.065
Imports per GDP	-0.096
Exports per GDP	0.251***
Corporate tax	-0.006
Corruption	-0.002
Constant	0.020

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Finally, Table 4.8 shows the results of our gravity model for Poland. In Poland's case we have quite a lot of statistically significant findings. Lagged FDI flow and GDP growth both increase inward FDI flows. The strangest finding is that data for Poland would imply that high corpo-

Table 4.7 Regression results from our gravity model for FDI flows, Germany

Dependent variable: FDI flow per GDP	
Number of obs.	431
Adjusted R-squared	0.027
Root MSE	0.003
	Coefficient
Lagged FDI flow	0.055
GDP growth	0.000
Distance	-0.036
Imports per GDP	0.058*
Exports per GDP	-0.006
Corporate tax	0.000
Corruption	-0.001
Constant	0.001

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

Table 4.8 Regression results from our gravity model for FDI flows, Poland

Dependent variable: FDI flow per GDP	
Number of obs.	216
Adjusted R-squared	0.417
Root MSE	0.002
	Coefficient
Lagged FDI flow	0.422***
GDP growth	0.000**
Distance	-0.024
Imports per GDP	0.007
Exports per GDP	0.039*
Corporate tax	0.009**
Corruption	-0.001**
Constant	-0.012**

Note: ***Statistical significance of <1%; **Statistical significance of <5%; *Statistical significance of <10%.

rate taxes increase FDI flows. This finding is against all our earlier results. This result can be related to the measurement of corporate taxes as percentage of GDP. The alternative way of measuring tax rates would be to use official tax rates presented by the tax authorities. This would, however, require harmonization in terms of tax bases (effective tax rates).

5 Summary

The econometric findings in our two models differ somewhat between countries. The fact that some results stay the same shows, however that these findings are robust and not just caused by some statistical noise.

In our first model the case of the Baltic countries shows that corporate taxation is one of the main factors affecting investment decisions of the foreign companies. Corporate taxation is especially important in countries that have a lower productivity because these countries compete more with other low cost countries. This however does not mean that highly developed countries could ignore this issue, and we can see from our results that for example Germany could attract more FDI flows by lowering its corporate tax level. In our gravity model estimations we see this effect also but it is not statistically significant.

Corruption works like a tax so the Nordic Countries benefit from their low corruption. These countries are also economically safe for investors so they attract companies that appreciate safe returns more than big profits. We can see this effect in both of our models.

The higher the level of FDI is, the more it could decline if the global economy declines. Global recessions are especially dangerous for countries that offer low costs for foreign companies. Basically this means that poorer and more risky countries suffer more from recessions than rich and stable countries.

Our gravity model results show similar findings to our basic model. The main additional finding of our gravity model is that distance between the host and home country is not a significant variable for FDI flows in the Baltic Sea Region. This is a very interesting result and shows how different FDI flows are from international trade.

References

Bengoa, M. and Sanchez-Robles, B. (2003): "Foreign direct investment, economic freedom and growth: new evidence from Latin America". European Journal of Political Economy, Volume 19, Issue 3, September 2003, Pages 529–545.

Brenton, P., Di Mauro, F. and Lücke, M. (1999): "Economic Integration and FDI: An Empirical Analysis of Foreign Investment in the EU and in Central and Eastern Europe". Empirica, Volume 26, Number 2, 95–121.

Chakrabarti, A. (2001): "The Determinants of Foreign Direct Investment: Sensitivity Analyses of Cross-Country Regressions". Kyklos, Volume 54, 89–114.

Cuadros, A, Orts, V. and Alquacil, M. (2004): "Openness and Growth: Re-Examining Foreign Direct Investment, Trade and Output Linkages in Latin America". Journal of Development Studies, Volume 40, Issue 4, 2004.

De Mello-Sampayo, F. (2009): "Competing-destinations gravity model: an application to the geographic distribution of FDI". Applied Economics, 41, 2237–2253.

De Mooij, R. and Ederveen, S. (2006): "What a difference does it make? Understanding the empirical literature on taxation and international capital flows". European Commission, Directorate-General for Economic and Financial Affairs, Economic papers, No. 261.

Kotilainen, M. and Nikula, N. (2010): "Why do firms invest in the Baltic Sea Region". ETLA, Discussion Papers No. 1229.

Noorbakhsh, F., Paloni, A. and Youssef, A. (2001): "Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence". World Development Volume 29, Issue 9, September 2001, Pages 1593–1610.

Ozawa, T. (1992): "Foreign direct investment and economic development". Transnational Corporations, Volume 1, No. 1 (February 1992), pp. 27–54.

Quazi, R. and View, P. (2007): "Foreign direct investment in Latin America: a panel regression study". The International Journal of Business and Finance Research, Volume 1, Number 1.

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ETLA
Elinkeinoelämän tutkimuslaitos
The Research Institute of the Finnish Economy
Lönnrotinkatu 4 B
00120 Helsinki

Puh. 09-609 900
Fax 09-601 753
www.etla.fi
etunimi.sukunimi@etla.fi

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