INFLUENCE OF FOREIGN DIRECT INVESTMENTS ON FOREIGN TRADE RESTRUCTURING IN POLAND FROM 2004 TO 2011

Wojciech Zysk - Sławomir Śmiech

Abstract

This article attempted a holistic approach to the relationship between capital inflows in the form of foreign direct investment (FDI) and foreign trade of the host country, both export and import. In this paper is made an attempt to settle the controversy around the motives connected with investing in Poland and verification hypothesis that FDI has a significant impact on the Polish foreign trade. Will be examined the relationship between the value of foreign direct investment in Poland in 2004-2011 and the geographic structure of trade in two directions: exports and imports. The analysis of influence of FDI on foreign trade restructuring in Poland is done (linear gravity model was used). Research results (during the period of the research) are: FDI influence geographical and commodity structure of Polish foreign trade to a high extent, FDI strongly influence the volume of Polish export and import, value of imports is correlated with value of FDI inflow to a higher extent than with value of export and - as far as statistics is concerned - there is a significant co-dependence between the inflow of capital to Poland – in the form of FDI – and geographical and commodity pattern of Polish foreign trade.

**Key words:** Foreign Direct Investment, International Trade, Gravity Model, Resistant Regression

JEL Code: P45, F21, F10

Introduction

In the era of globalization and internationalization the important phenomenon is the dynamic international movement of capital which founds initiation and the development of an economic activity. Foreign capital flowing from beginnings of the nineties of the 20th century into countries of our part of Europe in the form of foreign direct investment (FDI) affected recalled economic processes. It is well known, that the definition of the foreign direct investment is inseparably associated with comprehending transnational corporations (multinational corporations, MNCs). Investing abroad is the basis for action of such a

companies. Intensification of international capital flows, but especially a foreign direct investment and consequences of the inflow of this capital for the host country are a provoking issue of a lot of disputes, controversy, debate and discussion. It is generally acknowledge that the inflow of foreign direct investment accelerates economic development of host countries, but also expressed concerns about their actual, continuous and sustainable impact on creating the conditions for sustainable economies growth. World experiences (Jayachandran & Seilan, 2010; Makki & Agapi, 2004; Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2004; Weresa, 2001) show that the positive effects dominate in the evaluation of the foreign direct investment, however the potential and real risks and costs should be taken into account. These issues are particularly important in case of Poland where there has been a significant increase in investment in recent years, especially after the accession to the European Communities[1]. Figure 1 presents the inflow of capital in the form of FDI into Poland in the years 1990-2011.

Fig. 1: Inflow of FDI into Poland, years 1009-2011, millions of USD.
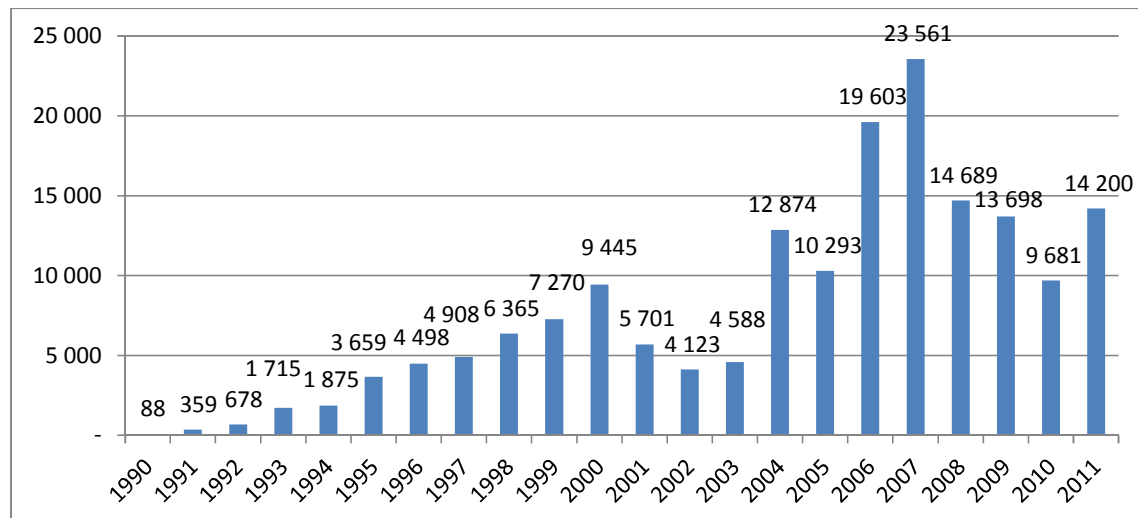
Source: (2013, 04 02). Retrieved from www.paiz.gov.pl, (2013, 04 02). Retrieved from www.nbp.pl, (2013, 04 02). Retrieved from www.unctad.org.

The Polish membership in the European Communities in 2004 (the so-called impulse accession) encourages decisions to invest capital in the form of FDI (including reinvested earnings) by foreign companies (including TNCs), and this process has a strong impact on the development of Polish exports and imports. Integration processes of the European Communities brought our country a number of benefits, i.e:
- increase in foreign trade (due to the trade creation effect and trade diversion effect),

---

[1] The issue of the relationship between FDI flows and changes in Polish foreign trade in the previous period (1993-2002) is described in the book: Zysk, W. (2012). *Foreign capital and foreign trade in Poland. Pre-accession period*. Warsaw: CeDeWu.

- increase the profitability of exports (less transaction costs after the abolition of customs duties and the cost of crossing the border),

- the influx of new technologies and management methods,

- the inflow of capital in the form of FDI (in both greenfield and brownfield investment).

In this paper an attempt is made to settle the controversy around the theme of investing in Poland and the verification of the hypothesis that foreign direct investment (the presence and activities of subsidiaries of transnational corporations in which foreign capital invested in the form of FDI) have a significant impact on the Polish foreign trade.

The relationship between the value of inflow of foreign direct investment in the years 2004-2011 and the geographic structure of foreign trade of our country in two directions: exports and imports was examined. To verify the hypotheses gravity model was used. Taking into account the heterogeneity of countries and time periods several specification of gravity model were considered. We used random and fixed-effect panel models. The rreference model were obtained using pooled OLS. In the sample there were several outliers. In order to limit their influence on analysis results a ressitant regression (least-trimmed squares) was used. The results obtained in this case characterized a typical investor's country and typical periods.

2 Methodology and data analysis

Assessment of the impact of direct investments to the size of the import from the country of the investor and the export to the country of investor was conducted with the gravity model. The gravity model in its form assumes that the volume of trade between countries is proportional to a size of economies, measured with the size GDP and is inversely proportional to a distance between these countries. In the present study an assumption was made, that the volume of trade depends on the investment value and is inversely proportional to the distance between Warsaw and the capital city of the country of the investor. Additionally a number of investors was included in a model. This variable is supposed to measure the relation between the inflow of investors and changes of the value of export and the import. Given these assumptions, the analyzed model took the following form:

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \varepsilon_{it} \tag{1}$$

where: y_{it} it is a size of the import to Poland from i country, or export from Poland to i country in the year t, x_{1it} - it is a level of direct investments from the country i in Poland, x_{2it} - number of investors from the country i, x_{1it} - distance of capital cities of country i from Warsaw, ε_{it} - the error term.

The estimation of model parameters is connected with certain problems. Most important amongst them its heterogeneity among countries and zero trade flows. Comparison of methods of estimating parameters in gravity models can be found in the work of Santos Silva & Tenreyro, 2006.

Assumptions adopted for the construction of sample in the study allowed to avoid the problem of zero trade folws[2]. The estimation of parameters was conducted with the use of pooled OLS, resistant regression[3], fixed and random panel models.

In this study, the following constraints modeling:

1. sample period is 8 years (annual data for the years 2004-2011),
2. variable import, export, FDI inflows are measured in millions of USD,
3. number of investors in the piece,
4. geographical distance in kilometers (transport costs between Poland and the studied countries approximated using parameter geographical distance between the capital cities of Warsaw and 34 countries surveyed),
5. essential variables in this study are variables characterizing the involvement of foreign capital from the country in Poland (N) and the number of investors in the country invests FDI (P) - which is a characteristic of investment projects,
6. to eliminate the influence of factors commonly considered to be important for the development of trade in the model included explanatory variable (O),
7. Output sample consisted of 34 countries, with 8 observations for each country: the years 2004-2011, a total of 272 observations.

Figure 1 presents the distributions of: the export into the biggest business partners of Poland, the import to Poland and amounts of direct investments in Poland in 2004-2011 years.

---

[2] Choice of the biggest business partners of Poland.
[3] Lts minimize function of the sorted squared residuals Rousseeuw & Leroy (1987).

Fig. 1: Export, import and foreign direct investment in Poland in the period 2004-2011
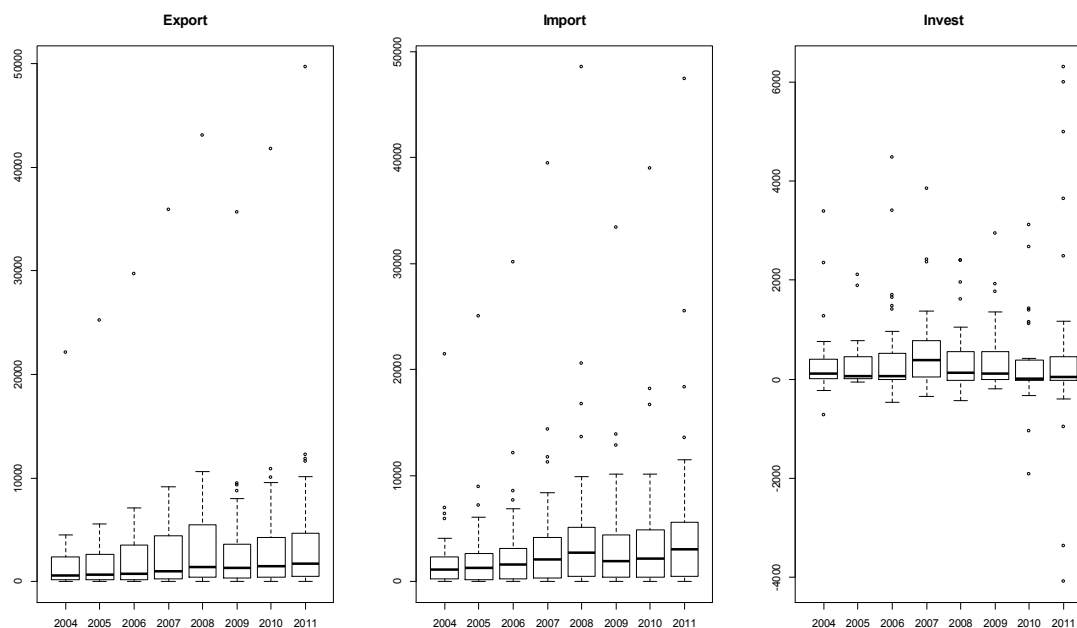
Source: (2013, 04 02). Retrieved from www.stat.gov.pl.

Median of the export and of import (slightly) grew in years 2004-2011. The distributions of these variables are highly asymmetric. The highest volume of the trade with Poland (it is outlier) in every year have Germany. A situation is different in case of the value of direct investments. All quartiles of the distribution grew to 2007, and then a slow fall in the size of investment is taking place. Countries which were characterized by the greatest level of direct investments are: France (2004), Germany (in the entire period), Luxembourg (2006, 2010, 2011), Sweden (2011). Negative (outlier) the level of investment took place in 2010 and 2011. Then from Poland entities from Switzerland and Ireland retreated.

Individually equations of models were being built for the export from Poland to the country of investor and individually for the import from countries of investors to Poland. Parameter estimates of individual models were compared in table 1 to 4.

For pooled OLS, which does not consider heterogeneity across groups or time, all parameters are statistically significant. The size of investment has a positive impact both to the size of the import as well as the export. In addition the evaluation of this parameter in the equation for exports is slightly higher.

Dramatically different results were obtained from the resistant regression model. In this case coefficients indicate what and how influences the size of the import and the export for the

majority (typical) of country of trade partners of Poland and for typical periods. It turns out that under those conditions, the volume of direct investments have a negative impact on the export to the investor's country but a positive effect on the import from the investor's country. Tables 3 and 4 presents the results obtained using the panel data models. In case of fixed model, factor Year was used (on account of the heterogeneity of the time and the result of the Breusch-Pagan test[4]). In this model, the level of direct investment affect in a similar way to the level of imports and exports.

Tab. 1: Results from pooled OLS

	Export		Import	
	coef	p-value	coef	p-value
const	2997.136	1.5e-07	2866.791	1.73e-06
Invest	2.713	3.5e-13	2.592	3.05e-11
N_entities	19.666	0.09059	21.300	0.083
Dist	-0.326	0.00377	-0.201	0.086

Source: Own calculations with R CRAN

Tab. 2: Results from resistant regression (lts)

	Export	Import
	coef	coef
const	601.55328	689.20325
Invest	-0.141	1.989
N_entities	-10.59811	-7.65919
Dist	-0.01869	-0.03498

Source: Own calculations with R CRAN

Tab. 3: Results from fixed model (factor Year)

	Export		Import	
	coef	p-value	coef	p-value
const	1798.878	0.098	1878.91	0.101
Invest	2.652	1.73e-12	2.512	1.51e-10
N_entities	31.734	0.016	35.765	0.010
Dist	-0.310	0.006	-0.1833	0.119

Source: Own calculations with R CRAN

Similar results were obtained for the random model. Here, the slightly larger is the impact of foreign direct investment on imports than on exports. Changes of foreign direct investment

---

[4] Breusch-Pagan for time effect give p-value < 2.2e-16.

across time and between countries by one unit, will cause the rise in the export by 0.346 million USD and the import will rise by 0.352 million USD at the same time).

Tab. 4: Results from random model

	Export		Import	
	coef	p-value	coef	p-value
const	5055.871	2.226e-05	5218.354	5.593e-05
Invest	0.346	0.045	0.352	0.057
N_entities	-25.375	1.754e-08	-24.03021	9.021e-07
Dist	-0.529	0.044	-0.345	0.227

Source: calculations with R CRAN.

Conclusion

The unambiguous confirmation of a positive impact of foreign direct investment to changes in the structure of foreign trade is a difficult task. The use of traditional tools such as pooled OLS model and panel models (fixed and random) shows that the change in the level of foreign investments affected the level of imports and exports in a similar way (Falk & Hake, 2008). In contrast, the resistant regression model. Assuming that the compound is tested for common objects and typical periods - a value of imports is correlated with value of FDI inflow to a higher extent than with value of export. An issue remains to what extent received results are characteristic of Poland and to what extent are universal for countries of Centre Europe (Faras & Ghali, 2009; Sridharan, Vijayakumar & Chandra Sekhara Rao, 2009; Rutkowski, 2006). The scale and structure of FDI in Polish requires further study. It seems particularly important issue of the impact of the BIZ assessment in the relation for domestic investments to the size of the import and the export. It is also important to examine the number and value of greenfield investment projects, as well as mergers and acquisitions (brownfield investment). It should also be noted that in addition to testing the same value of FDI, it is important to focus on the structure of these investments. Both in Poland as well as in remaining Visegrad Group countries (V 4) the phenomenon of capital investment in service centers, resulting in development of the business process outsourcing (BPO - Business Process Outsourcing or SSC - Shared Service Centers) should be examined. But these are not capital-intensive investments, and have little impact on the country's foreign trade development in host country. The disinvestment phenomenon, that is disposal of all or part assets by the companies, especially in times of crisis should be observed with attention.

References

1. Alfaro, L., Chanda, A., Kalemli-Ozcan, S. & Sayek, S. (2004). FDI and economic growth: The role of local financial markets, *Journal of International Economics, 64*, 89–112.

2. Falk, M. & Hake, M. (2008). A panel data analysis on FDI and exports. *FIW Research Report*, *12*, 1-27.

3. Faras, R. Y. & Ghali, K. H. (2009). Foreign direct investment and economic growth: the case of the GCC countries. *International Research Journal of Finance and Economics*, (29), 134-145.

4. Jayachandran, G., & Seilan, A. (2010). A causal relationship between trade, foreign direct investment and economic growth for India. *International Research Journal of Finance and Economics*, (42), 74-88.

5. Makki, S.S. & Agapi, S. (2004). Impact of foreign direct investment and trade on economic growth: evidence from developing countries, *American Journal of Agricultural Economics*, *86*(3), 795-801.

6. Rousseeuw, P. J. & Leroy, A. M. (1987). Robust Regression and Outlier Detection. Wiley.

7. Rutkowski, A. (2006). Inward FDI and financial constraints in Central and East European Countries. *Emerging Markets Finance and Trade*, *42*(5), 20-60.

8. Santos Silva, J. & S.Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics, 88*, 641-58.

9. Sridharan, P., Vijayakumar, N. & Chandra Sekhara Rao, K. (2009). Causal relationship between foreign direct investment and growth: evidence from BRICS countries, *International Business Research*, *2*(4), 198-203.

10. Weresa, M. (2001). The impact of foreign direct investment on Poland's trade with European Union. *Post-Communist Economies*, *13*(1), 71-83.

11. Zysk, W. (2012). *Foreign capital and foreign trade in Poland. Pre-accession period*. Warsaw: CeDeWu.

Contact

Wojciech Zysk

Cracow University of Economics, Department of Statistics,

Rakowicka 27 st., 31-510 Cracow, Poland

zyskw@uek.krakow.pl

Sławomir Śmiech

Cracow University of Economics, Department of Statistics,

Rakowicka 27 st., 31-510 Cracow, Poland

smiechs@uek.krakow.pl