



# ***ANALIZY I OPRACOWANIA***

**PRODUCTIVITY SPILLOVERS  
FROM FOREIGN DIRECT INVESTMENT  
IN POLISH MANUFACTURING  
1993-2006**

**Anna Golejewska**

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# Productivity Spillovers from Foreign Direct Investment in Polish Manufacturing 1993-2006

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## Abstract

Using panel data this paper examines the impact of firms with foreign capital on labor productivity of local firms in Poland. To examine productivity spillovers from foreign direct investment in Polish manufacturing I make two hypotheses: the contagion and technology gap hypothesis. The first one assumes that productivity spillovers from foreign firms to local ones increase in line with the growing share of foreign-owned firm in total production. The second one presumes that the bigger technological gaps between foreign and local firms the more intensive technology spillovers. Estimation results indicate the lack of spillovers in Polish manufacturing as a whole. Considering different groups of industries, I observe both: positive and negative productivity spillovers. The bigger technology gap between foreign and local firms is reflected in less intensive spillovers.

**Keywords:** Foreign Direct Investment, Spillovers, Productivity

**JEL codes:** C51, F21, F23

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## 1 Introduction

The last decades have witnessed an important change in governments' attitude towards multinational firms. In the 1960s and the 1970s countries tended to discourage inward foreign direct investments (FDI) because they presumed that foreign multinationals would deplete local economies. Over the last 25 years, many developed and developing countries have eliminated their restrictions to inward FDIs. It is more frequent that national as well as regional governments offer various kinds of incentives like tax holidays, subsidies and low tax rates to attract foreign investors. This different attitude towards foreign investors is mostly a result of a changing view of the FDIs' role in knowledge creation and dissemination. It is increasingly recognized that MNEs are key players in the global generation, adoption and diffusion of technology. Especially, firms belonging to multinational groups are larger, concentrate mainly in high-tech industries, have higher productivity and pay higher wages, and demonstrate a higher tendency for innovation, for carrying out R&D. This might have a direct impact on host countries in which average productivity and innovation increase as the share of activities due to multinationals in the economy rises. This has to do with the fact that FDIs bring in large amount of assets which might not be available locally, such as technologies, market and employment opportunities, capital, and management skills (Barba, Navaretti and Venables, 2004).

The relative technological advantage of MNEs also makes it possible that they would cause (directly or indirectly) technological improvement of domestic firms, in particular in countries that are relatively far from the technological frontier. Theory identifies several channels through which FDI generates externalities that increase the productivity of host country. It is possible, however, for the net effect of such linkages on host country welfare to be negative, once we take into consideration the impact of FDI on the profitability of domestic firms. Whether spillovers from multinationals raise host country welfare is an empirical question.

With the opening of the CEEC-s, FDI has become an important mechanism of their integration into world economy, especially into the EU. In mid-1990s Poland took over the position of the main destination of FDI inflows in this region. According to the Polish Information and Foreign Investment Agency, at the end of 2007, the value of FDI inward stock accumulated in Poland throughout the transition period amounted to over 107 mld EUR. The largest investment outlays in Poland were made by investors from the EU countries. It is estimated by the National Bank of Poland that in 2007 85.3% of FDI flows were from these countries, mainly from France, Germany, Austria, Italy and Sweden. The most significant investment from outside the EU came from residents of United States of America, Netherlands Antilles, Republic of Korea (South Korea) and Japan. In 2007 the

share of manufacturing in FDI inflow was high and accounted for 20% but it was lower than in previous years (24% in 2006, 28% in 2005 and 37% in 2004) .

The objective of this paper is to examine the impact of FDI on labor productivity of local firms in Poland. The analysis focuses on manufacturing and is based on firm level data compiled by the Polish Central Statistical Office on an annual basis. Data are aggregated up to the three-digit level of the EKD (103 industries) – the Polish correspondence to the NACE. I analyze manufacturing firms only, mainly due to two reasons: first, manufacturing sector received high volume of FDI over the past years and, second, the risk of liquidation of FDI due to further relocation is more severe in the manufacturing rather than in services, financial intermediation or other sectors where the servicing-the-market motive prevails. There are two exclusive types of firms within each industry: locally-owned and firms with foreign capital (foreign firms). All firms with foreign predominance in equity capital are counted as the second group. Aggregated three-digit data are not provided if they refer to less than three firms. All variables were transformed into constant prices of 1993, to eliminate artificial effects caused by different rate of inflation.

The paper is organized as follows. Section 2 provides the theoretical background. Section 3 presents the main results of statistical and econometric research. Section 4 concludes.

## **2 Theoretical background**

MNEs play an important role in transferring technology across national borders. They transfer technology internalized - to their affiliates and externalized - to other firms in the host economy. They also can have both a direct and indirect positive impact on the diffusion of technology, irrespectively of their ownership and control. A MNE can stimulate technological change and learning directly through the transfer of new technology and organizational skills to its affiliates. Simultaneously its presence in the host economy may cause indirect effects in the form of technology/productivity spillovers from their affiliates to local enterprises.

The literature identifies usually two types of productivity spillovers (Javorcik 2004). Local firms can benefit from both the presence of foreign firms in their sector (horizontal spillovers) and from interaction with foreign firms upstream or downstream in the production chain (vertical spillovers). In case of vertical spillovers, backward spillovers mean spillovers from foreign firms to their local sub-supplier (upstream in the production chain), while forward spillovers denote the spillovers from foreign-owned companies to their local customers (downstream in the production chain).

The economists try to explain the size and nature of FDI spillovers using direct and indirect approaches. The direct approach relates productivity measures of local firms or industries to,

among other things, the extent of foreign ownership in the host country. The aim of indirect approaches is to search for different aspects of interaction between MNEs and host country that are related to FDI spillovers. To these belong: competition, co-operation, human capital, demonstration- and imitation-effects. Competition with the foreign-owned company can increase intra-industry spillovers by stimulating technology changes. Competitive pressure forces local firms to introduce new products to preserve their market share and implement management methods to increase productivity. Co-operation between firms with foreign capital and upstream suppliers and downstream customers increases technological spillovers. In order to change the quality standards of their suppliers, MNEs often provide resources to improve the technological capabilities of both vertically and horizontally linked firms. Human capital can spillover from foreign to locally-owned firms by movement of skilled labor between employers. As a final point, the proximity of local to foreign firms can cause demonstration- and imitation spillovers. When foreign-owned firms introduce new products and processes, they provide a sort of demonstration to locally-owned firms. Local firms may also imitate foreign firms through reverse engineering, personal contact and industrial espionage. Additionally, a concentration of related industrial activity might also stimulate the creation of industrial clusters, which encourages further FDI spillovers (Knell).

Not all FDI leads to technology transfer and positive spillovers. The MNE can reduce the extent of technology spillovers by limiting downstream producers to low-value added activities or eliminate them by relying on foreign suppliers for higher value-added intermediate products. They may also limit export to competitors. Finally, FDI can limit domestic production when affiliates are set up with the main purpose of protecting existing property rights and taking out patents in the host country.

By and large the theoretical literature predicts positive effects of FDI on domestic firms' productivity through the labor mobility channel (Kaufmann, 1997; Haaker, 1999; Fosfuri, Motta, and Rønde, 2001; Glass and Saggi, 2002) or through competition and demonstration effects (Wang and Blomstrom, 1992). These models outline horizontal spillovers. Additionally, Rodriguez-Clare (1996) shows forward and backward linkages between foreign and domestically owned firms as a possible mechanism for positive spillovers. However, the results of empirical studies are mixed. Most studies focus on the inter-industry rather than intra-industry spillovers. Among 42 studies on horizontal productivity spillovers of FDI in developed, developing, and transition countries reviewed in Goerg and Greenaway (2004), only 20 studies reported positive and significant results. Among the studies using firm level panel data (total 24), which the authors argue to be the most suitable estimating framework, only 5 found positive and significant FDI spillovers, 4 of them in developed countries. For transition countries, only one of 8 studies confirmed positive and significant FDI spillover

effects. More conclusive are the results for vertical spillovers. Among 5 studies focusing on vertical FDI spillovers, 3 found positive backward FDI spillovers and one reported positive forward FDI spillovers. Besides Javorcik (2004) and Blalock and Gertler (2007) confirmed positive vertical FDI spillovers in Latvia and Indonesia, respectively.

### **3 Empirical results**

The share of foreign-owned firms in capital stock of Polish manufacturing rose from 13,3% in 1993 to 52,6% in 2006. At the same time their share in total output increased from 14% to 52,2% and in total employment from 9% to 33,9%. The role of firms with foreign capital as measured by their share in domestic industry output was stronger than that measured by their contribution to total employment in a host country. This implies that labor productivity (LP) in firms with foreign capital was on average higher than the productivity of domestic industry. The fact that the share of foreign firms in domestic capital stock was higher than their share in employment means that they use more capital-intensive technologies than domestic industry as a whole. Both conclusion are confirmed by empirical results. Comparisons of productivity levels and productivity growth in foreign-owned and domestic firm in the years 1993-2006 reveals that labor productivity and capital intensity of the former have been much higher than of the latter (see tables 1 and 2).

In 2006 the average LP and capital intensity of foreign firms was more than two times higher than those of local firms. In 1993-2006 both LP and capital intensity in firms with foreign capital rose faster than the same indicators for local firms. In 2006 LP and capital intensity in foreign firms were almost eight times higher in comparison to the year 1993. In the period analyzed the same indicators for local firms rose by nearly 300% and over 200% respectively. The growth rate of LP and capital intensity in total manufacturing amounted to above 400% and 300% respectively. This means that foreign-owned firms contributed directly to improvements in total manufacturing productivity developments as well in the level of capital intensity.

On the basis of cross-industry analysis I have identified industries with the highest average LP in total manufacturing. These are: manufacture of refined petroleum products (NACE 232), manufacture of office machinery and computers (NACE 300), manufacture of motor vehicles (NACE 341), manufacture of tobacco products (NACE 160), manufacture of prepared animal feeds (NACE 157) and manufacture of vegetable and animal oils and fats (NACE 154). The branches with the lowest average LP where: manufacture of sports goods (NACE 364), manufacture of leather clothes (NACE 181), manufacture of luggage, handbags and the like, saddlery and harness (NACE 192), manufacture of other transport equipment

(NACE 355) and manufacture of knitted and crocheted articles (NACE 177). The highest growth rate of LP was registered in: forging, pressing, stamping and roll forming of metal; powder metallurgy (NACE 284), manufacture of other non-metallic mineral products (NACE 268), manufacture of office machinery and computers (NACE/EKD 300), manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods (NACE 323) and manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy (NACE 322). Cross-industry analysis shows that the biggest productivity gap between foreign- and locally-owned firms took place in such sectors as: manufacture of radio, television and telecommunications equipment; manufacture of motor vehicles and manufacture of veneer and plywood sheets. Local firms had the productivity advantage in manufacture of professional, scientific, measuring and controlling equipment; finishing of textiles; manufacture of isolated wires; manufacturing of office, accounting and computing machinery; manufacturing of wearing apparel of weather; building and repairing of ships; manufacture of other products of wood and recycling of metal products.

Productivity performance of a given industry depends not only on direct effects of FDI but also on indirect impact via technological spillovers. Indirect effect are estimated by means of econometric analysis, in which I tested two hypotheses:

- I. *the contagion hypothesis*: productivity *spillovers* from foreign firms to local ones increase in line with the growing share of foreign-owned firm in total sector production
- II. *the technology gap hypothesis*: the bigger technological gaps between foreign and local firms the more intensive technology spillovers (Findlay, 1978).

The technology level of local firms in comparison to foreign firms is often used as a proxy for absorptive capacity. Findlay (1978) shows that given a certain minimum of economic development, regions or countries with a large initial technological gap are more likely to gain from spillovers compared to advanced regions. In contrast to the “technology gap hypothesis”, some economists argue that spillovers increase, the lower the technological gap (Cantwell 1989). Kokko et al (1996) argue that in case of moderate technology gaps foreign technologies are useful for local firms because they possess the skills needed to make use of foreign technologies. Quite the opposite, large gaps may indicate that foreign technologies are so different from local ones, that locally-owned firms are unable to learn them, or that local firms are too weak to be able to learn. This hypothesis has been described as “technological accumulation hypothesis” (Cantwell 1989). However, taking into account nonlinearities, firms both too close to and too far from the foreign technology frontier will benefit less from FDI than firms with medium technological level.

**Table 1. Labor productivity and capital-labor ratio in Polish manufacturing, 1993-2006, thousands PLN**

	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06
<b>LP (foreign)</b>	30,4	38,2	72,1	90,3	108,6	121,9	145,9	160,0	168,7	171,2	201,3	222,1	217,4	234,5
<b>LP (local)</b>	36,8	40,6	50,8	50,9	63,9	67,9	70,6	80,1	84,4	90,5	97,8	86,7	93,2	108,1
<b>LP (total)</b>	36,5	40,5	51,9	53,5	67,6	73,5	84,4	96,7	103,6	110,1	123,3	137,5	140,1	152,3
<b>LP (local)/ LP (foreign)</b>	1,21	1,06	0,70	0,56	0,59	0,56	0,48	0,50	0,50	0,53	48,6	39,0	42,9	46,1
<b>C/L (foreign)</b>	10,5	13,0	26,3	27,6	32,0	78,0	73,7	69,2	73,7	75,8	82,2	79,3	nd	82,6
<b>C/L (local)</b>	17,3	16,1	18,1	19,0	21,8	23,7	26,9	28,4	31,5	35,3	35,4	26,9	nd	38,0
<b>C/L (total)</b>	17,1	16,0	18,6	19,5	22,7	29,4	35,5	36,8	41,1	45,1	46,9	45,6	nd	53,2
<b>C/L (local)/ C/L (foreign)</b>	1,64	1,24	0,69	0,69	0,68	0,30	0,37	0,41	0,43	0,47	43,1	33,9	nd	46,0

*Source: CSO database, own calculations*

**Table 2. Labor productivity growth in Polish manufacturing, 1993-2006, previous year=100**

LP growth (per cent)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	average
<b>foreign firms</b>	125,6	189,0	125,2	120,3	112,3	119,6	109,7	105,4	101,5	117,6	110,3	97,9	107,9	118,6
<b>local firms</b>	110,5	125,2	100,2	125,4	106,3	104,0	113,5	105,3	107,3	108,1	88,7	107,5	116,0	109,1
<b>total</b>	110,8	128,1	103,0	126,4	108,7	114,8	114,7	107,1	106,2	112,0	111,5	101,9	108,7	111,8

*Source: CSO database, own calculations*

Weak firms will lack resources to absorb new technologies (negative spillovers), whereas for technologically advanced firms the potential to gain from spillovers will be rather limited. In this paper I adopted the “technology gap hypothesis”.

To test the hypotheses above I used the following regressions:<sup>1</sup>

$$[1] \Delta \ln LP_{lit} = \beta_1 \Delta \ln Y(\text{total})_{it} + \beta_2 \Delta \ln (C/L)_{lit} + \beta_3 FDI_{it} + \beta_4 (FDI_{it} * GAP_{lit}) + \beta_0 + \xi_{it} (1)$$

$$[2] \Delta \ln LP_{lit} = \beta_1 \Delta \ln Y(\text{total})_{it} + \beta_2 \Delta \ln (C/L)_{lit} + \beta_3 FDI_{it} + \beta_4 (FDI_{it} * GAP_{lit}G1) + \beta_5 (FDI_{it} * GAP_{lit}G2) + \beta_6 (FDI_{it} * GAP_{lit}G3) + \beta_7 (FDI_{it} * GAP_{lit}G4) + \beta_8 (FDI_{it} * GAP_{lit}G5) + \beta_0 + \xi_{it} (2)$$

$$[3] \Delta \ln LP_{lit} = \beta_1 \Delta \ln Y(\text{total})_{it} + \beta_2 \Delta \ln (C/L)_{lit} + \beta_3 FDI_{it} + \beta_4 (FDI_{it} * GAP\_L_{lit}) + \beta_0 + \xi_{it} (3)$$

where  $it$  denotes industry  $i$  in time  $t$ ,  $l$  means locally-owned firms,  $LP$  stands for labor productivity and is defined as a ratio of total output to labor input,  $C/L$  is the capital/labor ratio,  $\Delta Y(\text{total})$  measures the growth rate of aggregate output of the industry and  $FDI$  stands for the share of foreign firms output in domestic output. The variable  $GAP$  (technology gap) is defined as a ratio of labor productivity of foreign firms to the labor productivity of local firms within the same three-digit NACE industry, minus one.  $G1 - G5$  are the groups of industries classified by different taxonomies.  $GAP\_L$  is a dummy variable equal 1, if local firms in the  $it$ th industry has a technology gap that is smaller in value than the median value of  $GAP$  for all domestic industries, and it is equal 0 otherwise.

Estimating first equation I test at the same time the contagion and the technology gap hypotheses. The marginal effect of bigger foreign participation on productivity growth of local firms is given by  $\beta_3 + \beta_4$ . In the second regression I test the impact of FDI in different groups of industries according to various classifications. To test the technology hypothesis I also use the last equation.  $\beta_3$  apply here to industries with a wide technology gap and  $\beta_3 + \beta_4$  to the others. If  $|\beta_3| > |\beta_3 + \beta_4|$ , the technology gap hypothesis cannot be rejected.

To verify the hypothesis I have estimated a panel data model that means the data set combined time series and cross sections observations. I used unbalanced panel data for 103 industries of Polish manufacturing in 1993-2006. Unbalanced, because in some years the number of firms in an industry was too small to publish official information or there were other problems with data in Polish Central Statistical Office, from which I received the data. At the first step of the evaluation of the model I choose the explanatory variables. Then I estimated two-way fixed effects and two-way random effects panel data models. For the FE model I

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<sup>1</sup> For details on methodology see: Żukowska-Gagelmann, 2000

used within estimator (which is equal the OLS with dummy variables) and the RE model was estimated by GLS, as I must assume that the individual effects were correlated with the disturbances<sup>2</sup>. To decide which model should be an object of final interpretation I used the Hausman specification test. In each regression the conclusion was that I cannot assume the explanatory variables were uncorrelated with the disturbances so the GLS estimator was biased in each case. Therefore the final interpretation was made for estimation results of FE models. The estimation results are presented in table 3. For different taxonomies see Appendix.

The results of estimation are satisfactory for the purpose of analysis which is the impact of FDI on domestic firms and not explanation of all changes in productivity. LP changes of local firms are significantly positively related to the changes of their capital intensity and the growth rate of aggregate output of the industry. This finding certainly comes as no surprise. Nevertheless, the equation 1 suggests that there where no productivity spillovers from foreign firms to local ones in manufacturing as a whole in 1993-2006. The share of foreign firms output in domestic output doesn't significantly affect the changes in productivity of locally-owned firms. The lack of spillovers doesn't support the contagion hypothesis, doesn't confirm positive impact of foreign capital on domestic producers neither. The results are incoherent with the results obtained by Żukowska-Gagelmann (2000) for total Polish manufacturing in 1993-1997 and with our previous results for the period 1993-2002 (Ciołek, Golejewska 2006). Both, using the same methodology, confirmed negative productivity spillovers in Polish manufacturing. Our previous results suggested that the aggregate productivity in a given sector might have risen at the cost of domestic firms. Competitive pressure from stronger foreign firms might have forced some domestic firms to exit the market. Some foreign firms employed wage-arbitrage and the domestic sector might haven't been able to respond to wage increases. Also privatization might have removed local firms from the market, particularly when it covered the best firms. According to the results for the period 1993-2006, one might suppose that the competitive ability of local firms might have improved.

The estimated lack of significant positive spillovers arising from FDI in Polish manufacturing as a whole may be due to many reasons. The medium and large size of firms examined, recognized not to be highly interactive with foreign firms in contrast to small firms, which are much more responsive, may be one of them. The sectoral distribution of FDI may be important, as I found that, it is still predominantly located in more traditional, low technology, sectors. In these latter type sectors one may suspect that the possibility of technology

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<sup>2</sup> To find details about panel data models and their interpretation see: Green (2003) or Baltagi (2001)

spillovers is less likely to occur. Finally, the results may indicate that the indirect gains are not automatic consequence of foreign firm's presence, but they depend to a large extent on the efforts of local firms to invest in learning or R&D activities so as to decode the spilled knowledge. I assume that local firms rather cut production than increase investment in new technologies in response to competitive pressure from stronger foreign firms.

Considering the equation 2, one can see that the bigger technology gap is reflected in less intensive spillovers for different groups of industries according to various classifications, thus I reject the technology gap hypothesis. However the direction of spillovers differs across the groups. The results of estimation suggest positive productivity spillovers for industries characterized by: average or low sensitivity to economies of scale; high human capital- and low physical capital intensity; high physical capital- and low human capital intensity; medium high technology intensity and based on blue collar skills. There are only three groups of industries, where I observe negative spillovers. These are industries characterized by: high human capital- and physical capital intensity; low sensitivity to non-tariff barriers and low technology intensity.

The estimation results of regression 3 imply that the fact that a technology gap is smaller or bigger in value than the median value has not statistically significant impact on LP changes of local firms.

#### **4 Concluding remarks**

FDIs are considered as the creator and diffuser of new and superior technologies. If they fulfill this attributed role, then they are expected to generate some spillovers to domestic industries in host economies. Theoretical and empirical studies propose that domestic technological capability is also important in this process.

The results suggest that in spite of positive contribution of foreign-owned firms to labor productivity- and capital intensity growth one does not observe positive productivity spillovers to domestic firms in Polish manufacturing as a whole in 1993-2006. Thus, the role of FDI in improving industrial competitiveness of Poland is at least ambiguous. The lack of positive spillovers may arise from the size of firms examined, the sectoral distribution of FDI and poor efforts of local firms to invest in learning or R&D activities. However the results differ between industries. For most of industries results of estimation suggest positive productivity spillovers. There are only three groups of industries which suffer negative productivity spillovers. Negative spillovers in these industries may be due to competitive pressure from stronger foreign firms and wage-arbitrage employed by them, and privatization. For all the groups the bigger technology gap is reflected in weaker productivity transfers.

**Table 3. Productivity spillovers and technology gap between foreign-owned and domestic firms in Polish manufacturing in 1993-2006**

$\Delta \ln LP_{it}$	Regressions							
	<i>total manufact. (1)</i>	<i>sensitivity to EOS (2)</i>	<i>sensitivity to IN- OUT (2)</i>	<i>factor intensity Neven (2)</i>	<i>sensitivity to NTB (2)</i>	<i>technolog y intensity (2)</i>	<i>employee s' skills (2)</i>	<i>total manufact. (3)</i>
$\Delta \ln Y(total)_{it}$	<b>0,440555</b> [0,000]	<b>0,447065</b> [0,000]	<b>0,436313</b> [0,000]	<b>0,426682</b> [0,000]	<b>0,459809</b> [0,000]	<b>0,421941</b> [0,000]	<b>0,418551</b> [0,000]	<b>0,441125</b> [0,000]
$\Delta \ln (C/L)_{it}$	<b>0,208682</b> [0,000]	<b>0,201125</b> [0,000]	<b>0,208893</b> [0,000]	<b>0,192470</b> [0,000]	<b>0,200679</b> [0,000]	<b>0,204263</b> [0,000]	<b>0,202259</b> [0,000]	<b>0,209275</b> [0,000]
$FDI_{it}$	0,054821 [0,236]	<b>0,153348</b> [0,004]	0,094461 [0,068]	<b>0,181872</b> [0,000]	<b>0,112204</b> [0,015]	<b>0,144457</b> [0,005]	<b>0,116237</b> [0,022]	0,030506 [0,416]
$FDI_{it} *GAP_{it}$	-0,010683 [0,368]							
$FDI_{it} *GAP_{it}G1$		<i>dropped (lack of data)</i>	-0,007012 [0,574]	0,013814 [0,285]	-0,034688 [0,190]	0,015950 [0,237]	-0,071495 [0,062]	
$FDI_{it} *GAP_{it}G2$		-0,001211 [0,923]	-0,027840 [0,170]	<b>-0,116758</b> [0,000]	-0,002331 [0,844]	<b>-0,049503</b> [0,005]	<b>-0,057304</b> [0,002]	
$FDI_{it} *GAP_{it}G3$		<b>-0,043398</b> [0,037]	-0,058018 [0,351]	-0,056359 [0,363]	<b>-0,154519</b> [0,000]	-0,058856 [0,122]	0,005842 [0,651]	
$FDI_{it} *GAP_{it}G4$		<b>-0,124148</b> [0,001]	-0,091827 [0,653]	<b>-0,059736</b> [0,001]		<b>-0,150514</b> [0,001]	-0,114325 [0,203]	
$FDI_{it} *GAP_{it}G5$				<b>-0,222969</b> [0,003]				
$FDI_{it} *GAP_{it}L_{it}$								-0,012355 [0,866]
<i>constant</i>	0,010056 [0,480]	0,003566 [0,807]	0,006299 [0,665]	0,002043 [0,886]	0,011224 [0,422]	0,012115 [0,398]	0,008931 [0,529]	0,012371 [0,377]
Number of observations	493	472	472	458	472	472	472	493
R <sup>2</sup>	0,448	0,463	0,450	0,484	0,473	0,474	0,465	0,447
F	82,71 [0,0000]	55,95 [0,0000]	45,36 [0,0000]	44,10 [0,0000]	58,37 [0,0000]	50,15 [0,0000]	48,25 [0,0000]	82,36 [0,0000]

Source: calculations with Stata SE8.

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## Appendix

1.	sensitivity to economies of scale EOS, (Amiti 1999, Brodzicki 2003)	<ol style="list-style-type: none"> <li>1. very high sensitivity to EOS</li> <li>2. high sensitivity to EOS</li> <li>3. average sensitivity to EOS</li> <li>4. low sensitivity to EOS</li> </ol>
2.	sensitivity to input-output linkages IN-OUT (Brodzicki 2003)	<ol style="list-style-type: none"> <li>1. very high sensitivity to IN-OUT</li> <li>2. high sensitivity to IN-OUT</li> <li>3. average sensitivity to IN-OUT</li> <li>4. low sensitivity to IN-OUT</li> </ol>
3.	factor intensity (Neven 1994)	<ol style="list-style-type: none"> <li>1. very high human capital intensity</li> <li>2. high human capital intensity and low physical capital intensity</li> <li>3. low human capital- and physical capital intensity</li> <li>4. high physical capital intensity and low human capital intensity</li> <li>5. high human capital- and physical capital intensity</li> </ol>
4.	sensitivity to non-tariff barriers NTB (Brodzicki 2003)	<ol style="list-style-type: none"> <li>1. high sensitivity to NTB</li> <li>2. average sensitivity to NTB</li> <li>3. low sensitivity to NTB</li> </ol>
5.	technology intensity (OECD 1995)	<ol style="list-style-type: none"> <li>1. high technology industries</li> <li>2. medium high technology industries</li> <li>3. medium low technology industries</li> <li>4. low technology industries</li> </ol>
6.	level of employees' skills WIFO 2 (Peneder 1999)	<ol style="list-style-type: none"> <li>1. low skills</li> <li>2. blue collar skills</li> <li>3. white collar skills</li> <li>4. high skills</li> </ol>

*Source: own elaboration*



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