The Effect of Direct Foreign Investment on Domestic Firms: Evidence from Firm Level Panel Data in Emerging Economies

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Abstract:

This paper uses firm level panel data to investigate empirically the effects of direct foreign investment (DFI) on the productivity performance of domestic firms in three emerging economies of Central and Eastern Europe, Bulgaria, Romania and Poland. To this end a unique firm level panel data set is used with detailed information on foreign ownership at the firm level. Three key questions are addressed in the present paper: (1) do foreign firms perform better than their domestic counterparts? (2) do foreign firms generate positive spillovers to domestic firms? (3) Do technological spillovers from foreign firms depend on the absorptive capacity of domestic firms?

I find that firms with some foreign investment perform better than firms without foreign participation. I find no evidence of positive spillovers to domestic firms on average. In contrast, on average there are no spillovers to domestic firms in Bulgaria and Romania, while there are negative spillovers to domestic firms in Poland. In addition, for Bulgaria and Poland, I find evidence that the absorptive capacity of domestic firms might matter to benefit from foreign investors. The results are consistent with recent theories of R&D spillovers through DFI.

JEL classification: D24, F14, O52, P31

Keywords: Foreign Investment, Spillovers, Absorptive Capacity, Emerging countries

I. Introduction

This paper uses firm level panel data to investigate empirically the effects of direct foreign investment (DFI) on the productivity performance of domestic firms in three emerging economies of Central and Eastern Europe, Bulgaria, Romania and Poland. The collapse of communism in Central and Eastern Europe and the emergence of a market economy has led to a large inflow of direct foreign investment in the region during the last decade. Policy makers in the emerging economies were faced with a collapsing state sector and a slowly growing private sector. With financial markets and commercial banking virtually absent , they encouraged foreign investors to take part in the privatisation process or to invest in their countries.

There are various reasons why many policy makers believe DFI is beneficial to their country. A first reason is the need for strategic restructuring in firms in the emerging countries[1]. Most firms in the emerging economies of the former Soviet block were characterised by obsolete machinery and outdated production methods. To compete in a market environment, firms had to improve their efficiency by engaging in strategic restructuring, i.e. updating the equipment and production process (e.g. Irina Grossfeld and Gérard Roland, 1996). Foreign firms have the technological know-how and finance necessary to update the equipment and bring about such strategic restructuring. Foreign participation in domestic firms has the additional benefit that it can impose an efficient corporate governance in privatized firms, often privatized to insider workers/managers, who might block restructuring (Olivier Blanchard, 1997, pp.77-88).

[1] Strategic restructuring refers to improving the long run viability and efficiency of a firm.

Klaus Wallner (1998) shows theoretically that especially in the emerging countries, characterized by soft budget constraints, foreign investment is welcomed to achieve such strategic restructuring as the presence of foreign investors gives governments incentives to reduce subsidies to firms because otherwise a part of the subsidy may disappear in 'foreign pockets'. Hence, the hardening of budget constraints increases effort by managers to restructure more.

A second important reason why foreign investors are invited to emerging countries rests on the believe that they generate positive externalities to the domestic firms through a transfer of know-how and technology. Such spillovers can occur through various channels. David J. Teece (1977) argues that the introduction of new products and production processes by foreign firms may benefit domestic firms through the accelerated diffusion of new technology. This could occur through labour turnover or through imitation or other channels. One other channel works through the equilibrating mechanism in the market when liberalization, here the opening up of Central and Eastern Europe to the rest of the world, is implemented.

A number of recent theoretical papers show that the degree to which domestic firms may benefit from such spillovers depends on the "absorptive capacity" of domestic firms. Franseca Sanna-Randacio (1999) and D. Leahy and Peter Neary (1999) show that DFI always leads to an increase in the productivity of the investing firm, however, DFI increases the host country's productivity only if the degree of spillover is high enough. The latter is more likely achieved in sectors characterized by intensive R&D or by firms which have a sufficient amount of knowledge to start with.

This has been suggested in earlier empirical work. Ari Kokko (1994) and Borensztein, De Gregorio and Lee (1998) also give evidence which suggests that positive DFI spillovers to local firms are only generated if the technology gap

between the foreign firm and the domestic one is not too large and if there exists a minimum treshold of human capital in the host country.

The technological spillovers thus lead to positive effects on domestic firms, however, there may exist a competition effect which works in the opposite direction. Foreign entry disturbs the existing market equilibrium and could force domestic firms to produce less output which pushes them up their average cost curves (e.g. Brian J. Aitkin and Ann E. Harrison, 1999). Which effect dominates depends on the stength of the technological spillover effect (and the absorptive capacity of firms) versus the competition effect.

In this paper I study first the two key questions which have been central in the recent literature on DFI (for two recent papers see Magnus Blomström and Fredrik Sjöholm, 1999 and Brian J. Aitken and Ann E. Harrison, 1999). First, to what extent do joint ventures or wholly owned foreign subsidiaries perform better than their domestically owned counterparts? Second, is there any evidence of 'spillovers' to domestic firms? I will look at the 'net spillover' effect, i.e. the sum of the technological spillover and the competition effect. Then I test whether 'spillovers' depend on the absorptive capacity of the firm. In other words, to disentangle the competition effect from the pure technological spillover effect, I test whether the spillover to domestic firms is more likely to be positive in firms which are R&D intensive.

To this end I use a unique panel data set of over 5000 firms in Poland, Romania and Bulgaria for the years 1993-97[2]. Together these countries cover more than 70 million people and hence these economies are an important part of the Central and Eastern European Economies. While Bulgaria and Romania are characterized by

[2] except for Romania data run from 1994 onwards.

slow reforms and poor macro economic performance, Poland has achieved GDP levels comparable to the pre-transition years and has positive growth rates.

Because we use panel data we are able to track the same firm over time and hence we are able to control for unobserved firm level fixed effects, like for example the quality of the firm. Hence, as in Aitkin and Harrison (1999) I am able to control for the potential endogeneity of foreign ownership and spillovers .

The next section describes the data and econometric approach, section III gives the results and section IV is a concluding one.

II. Data and Econometric Approach

Data

The data set that is used provides information on more than 1400 firms in Bulgaria and 1800 firms in Poland over the period 1993-1997, and on more than 2600 firms in Romania between 1994-1997. The data are unbalanced panel data, however, attrition is likely to be random due to imperfect reporting, rather than exit of firms. The data consists of the company accounts of all incorporated firms in both the manufacturing and the non-manufacturing sectors satisfying at least one of the following criteria: number of employees greater than 100, total assets and operating revenues exceeding 16 million and 8 million USD, respectively. They are retrieved from annual company accounts published by the Creditreform Bulgaria OOD and by the Romanian Chamber of Commerce and Industry[3].

Annual averages of employment, output and their growth rates for foreign and domestic firms are given in table 1. Foreign firms are defined as firms where a

[3] Data are available on the Amadeus CD-ROM (Dec. 1998), a Pan European financial database, provided by Bureau van Dijk Electronic Publishing SA.

positive fraction of the shares is owned by a foreign investor in 1997. The average fraction of shares held by foreign investors is 61%, 59% and 73% for Bulgaria, Romania and Poland respectively. Thus on average foreign investors are majority share holders.

From table 1 it is clear that in all countries the output in foreign firms is higher on average than in domestic ones. Average employment in contrast does not vary that much between foreign and domestic firms on average. This implies that labour productivity on average is larger in foreign firms than in domestic ones. It is also interesting to note that the average output in Poland is much larger than in Bulgaria and Romania, which is a reflection of the more advanced stage of transition Poland is in. The growth rates in table 1 also reveal the difference in performance between foreign and domestic firms. On average, growth rates of output or employment in foreign firms are always higher than in domestic ones. The growth rates in table 1 suggest that the collapse in output observed in all transition countries was especially due to a collapse in output of the domestic firms, while the foreign firms were expanding and hence gaining market share. This has also been suggested by Patrick P. Walsh and Alexandre Repkine (1999) who investigated the evolution of output at the sector level in transition economies. They show that sectors trading on world markets before the collapse of communism did better during the transition from plan to market. This is not surprising since these sectors were exposed to competitive pressure even during communism and therefore they had to produce a viable product in an efficient way.

A first indication whether technological spillovers of foreign firms might be important is given in table 2. I show annual average gross job reallocation rates for the transition countries under consideration for sectors with foreign presence and for

sectors without foreign investors. Spillovers may occur through job mobility, i.e. workers moving from foreign owned firms to domestic firms thereby transferring the technological know-how of foreign firms to domestic firms. Higher job reallocation should then lead to more spillovers. I use a standard measure of job reallocation that is defined as the sum of the gross job creation rate in a sector and the gross job destruction rate (defined as a positive number) in a sector (e.g. Davis and Haltiwanger, 1992). The job creation rate is the sum of all job gains in expanding firms divided by the total employment of a sector, the job destruction rate is the sum of all job losses divided by the total employment of a sector.

In table 2 it can be noted that the job reallocation rate in sectors with no foreign firms is lower, albeit slightly, than the job reallocation rate in sectors where there are foreign firms active. This already suggests that spillovers could occur more easily in the type of sectors where foreign firms are active. It also suggests that sectors with foreign investment are the more turbulent (flexible) ones in terms of jobs. This could be related to the fact that sectors with foreign investors are more likely to be the traded sectors. James Levinsohn (1999) reports for Chile that gross job reallocation in the traded sectors is much larger than in the non-traded ones. He suggests that in traded sectors sunk costs of entry are lower which explains the higher turnover. If job reallocation is high then worker turnover is also likely to be high, which should generate spillovers to the domestic firms.

Econometric Approach

I follow Brian Aitken and Ann Harrison (1999) and estimate a log-linear production function at the firm level to test whether (1) foreign firms perform better than domestic ones, (2) there exist spillovers from DFI to local production, (3) whether technological spillovers are more likely to occur in firms with a sufficient amount of R&D, i.e. firms which can absorb new technology. In particular, the following specification is the starting point of my analysis:

$$y_{it} = \alpha_i + \alpha_1 n_{it} + \alpha_2 k_{it} + \alpha_3 \eta_t + \alpha_4 DFI_i + \alpha_5 DFI_i XT_i + \alpha_6 Spill_{jt} + \varepsilon_{it} \qquad (1)$$

where subscript i stands for firm i, subscript t for firm t, y is log output, n is the log employment, k is the log of capital. To capture possible common aggregate shocks in production, like technological progress or some other unobserved time varying factors I include time effects, η. The fraction of shares held by a foreign investor is denoted by *DFI*. I also interact foreign ownership with the time trend to capture the fact that the effect of foreign ownership might affect both the level and the growth in productivity. This might be the case if it takes some time for foreign know-how to spillover to the local firm. Finally, *Spill* measures the sector level technological spillovers that arise from foreign investors. I proxy it by the share of output accounted for by foreign firms in total output at the 2-digit NACE sector level. Finally, ε, is a white noise error term.

In equation (1), there is an unobservable fixed effect, α_i, which captures firm specific heterogeneity. Such an unobservable fixed effect is potentially correlated with the other explanatory variables. If it is not controlled for in the estimation, then inconsistent estimates due to an omitted variable bias result. One way of controlling for these fixed effects is by first differencing equation (1). At the same time, it is a way to control for potential endogeneity of foreign ownership, i.e. foreign investors might only acquire shares in the better firms. If I categorise firms in 'good' versus 'bad' firms then the unobserved fixed effect captures this and hence it is possible to avoid an endogeneity bias. First differencing equation (1) yields

$$\Delta y_{it} = \alpha_1 \Delta n_{it} + \alpha_2 \Delta k_{it} + \alpha_3 \Delta \eta_t + \alpha_5 DFI_i + \alpha_6 \Delta Spill_{jt} + \Delta \varepsilon_{it} \qquad (2)$$

The above modelling strategy allows me to test whether foreign firms perform better and whether spillovers are present. To test whether such spillovers go to domestic firms I will show results for the sub-sample of domestic firms only. While equation (2) can reveal some pattern of spillovers, it does not explicitly test whether spillovers are of a technological nature or whether spillovers are related to other economic factors, like financial expertise or management expertise. Based on company accounts data it will not be possible to test this explicitly, survey level data modelling the technology flows are needed (e.g. Bruno Cassiman and Reinhilde Veugelers, 1999). However, I am able to test whether spillovers are more likely to occur in firms which have some absorbtive capacity for R&D. If spillovers are of a technological nature, it is reasonable to believe - in view of the recent theoretical work by D. Leahy and Peter Neary (1999) and Fransesca Sanna-Randacio (1999) -

that firms engaging in R&D activities are more likely to benefit from spillovers. In other words, the technological gap in these firms will be lower. I therefore augment equation (2) with the R&D expenditures at the firm level, proxied by log intangible fixed assets and interact spillovers with R&D expenditures at the firm level.

III. Results

I start in table 3 with showing the results of estimating equation (2), without taking into account whether spillovers occur more likely in firms which have intensive R&D. Since panel data are used, I take into account the fact that observations of individual firms over time are not independent and therefore estimate equation (2) with OLS, but adjusted for heteroskedasticity with clusters based on the individual firm groupings over time. Since the equation is estimated in first-differences I control for unobserved fixed effects.

From the first column for each country in table 3, I find that foreign firms always outperform domestic ones. Moreover, the estimate of the effect of foreign investment is about the same in each country, approximately 10%. This means that a firm that would change its ownership structure from 0% foreign participation to 100% foreign participation, total factor productivity would increase by 10%. This result confirms the hypothesis that foreign firms or joint ventures have some superior knowledge and/or technology which allows them to be more efficient than their domestic counterparts. It is also consistent with the idea that foreign firms induce restructuring at the firm level which leads to higher productivity (Wallner, 1998). In addition, I find no evidence of positive spillovers, rather no spillovers in the case of Bulgaria and Romania or negative spillovers in the case of Poland take place.

In the second column for each country of table 3 I test in addition the effect ‘spillovers’ on domestic firms only, by considering the sub-sample of only domestic firms. The same result holds. The third collumn checks whether ‘spillovers’ are different when only the manufacturing sector is considered. Again the same results are found, except that in the case of Poland the magnitude of the negative spillover effect is somewhat reduced.

‘Spillovers’ lead on average to no or negative effects on domestic firms’ productivity. In the context of the emerging countries of Central and Eastern Europe this is perhaps not really a surprise, given that most domestic firms were characterised by outdated and old equipment, with no or little room for R&D and innovation and hence the absorbtive capacity of domestic firms might be limited.

The negative spillover effect found for Poland might come in this sense as a surprise since the technology gap in more advanced countries, like Poland, is presumably smaller than the technology gap in more backward countries, like Bulgaria and Romania. However, at the same time product market competition is likely going to be stronger in the more advanced countries. Poland has liberalized its product markets faster than Bulgaria and Romania and therefore the Polish market is likely to be a more competitive market compared to countries that liberalized at a slow rate. In this sense, a negative competition effect that dominates a potential positive technological spillover effect may dominate, which results in an overall negative ‘spillover’ effect. This is a plausible story and consistent with the fact that the negative ‘spillover’ effect is reduced for Poland when only the manufacturing sector is considered. Manufacturing is less competitive than non-manufacturing in the sense that manufacturing is more likely to be characterised by high sunk costs of entry. Such negative ‘spillovers’ from foreign to domestic firms were also reported in

two other studies, both used firm level panel data. For the Czech Republic Djankov and Hoekman (1998) found that 'spillovers' associated with foreign investment were negatively correlated with domestic firm performance. Aitkin and Harrison (1999) for Venezuela also find a negative 'spillover' effect and interpret it as a 'business stealing' effect.

In table 4 I explore whether the absence of overall positive spillover effects can be explained by the lack of absorptive capacity by firms. I do this by interacting the 'spillover' effect with R&D expenditures, proxied by the log intangible assets of the firm. In addition, I also include log R&D expenditures in a separate way in the regression.

The results for each country are shown in column (1), column (2) reports the results for the manufacturing sector only.

The results are quite interesting. I find for all the three countries a positive interaction effect, for Bulgaria and Poland it is statistically significant at conventional levels, for Romania it is not statistically significant, although the t-statistic is equal to 1. This suggests that firms that are engaged in R&D can experience positive spillovers or in other words, provided firms have the absorptive capacity to learn from foreign firms' know-how they will benefit. In Bulgaria this is the case for any firm that has R&D and the effect increases with R&D expenditures. In Poland the competition effect dominates up to a critical level of R&D expenditures. Based on the estimates for Poland, firms that have R&D expenditures of at least 5 Million USD per year will experience positive spillovers from foreign firms in their market. This is consistent with models that show that DFI spillovers are only generated if the technology gap between foreign firms and domestic ones is not too large and if there exists a

minimum treshold of human capital in the host country (Kokko, 1994; Leahy and Neary, 1999; Sanna-Radacio, 1999).

IV. Conclusion

This paper studied the effects of direct foreign investment on the performance of firms in three emerging market economies, Bulgaria, Romania and Poland. Three questions were addressed. First, do foreign firms perform better than their domestic competitors, second does foreign investment generate positive 'spillovers' to local firms, third, how important is the absorptive capacity of local firms to benefit from foreign investment?

I find evidence that foreign firms perform better than domestic ones, however, I do not find evidence for the presence of positive 'spillovers' of foreign investors to the domestic firms. In contrast, I find evidence which suggests no 'spillovers' for Bulgaria and Romania and negative 'spillovers' for Poland on average. I suggest that the competition effect dominates the technological spillover effect in Poland. Once contolled for the absorptive capacity of firms, I report evidence of positive spillovers of DFI for R&D intensive firms in Bulgaria and Poland.

While previous studies have found positive spillovers from DFI to domestic firms, which motivated policies to attract DFI, the results in this paper suggest that policies to attract DFI might lead to perverse effects in the short run.

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Table 1

		Average sales	Average employment	Average sales growth	Average employment growth
Bulgaria	Foreign	11207	626	-0.06	0.0009
	Domestic	4811	518	-0.11	-0.04
Romania	Foreign	7290	425	0.16	0.14
	Domestic	5055	635	-0.03	-0.05
Poland	Foreign	96607	1271	0.19	0.08
	Domestic	47800	946	0.10	0.01

Note: output refers to sales in USDX1000

Table 2 : Annual Average Gross Job Reallocation

	No foreign firms present in the sector	Foreign firms present in the sector
Bulgaria	0.08	0.09
Poland	0.09	0.12
Romania	0.11	0.15

Table 3 : Results

	Bulgaria			**Romania**			**Poland**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
N	0.43* (0.04)	0.43* (0.04)	0.60* (0.06)	0.31* (0.03)	0.32* (0.03)	0.39* (0.04)	0.28* (0.04)	0.27* (0.05)	0.37* (0.10)
K	0.07* (0.01)	0.07* (0.01)	0.05* (0.01)	0.14* (0.01)	0.13* (0.01)	0.15* (0.02)	0.05* (0.01)	0.05* (0.01)	0.05* (0.01)
DFI	0.08* (0.04)	-	-	0.11* (0.03)	-	-	0.08* (0.03)	-	-
Spill	0.002 (0.03)	-0.01 (0.03)	-0.006 (0.04)	-0.004 (0.005)	-0.002 (0.006)	-0.13 (0.21)	-0.29* (0.09)	-0.30* (0.09)	-0.17** (0.11)
Region dummies/year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.79	0.80	0.79	0.17	0.16	0.21	0.23	0.22	0.29
Observations	6361	6057	3387	8580	8105	3674	2854	2674	1510

Note: heteroskedastic consistent standard errors in brackets; *denotes significant at the 5% critical level, ** denotes significant at the 10% critical level.

Table 4 : Results : Testing for Absorptive Capacity of Firms

	Bulgaria		**Romania**		**Poland**	
	(1)	(2)	(1)	(2)	(1)	(2)
N	0.43* (0.04)	0.60* (0.06)	0.32* (0.03)	0.39* (0.05)	0.26* (0.04)	0.36* (0.11)
K	0.07* (0.01)	0.05* (0.01)	0.13* (0.01)	0.15* (0.02)	0.05* (0.01)	0.06* (0.02)
R&D	0.01 (0.009)	0.01 (0.012)	0.01* (0.04)	0.01** (0.008)	-0.006 (0.06)	-0.009 (0.008)
Spill	-0.03 (0.04)	-0.03 (0.05)	-0.002 (0.006)	-0.04 (0.22)	-0.56* (0.17)	-0.39* (0.21)
R&DXSpill	0.04* (0.02)	0.03 (0.02)	0.002 (0.002)	-0.11 (0.09)	0.09* (0.04)	0.07** (0.04)
Year/region dummies	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.80	0.79	0.16	0.21	0.23	0.30
Observations	6038	3380	8105	3674	2561	1441

Note: heteroskedastic consistent standard errors in brackets; *denotes significant at the 5% critical level, ** denotes significant at the 10 critical level.