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The effects of foreign direct investment on domestic firms

Evidence from firm-level panel data in emerging economies[1]

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Abstract

This paper uses firm-level panel data to investigate empirically the effects of foreign direct investment 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 dataset is used with detailed information on foreign ownership at the firm level. Two main questions are addressed in the present paper: (1) do foreign firms perform better than their domestic counterparts? (2) do foreign firms generate spillovers to domestic firms?

The estimation technique in this paper takes potential endogeneity of ownership, spillovers and other factors into account by estimating a fixed effects model using instrumental variables in the general methods of moment technique for panel data.

Only in Poland, do foreign firms perform better than firms without foreign participation. Moreover, for all three countries studied here, I find no evidence of positive spillovers to domestic firms, on average. In contrast, on average, there are negative spillovers to domestic firms in Bulgaria and Romania, while there are no spillovers to domestic firms in Poland. This suggests a negative competition effect that dominates a positive technology effect.

JEL classification: D24, F14, O52, P31.
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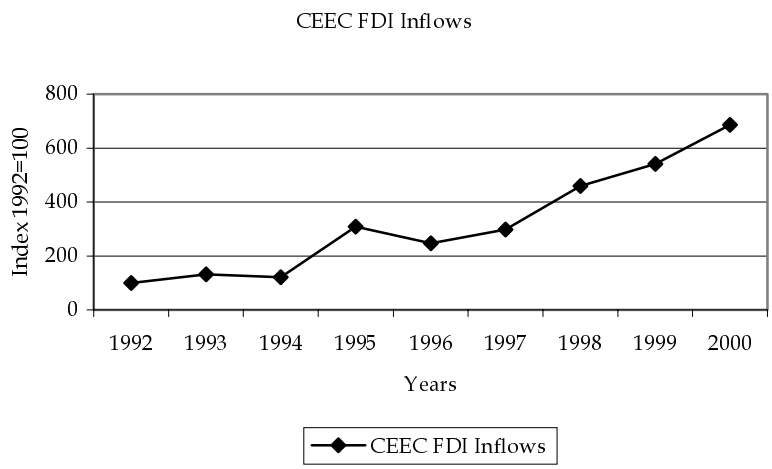
1. Introduction

This paper uses firm-level panel data to investigate empirically the effects of foreign direct investment (FDI) 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 (CEE) and the emergence of a market economy has led to a large inflow of FDI in the region during the last decade and in particular since the mid-1990s. Figure 1 shows the evolution of FDI inflows in CEE since 1992, where the level of FDI is normalized to 100 in 1992. By 2000, there was an almost sevenfold increase in FDI inflows to the region. Figure 1 also shows that the increase in FDI inflows started particularly after 1994. Such a substantial increase in FDI inflows in the regions is likely to affect the economic performance of the countries in CEE. This paper studies the impact of FDI on the performance of local firms in three countries of CEE using a unique panel dataset of more than 5,000 domestic and foreign-owned firms in the three countries.

Figure 1. The evolution of FDI in Central and East European countries[2]



Source: IMF balance of payments statistics (2000).

Policy-makers in the emerging economies were faced with a collapsing state sector and a slowly growing private sector. With financial markets and

[2] The CEEC countries here refer to Albania, Bulgaria, Croatia, Czech Rep., Macedonia, Hungary, Moldova, Poland, Romania, Slovak Republic and Slovenia.

commercial banking virtually absent, they encouraged foreign investors to take part in the privatization process or to invest in their countries. Given the enormous increase in foreign investment in these countries as illustrated in Figure 1, these countries provide an ideal natural experiment for measuring the impact of incoming foreign investment on performance.

There are various reasons why many policy-makers believe FDI is beneficial to their country. A first reason is the need for strategic restructuring in firms in the emerging countries.[3] Most firms in the emerging economies of the former Soviet Bloc were characterized 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. 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 (Blanchard, 1997, pp. 77–88).

A second reason why FDI may be beneficial to a transition country is the effect it has on hardening budget constraints. Foreign participation in domestic firms reduces the financial link between the government and the local firm, which may lead to harder budget constraints and hence better performance (Dewatripont and Maskin, 1995; Roland, 2000, chapter 9).

A third reason why foreign investors are invited to emerging countries rests on the belief that they generate positive externalities to the domestic firms through a transfer of know-how and technology. Such spillovers can occur through various channels. 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. Sanna-Randaccio (1999) and Leahy and Neary (1999) show that FDI always leads to an increase in the productivity of the investing firm. However, FDI increases the host country's productivity only if the degree of the technological spillover is high enough. The latter is more likely to be achieved in sectors characterized by intensive R&D or by firms that have a sufficient amount of knowledge at the outset.

[3] Strategic restructuring refers to improving the long-term viability and efficiency of a firm (e.g., Blanchard, 1997; Roland , 2000).

This has been suggested in earlier empirical work. Kokko (1994) and Borensztein, De Gregorio and Lee (1998) give evidence which suggests that positive FDI 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 threshold of human capital in the host country. Blomström and Sjöholm (1999) also report positive spillovers for Swedish firms.

The technological spillovers thus lead to positive effects on domestic firms. However, there may exist a competition effect that 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, at least if average cost curves are downward sloping, which would be the case if production involves a substantial fixed cost. This argument has been developed by Aitken and Harrison (1999). Which effect dominates depends on the strength of the technological spillover effect versus the competition effect. They use panel data for Venezuela and find negative overall spillovers from foreign firms to domestic ones, which suggests the competition effect dominates.

For CEE transition countries there are two papers that look at the question of spillovers for the Czech Republic. Djankov and Hoekman (1998) find no evidence of spillovers. Kinoshita (2000) also finds no spillover effects from joint ventures to local firms in the Czech Republic, however, she finds positive spillovers in sectors with active investors in innovative R&D.

In this paper I analyze two main questions: First, I test whether foreign-owned subsidiaries in transition economies perform better than their domestically-owned counterparts. Second, I test whether there exist 'spillovers' to domestic firms. I will look at the 'net spillover' effect, i.e., the sum of the technological spillover and the competition effect. In addition, I will make a distinction between sectoral and regional spillovers. I also test whether foreign firms benefit from the presence of other foreign firms in their sector or region.

I use a unique panel dataset of over 5,000 firms in Bulgaria, Romania and Poland for the years 1993–97.[4] Together these countries cover more than 70 million people and hence these economies are an important part of the Central and Eastern European economies. Bulgaria and Romania are lagging behind Poland in the transition towards a market economy. While all three countries experienced a substantial collapse in output at the start of transition, only Poland has reached GDP levels comparable to the pre-transition years and has positive growth rates. Both Bulgaria and Romania experienced a short period of positive growth in the mid-90s. However, output collapsed again in Bulgaria from 1995 and in Romania from 1997.

Because I use panel data I am able to track the same firm over time and hence I am able to control for unobserved firm-level fixed effects, like for example the quality of the firm. Hence, as in Aitken and Harrison (1999) I am able to control

[4] For Romania, data run from 1994 onwards.

for the potential endogeneity of foreign ownership and spillovers . Moreover, I will use the general methods of moments technique to estimate panel data as introduced by Arellano and Bond (1991) which allows me to construct instruments for potentially endogenous explanatory variables. This may be important if productivity shocks affect the levels of the input variables in a production function or if they affect spillovers. In that case fixed effects alone cannot properly control for the endogeneity. Furthermore, this technique allows me to estimate dynamic equations in a consistent way.

The next section describes the data and econometric approach, Section 3 gives the results and Section 4 concludes.

2. Data and econometric approach

2.1 Data

The dataset that is used provides information on 2,321 firms in Bulgaria between 1993 and 1997, 3,844 firms in Romania between 1994 and 1997 and 262 firms in Poland over the period 1993 and 1997. Due to a lot of missing observations on some of the input factors needed in the estimation, the total available number of firms for the estimation in Poland is much lower than in Bulgaria and Romania. The data form an unbalanced panel. 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.[5]

Foreign firms are defined as firms where a positive fraction of the shares is owned by a foreign investor in 1997. In the sample, around 10 per cent of the firms have a foreign investor in 1997.[6] For those firms with a foreign partner, the average fraction of shares held by foreign investors is 61, 59 and 73 per cent for Bulgaria, Romania and Poland, respectively. Thus if a domestic firm has a foreign investor, on average, the foreign investor has a majority stake. Because our data covers mainly medium- and large-sized firms most of the foreign firms are presumably traditional firms in which foreign multinationals participated or which were entirely taken over, rather than greenfield operations. However, it is not possible to confirm this from the data.

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

[6] We only observe ownership in 1997, so we assume that a foreign firm in 1997 was foreign from the start of the sample period.

2.2 Econometric approach and measurement issues

I estimate a log-linear production function at the firm level to test whether (1) foreign firms perform better than domestic ones, and (2) whether there exist spillovers from FDI to local production. In particular, the following specification is the starting point of my analysis:

$$y_{it} = \alpha_i + \alpha_1 n_{it} + \alpha_2 k_{it} + \alpha_3 m_{it} + \alpha_4 \eta_t + \alpha_5 FDI_i + \alpha_6 FDI_i XT_i + \alpha_7 Spill_{jt} + \varepsilon_{it} \quad (1)$$

where subscript i stands for firm i, subscript t for year t, y is log output, n is the log employment, k is the log of capital and m is the log of material inputs. Output is measured as sales at the firm level deflated by an aggregate price index. Sector level price indices were not available on a consistent basis for the countries studied here, so an aggregate producer price index was used for Romania and Poland, and an aggregate consumer price index for Bulgaria as there was no reliable producer price index available for Bulgaria. These price indices were taken from the EBRD annual transition report, 2000. The capital stock is proxied by the book value of tangible fixed assets in the firm, deflated by an aggregate price index. Finally, material inputs are proxied by material costs, which have also been deflated by an aggregate price index.

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 FDI. I also interact foreign ownership with the time trend ($FDI_i XT$) 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 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.[7] I will also report results in which both sectoral and regional spillovers are taken into account. The latter are measured as the fraction of output produced by foreign firms in total output of a particular region. Finally, ε, is a white noise error term.

Table 1 provides summary statistics for both domestic and foreign firms on the variables that were used in the regression analysis. It can be noted that, on average, real sales are collapsing in Bulgaria, which is consistent with the macroeconomic decline in GDP since 1995. In contrast, average real sales in Romania are growing rapidly, which is consistent with the fast growth rates in GDP noted since the mid-90s (until 1997, after which output collapsed again). Also, in Poland, average real sales are growing which is consistent with the fact that Poland is a successful transition country. We can also note that foreign firms seem to perform better than domestic firms in terms of growth rates of the various

[7] NACE is the standard European sector classification, which is comparable to the SIC classification.

indicators in all the three countries and in particular in Poland. The spillover effects, both sectoral and regional, are larger than 10 per cent on average, although there may be substantial variation across sectors as can be noted from the large standard deviations.

Table 1. Summary statistics
(means of the sample, standard deviations in brackets)

	Bulgaria		Romania		Poland	
	Domestic	**Foreign**	**Domestic**	**Foreign**	**Domestic**	**Foreign**
Sectoral spillover	0.08	0.18	0.13	0.21	0.14	0.17
	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)
Regional spillover	0.10	0.15	0.12	0.17	0.11	0.25
	(0.11)	(0.13)	(0.09)	(0.09)	(0.12)	(0.14)
Sales growth	–0.23	-0.15	0.04	0.09	0.02	0.20
	(0.47)	(0.54)	(0.29)	(0.37)	(0.31)	(0.40)
Employment growth	–0.03	–0.003	–0.06	0.04	–0.02	0.08
	(0.19)	(0.30)	(0.31)	(0.47)	(0.23)	(0.27)
Capital growth	–0.38	0.37	–0.25	–0.02	–0.01	0.02
	(0.63)	(0.56)	(0.42)	(0.52)	(0.46)	(0.25)
Material growth	–0.21	-0.11	–0.07	0.08	0.007	0.10
	(0.54)	(0.54)	(0.38)	(0.54)	(0.22)	(1.19)

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 categorize firms as '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:

$$\Delta y_{it} = \alpha_1 \Delta n_{it} + \alpha_2 \Delta k_{it} + \alpha_3 \Delta m_{it} + \alpha_4 \Delta \eta_t + \alpha_6 FDI_i + \alpha_7 \Delta Spill_{jt} + \Delta \varepsilon_{it} \qquad (2)$$

The above modeling strategy allows me to test whether foreign firms perform better and whether spillovers are present. However, equation (2) does not allow me to test whether foreign firms benefit in a different way from spillovers than domestic firms. It may be possible that foreign firms benefit from other foreign firms in their sector, while domestic firms do not as in Aitken and Harrison

(1999). For this reason I will include an interaction term in equation (2), where I interact foreign ownership with spillovers.

There is, however, a further econometric concern. An estimation by OLS of equation (2) may still lead to inconsistent estimates. This would be the case if productivity shocks have an effect on the input factors employed in the firm. Alternatively, productivity shocks may have an effect on spillovers, which would lead to an endogeneity of the spillovers. Furthermore, equation (2) is a static equation, allowing for some dynamic adjustment in output (in case of the presence of adjustment costs) would imply that equation (2) needs to be estimated with a lagged dependent variable which leads to further endogeneity problems.

To avoid inconsistent estimates I therefore estimate equation (2) using the General Methods of Moments technique (GMM) with Instrumental Variables as developed by Arellano and Bond (1991) for estimating dynamic panel data. The advantage of this method over other commonly used panel data estimation techniques lies in its efficient use of the number of instruments generated for the endogenous explanatory variables. For instance, in equation (2), a valid instrument for the differenced employment in the year 97 is the level of employment in the year 95 since this is not correlated with the differenced error term in 1997. Table 2 shows in a systematic way how the number of instruments increases as the panel progresses.

Table 2. Available instruments using GMM technique

	Endogenous explanatory variable	Available instruments
1997	Δx_{i97}	$x_{i95}, x_{i94}, x_{i93}$
1996	Δx_{i96}	x_{i94}, x_{i93}
1995	Δx_{i95}	x_{i93}

Note: *x* refers to any of the explanatory variables that are treated as endogenous.

In 1995, a valid instrument for a first differenced endogenous explanatory variable is its level in 1993. In 1996, valid instruments for the same variable include its level in 1993 and its level in 1994 and so on. So as the panel progresses an increasing number of instruments becomes available which increases the efficiency of the estimation. In order to test the validity of instruments a Sargan test of instrument validity is computed and is asymptotically χ^2 distributed. In addition, since the equation is estimated in first differenced form, the equation will show first-order serial correlation. However, what matters is the absence of second order serial correlation if the error term in the levels equation (1) is white noise. Therefore a test of second order serial correlation is reported and is asymptotically N(0,1) distributed.

3. Results

Tables 3, 4 and 5 show the results for Bulgaria, Romania and Poland, respectively. I show both OLS estimates and GMM IV estimates for equation (2). Since the equation is estimated in first-differences I also control for unobserved fixed effects.

Table 3. Results for Bulgaria
(Dependent variable: y)

Independent variables	OLS	IV	IV
n	0.127*	0.538*	0.560*
	(0.038)	(0.175)	(0.187)
k	0.047*	0.012	0.018
	(0.011)	(0.038)	(0.039)
m	0.626*	0.720*	0.738*
	(0.023)	(0.072)	(0.075)
FDI	–0.03	–0.112	–0.176
	(0.026)	(0.113)	(0.136)
Sector spill	–0.206*	–0.670*	–0.678*
	(0.091)	(0.360)	(0.371)
FDI x sector spill	3.528*	6.199	5.225
	(1.473)	(12.184)	(12.40)
Region spill	–	–	–0.175
			(0.206)
FDI x region spill	–	–	5.061
			(5.825)
Sargan Test	–	31.18 (df=31)	30.1 (df=29)
SOC test	0.248	–0.103	–0.025
Number of observations	4,662	4,662	4,662

Notes: (i) all equations include time dummies, (ii) heteroscedastic consistent standard errors in brackets, (iii) * denotes significant at the 5 per cent level, ** at the 10 per cent level, (iv) instruments include some or all available moment restrictions of the endogenous explanatory variables as well as region dummies.

Starting with Bulgaria, the OLS estimates in column (1) of Table 3 show no statistically significant effect of foreign ownership on performance. This may come across as a surprising result. However, in the context of transition economies it has been shown that privatized firms do not perform better than state-owned enterprises, because it may take time before restructuring feeds

through to firm performance (e.g., Konings, 1997). There is, however, a statistically significant negative spillover effect of foreign firms on domestic ones, which suggests that a competition effect is dominating a technological spillover effect. The interaction term, foreign X spillover, suggests that foreign firms benefit from the presence of other foreign firms in the sector. However, this equation does not take into account the potential endogeneity of spillovers and of the other input factors.

In the second column I therefore instrument all the input factors as well as the spillover effect using the moment restrictions suggested by the GMM technique (Arellano and Bond, 1991). A number of interesting results emerge. First, there still exist negative spillovers from FDI to domestic firms. The coefficient that is estimated with spillovers is equal to –0.67. Thus, a sector that has an increase in spillovers from 0 to 10 per cent would experience a decline in total factor productivity of 6.7 per cent on average. This suggests that the competition effect is dominating, which means that domestic firms, due to the increased competition from foreign firms in their sector, are pushed up their average cost curves due to a reduction in output they can produce. This would hold if domestic firms have a declining average cost curve, i.e., in the presence of increasing returns to scale. Based on the estimates of the coefficients of the input factors, this hypothesis seems to be plausible. The sum of the coefficients of the input factors is larger than 1 which suggests increasing returns to scale in production or a declining average cost curve. Note, also that the coefficient on capital is low and statistically not significant at conventional levels. In the context of transition economies this is not surprising as most firms are characterized by outdated equipment and a lack of investment in new equipment, which decreases the marginal productivity of capital.

A second result, which is the same as in the OLS estimation, is that foreign firms do not outperform domestic ones. Finally, the interaction effect between foreign ownership and spillovers is no longer statistically significant, albeit still positive. These IV results suggest that endogeneity may have been important in driving some of the results in the OLS regression. The Sargan test and the second order serial correlation test in column (2) all indicate that the model is correctly specified. The fact that there is no second order serial correlation suggests that further dynamics do not have to be specified in the model.

The third column tests whether regional spillovers may matter. As argued by Aitken and Harrison (1999) there may be reasons to expect that any benefits to domestic firms from foreign investment would be received first by their neighbours before they diffuse to other domestic firms. One mechanism through which this may occur is through job mobility. Workers who work with a multinational and then leave the firm to work in a domestic one are more likely to move to another firm within the same region. Job reallocation in transition countries (and elsewhere) occurs primarily within regions rather than across regions (e.g., Faggio and Konings, 1999). I measure regional spillovers as the

fraction of output produced by foreign firms in a given region in the total output produced by a given region. The results in column (3), however, show no statistically significant effect of regional spillovers to domestic firms in Bulgaria. Since Bulgaria is a small open economy regional effects are presumably less important in terms of competition. Rather the entire Bulgarian market is more likely to be the appropriate market to consider.

Table 4. Results for Romania
(Dependent variable: y)

Independent variables:	**OLS**	**IV**	**IV**	**IV**
yt-1	-	-	0.138*	0.144*
			(0.034)	(0.035)
n	0.134*	0.245*	0.106*	0.094**
	(0.017)	(0.073)	(0.06)	(0.063)
k	0.081*	0.04**	0.043*	0.043*
	(0.011)	(0.026)	(0.02)	(0.02)
m	0.604*	0.660*	0.411*	0.421*
	(0.017)	(0.036)	(0.04)	(0.044)
FDI	0.01*	0.04	0.001	0.128
	(0.002)	(0.003)	(0.02)	(0.17)
Sector spill	0.201*	0.436	-1.101*	-0.934**
	(0.083)	(0.459)	(0.528)	(0.579)
FDI x sector spill	-32.52*	-8.937	-21.06	-14.8
	(12.1)	(12.07)	(66.92)	(72.5)
Region spill	-	-	-	0.063
				(0.128)
FDI x region spill	-	-	-	-2.93
				(4.18)
Sargan Test	-	15.14	60.3	59.27
		(df=6)	(df=45)	(df=43)
SOC test	-3.708	-3.872	-	-
Number of observations	10,955	10,955	7,111	7,111

Notes: as in Table 3.

The results for Romania are reported in Table 4. I find that once some hidden dynamics are taken into account, the results are similar to those found for Bulgaria. In column (1) the OLS results suggest that foreign firms outperform domestic ones, that domestic firms experience positive spillovers and that foreign

firms do not benefit from other foreign firms in their sector as much as domestic ones. However, the second order serial correlation test suggests that the model is not correctly specified in terms of the dynamics. In addition, there may also be an endogeneity problem related to some of the explanatory variables.

In column (2) of Table 4, I therefore report the results using instruments for the input factors and for the spillovers. The results of column (2) show no statistically significant effects of spillovers and foreign ownership. However, again the diagnostics suggest that the model is mis-specified, i.e., the Sargan test of instrument validity and the second order serial correlation test reject the model specification. Column (3) therefore estimates a dynamic model, including the lagged dependent variable as one of the regressors. Since the model is estimated in first differences, the lagged dependent variable is also endogenous and therefore needs to be instrumented too, using all available moment restrictions from $t-2$ backwards. In column (3) the Sargan test accepts the model specification, the second order serial correlation test could no longer be computed since one time observation is lost due to the lagged dependent variable and the fact that the data for Romania only go from 1994 onwards, rather than 1993. However, since the lagged dependent variable is statistically significant, it is likely that this controls for the initial problem of second order serial correlation. The results indicate that spillovers from foreign firms to domestic ones are negative. The results in column (3) suggest that once the dynamics in the model are properly controlled for, again the same negative spillover effects show up. The interaction effect between foreign firms and spillovers is no longer statistically significant, and foreign ownership itself is no longer statistically significant. This is consistent with the empirical literature that has shown that privatization did not lead to better firm performance and that it may take some time before firms start to engage in restructuring.

Finally, column (4) tests for the presence of regional spillovers. As in Bulgaria, I find no statistically significant effect of regional spillovers on domestic firms.

Table 5 shows the results for Poland. Since I lost a lot of observations in the estimation due to missing data on material costs, the Polish sample is much smaller than the one used for Bulgaria and Romania, so the results for Poland need to be read with caution. The first column gives the OLS results. I find a statistically significant effect of foreign ownership on firm productivity performance. This effect remains statistically significant in the IV estimations, in contrast to the IV results for Bulgaria and Romania. In the case of Poland it may make sense that foreign firms outperform domestic ones since Poland is in a more advanced stage of development towards a market economy. If it takes time for firms to restructure then one may expect that in less developed countries, such as Bulgaria and Romania, foreign firms do not outperform domestic ones, while in the more advanced ones, such as Poland, the restructuring effects have come through, which is reflected in the positive effect of foreign ownership. In column (1) I find no statistically significant effect of spillovers.

Table 5. Results for Poland
(Dependent variable: y)

Independent variables	OLS	IV	IV	IV
n	0.01	0.022	0.062	0.03
	(0.14)	(0.121)	(0.108)	(0.11)
k	0.017	0.017	0.059	0.06
	(0.03)	(0.087)	(0.083)	(0.067)
m	0.429*	0.487*	0.613*	0.527*
	(0.081)	(0.129)	(0.094)	(0.079)
FDI	0.178*	0.215*	0.13	0.145*
	(0.08)	(0.097)	(0.11)	(0.062)
Sector spill	-0.253	0.174	-0.191	-0.172
	(0.324)	(0.790)	(0.689)	(0.721)
FDI x sector spill	1.14	3.175	-1.84	-
	(2.162)	(4.835)	(8.34)	
Region spill	-	-	-0.377	-0.48**
			(0.327)	(0.301)
FDI x region spill	-	-	1.77	-
			(10.84)	
Sargan Test	-	12.77	19.03	16.92
		(df=16)	(df=20)	(df=21)
SOC test	0.171	0.536	0.07	0.391
Number of observations	340	340	340	340

Notes: as in Table 3.

In column (2) I report the GMM IV estimates. The same results hold as in the OLS case, i.e., foreign firms outperform domestic ones or to put it differently, total factor productivity would increase by approximately 20 per cent in a firm that was to change its ownership structure from 0 per cent foreign participation to 100 per cent foreign participation. 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 .

Again I find no statistically significant effect of spillovers. This may be due to the fact that the 'technological' positive externality and the negative competition effect cancel each other out, or, it may be due to the fact that there are no increasing returns to scale, which would imply that there is no declining average cost curve. The latter makes sense, based on the estimates of the coefficients of the

input factors. Rather, decreasing returns to scale seem to hold on average, with the only statistically significant input factor being material costs. This is plausible as most firms in transition countries are still characterized by over-manning levels and an outdated capital stock. Moreover, since transition started earlier in Poland than in Romania and Bulgaria, the initial increase in competitive pressure at the start of transition was experienced at an earlier stage, such that the competition effect in the case of Poland is likely to be much lower than in the case of Bulgaria and Romania.

Finally, in column (3) I also test for the presence of regional spillovers. However, the only significant effect I find is the material costs of production. Also foreign ownership is no longer statistically significant at conventional levels. This is most likely due to multicollinearity of the data, given that only 262 observations are used in the estimation. For this reason I estimated the equation again, but leaving out the interaction terms between foreign ownership and spillovers. In column (4) the results are reported and show that as before foreign firms do better than domestic ones. In addition, I find evidence of negative regional spillovers, albeit only significant at the 10 per cent level, but still no evidence of spillovers at the sectoral level.

4. Conclusion

This paper studied the effects of foreign direct investment on the performance of firms in three emerging market economies, Bulgaria, Romania and Poland. Two main questions were addressed. First, do foreign firms perform better than their domestic competitors and second, does foreign investment generate 'spillovers' to local firms?

I find evidence that foreign firms do not perform better than domestic ones, except in Poland, the more advanced transition economy. This suggests that it may take time for ownership effects to have an effect on performance, due to lags in restructuring. In addition, I find no evidence of positive spillovers, but rather negative or no spillovers of foreign investment to domestic firms. This is rationalized through a competition effect that dominates a technological spillover effect in Bulgaria and Romania, which would hold under the assumption of increasing returns to scale (declining average cost curves). The competition effect may dominate the technology effect if the technology gap is too large, which would be the case in less advanced countries such as Bulgaria and Romania.

The results in this paper suggest that in the early stages of transition, the stages Bulgaria and Romania are in, the increased competition from FDI dominates technological spillovers to domestic firms. It suggests that inefficient firms will lose market share due to foreign competition, which in the long run should increase the overall efficiency of an economy. In the latter stages, when domestic firms have engaged in substantial restructuring and market competition has been

established, the dominating competition effect seems to vanish. Whether in the longer run technological spillover effects start dominating, leading to positive spillovers is a topic for future research when more years of data are available.

References

Aitken, Brian, J. and Ann E. Harrison (1999), 'Do Domestic Firms Benefit from Foreign Direct Investment? Evidence from Venezuela', *American Economic Review*, 89(3), pp. 605–18.

Arellano, M. and S. Bond (1991), 'Some Tests of Specifications of Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, 58, pp. 277–94.

Blanchard, Olivier (1997), *The Economics of Post-Communist Transition*, Clarendon Lectures in Economics, Oxford: Oxford University Press.

Blomström, Magnus and Fredrik Sjöholm (1999), 'Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter?' *European Economic Review*, 43, pp. 915–23.

Borensztein, E., J. De Gregorio and J-W. Lee (1998), 'How does Foreign Direct Investment affect Economic Growth?', *Journal of International Economics*, 45, pp. 115–35.

Dewatripont, M. and E. Maskin (1995), 'Credit and Efficiency in Centralized and Decentralized Economies', *Review of Economic Studies*, 62, pp. 541–55.

Djankov, S. and B. Hoekman (1998), 'Avenues of Technology Transfer: Foreign Investment and Productivity Change in the Czech Republic', CEPR discussion paper 1883, London: CEPR.

Kinoshita, Y. (2000), 'R&D and Technology Spillovers via FDI: Innovation and Absorptive Capacity', WDI Working Paper No 349, Ann Arbor, MI: WDI.

Konings, J. (1997), 'Firm Growth in Transition Economies', *Economics Letters*, September.

Faggio, G. and J. Konings (1999), 'Gross Job Flows and Employment Growth in Transition Economies', LICOS Discussion paper 77, KULeuven.

Kokko, Ari (1994), 'Technology, Market Characteristics and Spillovers', *Journal of Development Economics*, 43, pp. 279–93.

Leahy, D. and P. Neary (1999), 'Absorptive Capacity, R&D Spillovers, and Public Policy', mimeo University College Dublin.

Roland, G. (2000), *Transition and Economics: Politics, Markets and Firms*, Cambridge, MA: MIT Press.

Sanna-Randaccio, Francesca (1999), 'The Impact of Foreign Direct Investment on Home and Host Countries with Endogenous R&D', mimeo Universita' di Roma 'La Sapienza'.

Teece, David, J. (1977), 'Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-How', *Economic Journal*, 87(346), pp. 242–61.