

Ksenia Yudaeva, Konstantin Kozlov,  
Natalya Melentieva, and Natalya Ponomareva.

## **Does Foreign Ownership Matter?**

### **Russian Experience.**

Working paper # WP/2001/027

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The purpose of the paper is two-fold. The paper compares productivity of Russian firms that received foreign direct investments, and fully domestically owned firms. It also analyses spillovers from foreign-owned firms to domestic firms. Foreign firms are found to be more productive than the domestic ones, however, poor progress of reform in the region negatively affects productivity of foreign-owned firms. At the same time, there are positive spillovers between foreign-owned and domestic firms. This effect is particularly strong in the case of medium-sized firms (between 200 and 1000 employees), while spillovers on small firms are negative. The stock of human capital in the region is one of the main factors, which helps domestic firms to benefit from the entry of foreign firms. (JEL F2, O3)

**Keywords:** foreign direct investment, spillovers

**Юдаева К.В, Козлов К.К., Мелентьева Н.Ю., Пономарева Н.Б.** Влияет ли доля иностранного участия? Опыт России. Препринт # 2000/027.- М.: Российская экономическая школа, 2001.- 42 с. (Англ.)

В данной статье произведен сравнительный анализ производительности российских предприятий и предприятий в иностранной собственности, находящихся на территории России. Установлено, что производительность фирм в иностранной собственности больше, чем производительность российских фирм. Данный эффект существенно зависит от степени прогресса реформ в регионе. В регионах, где реформы протекали медленно, производительность иностранных предприятий существенно ниже, чем в других регионах. В то же время, между иностранными и российскими предприятиями существуют положительные внешние эффекты, то есть рост объема производства иностранных предприятий в отрасли ведет к росту производительности российских предприятий той же отрасли. Этот эффект особенно значим для российских предприятий среднего размера (200-1000), тогда как внешние эффекты на малые предприятия могут быть негативными. Одним из наиболее существенных факторов, позволяющих российским предприятиям выжить и извлечь пользу из появления иностранных конкурентов, является уровень человеческого капитала в регионе.

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At the outset of transition, it was expected that foreign direct investment (FDI) will become one of the major sources of growth in transition economies. Given high level of human capital in transition economies, lack of capital and technological know-how was considered as one of the major impediments to development in these countries. Foreign direct investment is one of the easiest ways to overcome these problems. On the one hand, FDI results in direct import of new capital and new technologies in the country. On the other hand, it is supposed to be easier for domestic firms to copy technologies of foreign-owned firms located nearby than trying to reproduce a technology used in manufacturing imported goods. Therefore, FDI was expected to become one of the most important ways of technological upgrading of Russian firms. Another important reason for welcoming foreign investors in transition economies is potential spin-offs of western managerial techniques. In planned economies, the behavior of managers was absolutely different from that in market economies. Managers were required to meet plan targets instead of maximizing their firms' profits. This created the wrong incentives for the managers. Instead of trying to improve firms' efficiency, decrease costs and increase profits, managers in planned economies were fighting for government subsidies and renegotiating plans for their firms with the government. There was no business culture in the Western sense of the word. In this situation, foreign-owned firms could serve as an example for domestic firms of how managers should behave.

In addition to the transfers of technologies and managerial techniques, foreign entry increases competition, thus forcing domestic firms to restructure faster. Restructuring can take the form of technological improvements and improvement in corporate governance, changes in the range and quality of goods produced. However, foreign competition may also have a negative effect on domestic firms, particularly at the beginning of transition. Those can be driven out

of the market by more efficient foreign competitors. Given that most firms in transition economies were inefficient, this development should not be regarded as negative, as it is just a result of replacement of inefficient firms by more efficient ones.

In this paper we study the effect of foreign direct investment on productivity based on the Russian experience. Despite the abundant natural resources and skilled labor force, the inflow of FDI to Russia was rather small in comparison with more advanced transition economies. The average annual per capita inflow of FDI to Russia in 1994-1998 was about US\$ 17, which is more than ten times as little as \$220 received by Hungary or \$134 received by Czech Republic.<sup>1</sup> Such a low level of foreign direct investments can be explained by both political and economic factors. In this paper, we do not look at the factors that determines the decision of foreign firms to invest. An accompanying paper by Manaenkov (2000) looks at such factors in greater detail. The purpose of this paper is to make an attempt to assess the impact of FDI on domestic economy. We use a dataset that includes all partially or fully foreign-owned firms that existed in Russia in 1992-1997, and all medium-sized and large as well as some of small domestic firms to assess the relative productivity of foreign-owned and domestic firms and the effect of FDI on domestic firms. Konings (1999) is a similar study of the effect of foreign investment on firms in Eastern European transition economies. He finds that foreign firms are more productive than domestic ones in all the countries of his study. However, the spillover effect is negative for domestic firms. Therefore, he finds that the market stealing effect is predominant at the initial stages of transition. In other words, he finds that foreign firms, which are more efficient, have advantage over domestic ones, and drive domestic firms out of the market.

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<sup>1</sup> Source: Lopez-Claros (1999).

Potential technological and corporate governance spillovers cannot outweigh this effect. Unfortunately, it is not clear in the Konings (1999) paper if the time-specific fixed effect is controlled for. Controlling for this effect changes our results dramatically, so, it is conceivable that negative spillovers observed by Konings are just a result of misspecification.

Konings result is consistent with previous findings by Aitken and Harrison (1999), who study the FDI spillovers to domestic firms in Venezuela. Aitken and Harrison find that the spillover effect is negative. Their interpretation is that foreign firms steal demand from domestic ones, and, therefore, force domestic firms to cut output and produce in the less efficient part of the costs curve. Other studies, such as Blomstrom and Sjöholm (1999), Blomstrom and Persson (1983) document positive spillovers from foreign-owned to domestic firms in developing countries.<sup>2</sup> However, these early studies were criticized by Aitken and Harrison (1999) because they use cross-section data, and, therefore, do not take the firms' specific fixed effect into account.

Our results for productivity differences between foreign-owned and domestic firms and for spillovers from foreign-owned to domestic firms are as follows. Foreign-owned firms were found to be more efficient than domestic ones. Our interpretation of this finding is that foreign-owned firms restructure faster than domestic ones, and, in addition, they have access to better technologies and are better managed. Intervention of local authorities in restructuring of foreign-owned firms can scare off investors and slow down the restructuring process. The regression results show that foreign-owned firms are more productive if located in reform-oriented regions, suggesting that faster reforming regions do not intervene

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<sup>2</sup> The literature on spillovers from multinationals on domestic firms is surveyed in Blomstrom and Kokko (1998).

in the restructuring of foreign-owned firms, and, therefore, attract more productive investments.

As far as spillovers from foreign-owned to domestic firms are concerned, the direction of such spillovers depends on the size of domestic firms. Small firms, with less than 200 employees, are negatively affected by the entry of foreign firms. Total factor productivity of such domestic firms goes down with an increase in the share of foreign-owned firms in the total production of the industry. On the other hand, foreign direct investments seem to have positive influence on domestic firms with 200-1000 employees.<sup>3</sup> Total factor productivity of such firms goes up with an increase in the share of foreign presence in the industry. Therefore, we have indirect evidence that medium-sized domestic firms tend to restructure faster facing increased competition from the foreign-owned firms. The difference in the behavior of small and medium-sized firms can be explained by differences in the access to financial resources between the two groups of firms. While access to external sources of finance is problematic for all Russian firms, this problem is particularly severe for the small firms.

Following Aitken and Harrison (1999), we also test for local spillovers. It is conceivable that technological and corporate governance spillovers happen faster among firms located within one region than among those located in different regions. Labor turnover is higher inside regions than across regions, and it is easier to copy technology or a managerial style of a nearby competitor, than those of a competitor located far away. Therefore we would expect a higher chance of positive spillovers on the local level. However, as in the case of the Aitken and Harrison (1999) paper, we also do not find positive local spillovers. On the

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<sup>3</sup> Foreign-owned firms in Russia are on average very small, with less than 100 employees. Hence, we confined our analysis to firms with less than 1000 employees.

contrary, we find strong negative spillovers, suggesting that the competition effect is predominant on the local level. This is true of firms of all sizes.

One of the most interesting of our findings is that the spillover effect depends positively on the level of education in the region. The higher is the proportion of population with secondary education, the higher are spillovers. This is true of firms of both size groups. A plausible explanation for this finding is that better educated managers and workers have a greater potential for copying technologies and managerial techniques from foreign firms. Therefore, our paper finds additional evidence of the importance of human capital as a factor of production.

The paper is organized as follows. In the next section we give a short review of the historical developments and current situation with foreign direct investment in Russia. This section also contains a review of data sources. In Section 2 we present the results regarding relative productivity of domestic and foreign-owned firms. Section 3 summarizes the results regarding spillovers from foreign-owned to domestically-owned firms, and Section 4 concludes.

## **1. Basic Facts about FDI in Russia and Data Description**

The latest wave of FDI in Russia started in Gorbachev's times after the Law on Joint Ventures with Firms from Capitalist Countries was passed. This law allowed only establishing joint ventures between domestic and foreign firms. In July 1991, the new law On Foreign Investment in Russia was adopted, which allowed opening in Russia of fully-owned foreign firms' subsidiaries. The initial inflow of foreign investment was very slow: according to Goskomstat, at the end of 1992 only 2533 foreign-owned firms were operating in Russia. The number of foreign-owned firms increased to more than 16000 by the end of 1996 but has declined slightly since then. In addition to general economic factors, such as

macroeconomic uncertainty, and poor corporate governance, the inflow of foreign direct investments was slowed down by the government regulations. The Russian Privatization Program set limits on the participation of foreign firms in the privatization of some enterprises. Permission for participation of foreign firms in the privatization of firms in the oil, gas, "strategic" materials, nuclear elements and some other industries was supposed to be issued by the Government of Russia or by the Sub-National Governments on a case by case basis<sup>4</sup>. Privatization by foreign firms of firms with less than 200 employees was decided upon by regional governments, some of which were hostile to foreign investors. On the other hand, the Law on Production Sharing Agreements, i.e., the major law that regulates foreign presence in natural resources industries, was passed only in December 1995. Moreover, no production sharing agreements were signed until 1999, when the Law on Production Sharing Agreements was changed, and the new law, bringing amendments to the Russian legislation in line with the Law on Production Sharing Agreements was passed.<sup>5</sup>

The firm level data used in this paper come from two sources: the Registry of Foreign Owned Firms, and the Russian Enterprise Registry Longitudinal Database (RERLD). These are the yearly enterprise censuses conducted by the Russian Statistical Agency (Goskomstat). The registries contain firm level information on output, number of employees, book value of capital, total costs, export and import, and some other variables. The Registry of Foreign-Owned Firms includes all fully or partially foreign-owned firms operating in Russia. The RERLD includes all Russian industrial firms with over 100 employees, all state-owned firms, and non-

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<sup>4</sup> See, for example, Presidential Decree signed on December 24, 1993. The Privatization Program, also envisaged that the decision about participation of foreign firms in the privatization of small firms with less than 200 employees were taken by the local authorities. More of the discussion of limits to foreign investments is in Bergsman, Broadman, and Drebensov (2000).

<sup>5</sup> For more details, see Afontsev (2000).

state firms with fewer than 100 employees that are up to 75% individually owned. It excludes firms with fewer than 100 employees that are more than 75% individually owned. Both datasets were cleaned of outliers, and, data permitting, missing values were replaced by the corresponding values from the censuses of subsequent years. Some missing values were obtained from the statistical part of the GNOZIS database.<sup>6</sup> As a result of this data-cleaning procedures, some of the summary statistics, which we report below, differ from the information published by Goskomstat. The before-cleaning summary statistics from the Registry of Foreign Owned Firms database were identical to the ones published by Goskomstat in the Information On the Foreign-Owned Firms part of its yearbook.

While this, to our knowledge, is the first paper that uses the Registry of Foreign-Owned Firms database, the RERLD was used before in the studies of Russian firms' restructuring. The description of RERLD can be found in other papers, for example, Brown and Brown (1999), so we will skip it and only provide a description of the Registry of Foreign-Owned Firms database.

The Registry of Foreign-Owned Firms covers the period between 1992 and 1997. It includes firms in all sectors of the economy. The sectoral breakdown is the following. Industry is the sector that attracted most foreign direct investment: in 1997, about 49% of foreign-owned firms' output was produced by manufacturing firms. The second largest sector is trade, which accounted for 29% of all output of foreign-owned firms in 1997, followed by transportation and communication, which accounted for only 10% of the total output of foreign-owned firms. The share of construction and housing is less than 4 percent each.

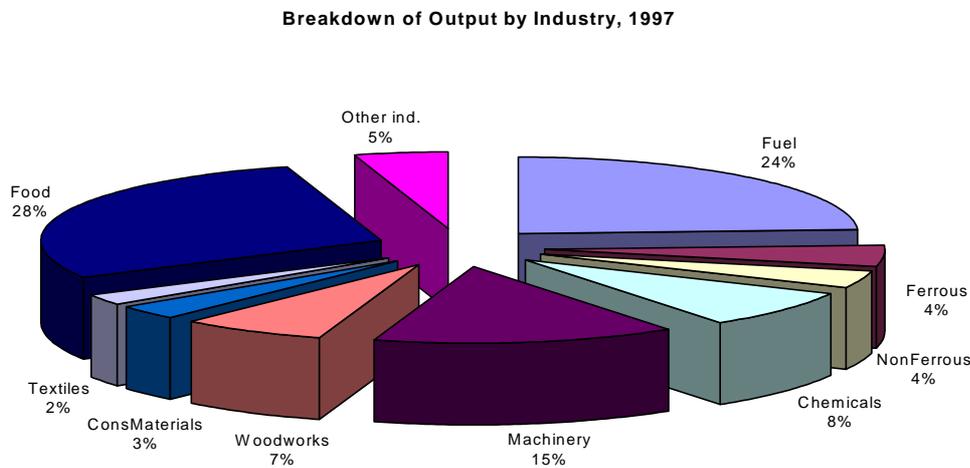
Since we only have information on domestic firms in the manufacturing

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<sup>6</sup> GNOZIS is the database, which includes statistical and balance sheet information on Russian firms. The firms coverage in GNOZIS is close to the one in the Russian Enterprise Longitudinal Database.

sector, we describe foreign manufacturing firms in greater detail. Figure 1 shows a breakdown of total output of industrial foreign-owned firms by industries in 1997. Food processing and fuel industries account for the largest shares of output (28% and 24% respectively), followed by manufacturing (15%), chemicals (8%), and wood (7%). Such composition of output suggests two major determinants of foreign investment in Russia: Russian natural resources and its potentially large market for consumer products.

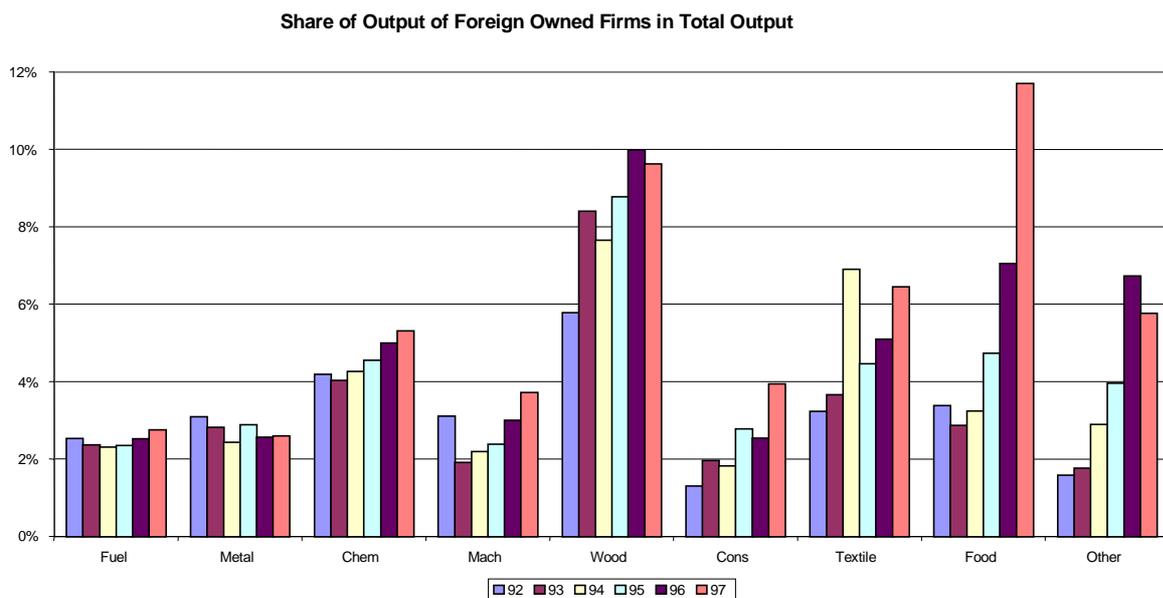
**Figure 1**



As we have mentioned, the inflow of FDI to Russia to date was rather small which is evidenced by the share of foreign-owned firms in total production. In 1992 this share for all manufacturing firms was 3%, increasing to only 4.5% by the end of 1997. The dynamics was not the same across industries, though Figure 2 shows a change in the share of foreign-owned firms in the total output across industries. The diagram shows that at the beginning of transition the share of foreign-owned firms in the total output was about of 2-3% in most of the industries. The main exception

was the wood industry, where this share was almost 6% as early as in 1992.<sup>7</sup> In the following years, the share of foreign-owned firms in the total output of such industries as chemicals, machinery, construction and textile, increased substantially. The most remarkable example is the food processing industry, where the share of foreign firms increased from about 3% in 1992 to almost 11% in 1997. On the other hand, the foreign share was stagnant in exporting industries, such as fuel and metals. This might have resulted from both federal and regional authorities policies toward foreign direct investment in extracting industries. As we said above, some limits on participation of foreign firms in privatization and establishment of new firms in the natural resources industries were set by the priva-

**Figure 2**



<sup>7</sup> We have some doubts as to the accuracy of the data on foreign-owned firms in the wood industry. The problem is that most of these firms had a foreign owner resident in Cyprus. Cyprus does not strike us as a country specializing in woodworking or furniture production, while it is an offshore zone where a lot of offshore Russian firms and banks are located. Therefore, it is not unlikely that some of the firms which have the foreign investor from Cyprus are in fact domestically-owned firms.

tization programs, and by the delay in the adoption of the Law on Production Sharing Agreements.

The largest investor in Russian economy is the USA (in 1997, American-owned firms accounted for 27.4% of foreign-owned firms' total output), followed by Germany (10.8%), the UK (9%), Switzerland (7.3%), Cyprus (5.5%), Ireland (5.5%), and Canada (4.4%). The shares of other countries are less than 4% each. American firms invested mainly in food processing (42% of American firms' total output in 1997), fuel (27%), and metallurgy (14%). German firms mainly invest in fuel (29%), machinery (27%), and chemicals (14%). The UK, again, invests mainly in food processing (40%), fuel (19%), and machinery (16%). Swiss firms concentrate in chemicals (38%) and fuel (35%). Most of the firms with the investor from Cyprus are operating in the fuel (30%), food processing (18%), and wood (17%) industries.<sup>8</sup> Almost all of the output of Irish firms is divided between the metal (62%) and food processing (31%) industries, while 94% of total output produced by Canadian firms is in the fuel sector.

Following the Russian law, we define foreign direct investment as a purchase of at least 10% of shares in a Russian firm. In very few cases, firms from the Registry of the Foreign-Owned firms either did not provide information on foreign ownership or reported that the foreign share was less than 10%. We dropped these firms from the dataset. The Russian law on foreign direct investment does not impose the lower limit of investment. Since most of foreign firms in Russia are rather small, and since, as a consequence of high of inflation, it is difficult to compute the value of firms' assets in dollars, we do not put any asset size restriction

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<sup>8</sup> As we said above, we are not sure whether the firms with a foreign investor from Cyprus are real foreign-owned firms or firms owned by a Cyprus subsidiary of a domestic firm.

on the sample either.<sup>9</sup> The distribution of foreign ownership share across firms is as follows. In most cases, the foreign partner controls equal shares of 1/3, 1/2 or 100% of equity. In 1997, only 9% of foreign-owned firms had a less than 30% foreign stake. About 26% of firms had a 30-49% foreign stake, another 44% were 50-90% foreign-owned, and at the remaining 21% of firms the foreign share was above 90%. The average size of firms varies slightly among different ownership groups. Curious enough, firms with the lowest share of foreign ownership also have the smallest size by output: about Rb.14 bn or US\$ 2.5 mn. The average size of firms with the average share of foreign ownership from 30 to 49%, from 50 to 90%, and from 90 to 100% was US\$ 4.4, 4.3, and 3.7 mn respectively. The distribution of foreign ownership does not vary substantially across industries and regions.

The regional composition of foreign-owned firms is as follows. Not surprisingly, the regions with the largest share of foreign firms' total output are Moscow and Moscow oblast, Tyumen and St.Petersburg, followed by Tula oblast, Komi Republic, Vologda oblast, Krasnodarsky kray and Tatarstan. The smallest number of the foreign-owned firms is in Altai Republic, Jewish Autonomous Okrug, Dagestan and Karachaevo-Cherkessiya.

The data set we use in the regressions is slightly different from the overall dataset we have. The difference is due to the fact that on average, foreign firms turned out to be much smaller than domestic ones. An average foreign-owned firm in the dataset has 73 employees, while domestic firms employ an average of 512 personnel. To decrease the potential size mismatch bias, we limited the analyses to the firms with between 5 and 1000 employees. The summary statistics for the sample used in the regressions are presented in the Table 4-1 in the Appendix.

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<sup>9</sup> IMF defines foreign direct investment as a purchase of at least 10% of equity in a firm, where the value of assets is at least \$500 ths.

## 2. Comparison of Foreign-Owned and Domestic Firms' Productivity

In this section we compare total factor productivity of foreign-owned and domestic firms. There is a number of reasons for foreign-owned firms to be more efficient than domestic ones. Parent companies based abroad can introduce new technologies in their domestic subsidiaries or joint ventures. Thus, the R&D capital in foreign-owned firms can be higher than in domestic ones. On the other hand, foreign-owned firms can benefit from managerial experience and distribution network of their foreign owners. Additionally, foreign-owned Russian firms can have access to the credit market abroad via their foreign parent companies, while Russian firms usually suffer from credit constraints.<sup>10</sup> The latter factor makes accumulation of capital and R&D capital easier for foreign-owned firms in comparison with domestic firms.

On the other hand, domestic firms have a number of advantages over the foreign-owned ones, which makes them more productive. It is often argued that domestic firms know the domestic market better. In addition, domestic firms have connections in the regional administrations and federal government. Connections in the government allow domestic firms to evade taxes and use money surrogates and barter as well as to receive direct or indirect subsidies. Such soft budget constraints create a situation when domestic firms lack incentives to restructure. On the other hand, though, as a result of the soft budget constraints for domestic firms, foreign-owned firms can have higher costs than domestic ones, and therefore be less efficient. Direct intervention of local authorities in the operations of foreign-owned firms, which is observed in some regions, may also damage efficiency of these firms.

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<sup>10</sup> On the credit constraints of the Russian firms see N. Volchkova (2000), or Perotti, Gelfer (1998).

Modern growth theory treats human capital and technological knowledge as an additional factor of production. Clearly, managerial techniques, sales networks, knowledge of the market, and other factors listed above, can also be considered as factors of production. Under this assumption, we can examine differences in total factor between foreign-owned and domestic firms by estimating the log-linear production function of the usual Cobb-Duglas form with constant return to scale:<sup>11</sup>

$$(1) \quad \frac{y_{it}}{l_{it}} = \alpha_1 + \alpha_2 \frac{k_{it}}{l_{it}} + \alpha_3 fdi_i + e_{it}$$

where  $y$  is the log of a firm's output,  $k$  is the log of fixed assets used in industrial production as of the beginning of the year,  $l$  is the log of total employment,  $i$  is the firm index and  $t$  is the year index. We use two different controls for foreign ownership: the dummy variable, which takes the value of one for fully or partially foreign-owned firms, and the actual share of the foreign partner in the firms. In the case when there are two or more foreign participants, we use the sum of foreign shares as an independent variable. The coefficient at the dummy for FDI measures difference in the total factor productivity between two groups of firms, foreign-owned and domestically-owned ones. Using the share of the foreign partner allows differences in productivity in firms with different degree of foreign participation to be controlled for.

The recent paper by Brown and Earle (2000) investigates a similar issue of comparative productivity of Russian firms with different ownership structures. The paper argues that a choice of the ownership type is not exogenous to the level of productivity. Brown and Earle show that non-state enterprises tend to have higher productivity in early years of transition, to face higher import competition, and to

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<sup>11</sup> We also estimated all equations using Cobb-Douglas function without constant return to scale restriction, and using translog specification. The results were qualitatively very similar.

export less. These results suggest that our productivity regression may suffer from selection bias. Unfortunately, even though we have a panel dataset, we cannot use the firm-level fixed effect estimator to control for selection bias in production functions. Foreign-owned firms appear in the Registry of the FDI dataset only after receiving foreign investment, so controlling for the firm-level fixed effect will automatically exclude the effect of foreign ownership in the regressions that use dummy variable for FDI as a control variable. The size of foreign participation changed only in a very small number of cases, so applying a fixed effect estimator to the specification that includes the share of foreign partner as an independent variable, is not possible either. Therefore, we use two alternative methods of controlling for selection bias. The first method consists in estimating the production function (1) using industrial or regional dummies. Alternatively, we estimate equation (1) as a cross section using the treatment effect estimator. Brown and Earle (2000) propose using dummies for supervising Ministries as first stage treatment variables. They argue that Ministries had substantial influence on the decision process regarding privatization of enterprises. Unfortunately, as in the case of fixed effect, this method is not suitable in our case, because newly registered foreign-owned firms do not report any past affiliation with the ministries. As an alternative, we use dummy variables for small (less than 200 employees) firms, and firms in oil, gas, and some other industries, which, as was mentioned above, were entitled to special treatment during the privatization process. As an alternative strategy, we use in the first-stage regressions some of the variables, which, according to Daniil Manaenkov (2000), affect the decision of foreign firms to invest. Manaenkov (2000) finds that the main determinants of FDI in Russia are the following: the proportion of people with secondary education in the region, concentration ratio in the industry, reform progress and quality of institutions in the regions, presence of other foreign firms in the industry or presence of other foreign

firms from the same country in the regions (as an indicator of experience of foreign investors), Bank of Austria Risk Rating of Russian Regions, and the regional climate. We use some of these variables in the first stage of the treatment procedure.

Measuring capital is a challenging task for the production function estimation in general and in Russia in particular. The firm level data we use contain information on fixed capital valued at the historical prices adjusted for inflation. Most of the capital was acquired by Russian firms at prices that existed in the planned economy, so they could be very different from prices prevailing in market economies. In addition, the fixed assets of some firms are very old and/or outdated, so the information we have on the value of capital may have very little to do with the true value of capital. Furthermore, the capital variable contains a lot of missing values, particularly in the case of foreign-owned firms. The largest number of observations of the value of capital of foreign-owned firms is in 1996, so we chose this year as the main year of our analysis. The number of non-missing observations for foreign-owned firms in the rest of the years is so small that we were unable to use the capital variable for those years.<sup>12</sup> We reestimated all equations for all other years using the value of capital as reported in 1996. The assumption of the constant capital size is quite plausible for the case of Russian firms, since these firms invest almost nothing. The results are very similar across years, so we do not report results for all years, but only those for 1996 and, occasionally for 1997. The results for other years are available upon request.

In Table 2-1 we report the results of estimation of equation (1) using the 1996 data. The upper block of the table reports the specification, which uses *fdi*

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<sup>12</sup> While the number of observations of fixed assets in foreign-owned firms in 1996 is around 3000, in other years, only about 40 firms report capital.

dummy, and the lower block reports the estimation results for the same equation, which instead of the dummy uses the share of the foreign partner.

The estimation methods for both specifications are the same across columns. The qualitative results of both specifications are very similar, so we discuss them jointly. The first column presents the results of a simple OLS estimation of equation (1). The coefficient at the *fdi* dummy and, alternatively, at the *fdi* share, is positive and highly significant, suggesting that foreign-owned firms are more productive than domestic ones. The positive coefficient at the *fdi* share variable also means that the higher is the share of the foreign owner, the more productive is the firm. Inclusion of 2-digit industrial dummies (column 2) or regional dummies (column 3) does not affect the qualitative result, although the coefficients at the *fdi* dummy and the *fdi* share in the specification with regional dummies are slightly lower than in the first two specifications. Columns 4 and 5 report the results of the treatment effect estimation procedure for the specifications, where *fdi* dummy was used as an independent variable, and IV estimator in the case of the *fdi* share as a right-hand side variable. In the specification reported in column 4, the dummy for Moscow, the dummy for the industries where the decision on the participation of a foreign investor in the auction was taken by the federal government, the dummy for the firms with more than 200 employees, which is a proxy for the firms the decision on the privatization of which was taken on the level higher than the regional governments, and the reform progress index, were used as a first stage regressors.<sup>13</sup> In the regression reported in column 5, we use as the first-stage regressors the percentage of adults with secondary education in the region, the dummy variable for Moscow and the proxy for economies of scale on a firm level constructed as the output of a firm divided by the output of an average firm in the 4-digit industry.

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<sup>13</sup>More details on the construction of the reform progress index are provided below.

The treatment effect and IV results are quite surprising. The coefficients at the *fdi* variables are not lower than in the OLS specifications, as we expected, but higher, particularly in the specifications reported in column 5.<sup>14</sup> The only exception is the specification with the *fdi* dummy reported in the column 4. The coefficient at the *fdi* variable in this specification is slightly lower than the corresponding coefficient in the unrestricted OLS specification, but the difference is not significant. The finding that the *fdi* coefficients are higher in the treatment effect and IV specifications, suggests that FDI go into less productive rather than more productive industries. At first sight this results sounds rather surprising, but upon reflection it does not seem so unreasonable. It is absolutely rational for foreign investors to enter industries where they have substantial technological advantage. In such industries, foreign firms can control the market, and, therefore, make higher profits. In application to Russia this means that foreign firms tend to invest in the industries that were underdeveloped in the planned economy. The demand for products of such industries in Russia is quite high and is not met by noncompetitive domestic companies. On the other hand, privatization policy of the Russian government could have led to the same result. While, as we have already said, the participation of foreign firms in the privatization of enterprises in natural resources and some other highly profitable industries was rather limited, the Presidential Decree on Speeding up Privatization explicitly said that participation of foreign firms was especially encouraged in the privatization of non-profitable firms, and firms that had to reduce production due to the lack of imported intermediate inputs.<sup>15</sup>

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<sup>14</sup> This result is consistent with the finding of Brown and Earl (2000), who find that foreign-owned firms are more productive than all other firms, when specification bias is controlled for. Brown and Earl use the same dataset as we do, however, in contrast to our paper, they limit the analysis to the firms that existed in 1992.

<sup>15</sup> See Presidential Decree on Speeding up Privatization of Federal and Municipal Enterprises of December 29, 1991.

**Table 2-1. Productivity of Domestic and Foreign-Owned Firms in 1996. Log of Labor Productivity as Dependent Variable.**

	OLS	OLS	OLS	Treatreg 1)	Treatreg 2)
Capital Intensity	0.16 [23.15]**	0.10 [15.41]**	0.15 [21.35]**	0.10 [15.33]**	0.10 [15.19]**
<i>fdi</i> Dummy	0.90 [21.74]**	0.84 [22.62]**	0.52 [10.08]**	0.88 [11.89]**	1.39 [23.57]**
Industry	inc.		inc.		
Regional			inc.	inc.	
Observations	14719	14719	14719	14698	14698
R-squared	0.05	0.25	0.11		
	OLS	OLS	OLS	Ivreg	Ivreg
Capital Intensity	0.16 [22.69]**	0.10 [14.82]**	0.15 [21.20]**	0.10 [14.04]**	0.15 [19.65]**
<i>fdi</i> Share	1.46 [21.11]**	1.36 [21.85]**	0.87 [10.30]**	1.63 [9.72]**	3.99 [24.03]**
Industry	inc.		inc.		
Regional			inc.	inc.	
Observations	14719	14719	14719	14698	14698
R-squared	0.05	0.25	0.11	0.25	0.15

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

1): Treatment variables/Instruments: Restricted Industries, Big Enterprises, Reforms, dummy for Moscow.

2): Treatment variables/Instruments: Secondary Education, dummy for Moscow, Scale.

Magnus Blomstrom and Frederik Sjöholm (1999) suggested that foreign-owned firms with a higher share of foreign ownership should be more efficient than firms with a small foreign stake. When a foreign owner has more control over a firm, he can choose to introduce more advanced technologies. In the Russian context, there is an additional factor that allows the majority foreign-owned firms to be more productive: the larger is the foreign stake, the more foreign managers are employed at the firm. Thus, firms with a big foreign stake should be better managed. On the other hand, there is substantial literature on the choice of a type of foreign investment by multinationals, which argues that joint ventures can be more profitable than fully-owned subsidiaries. Domestic firms have superior knowledge

of the local product market, distributional networks, the local personnel's working habits, administrative culture and other local peculiarities. In addition, domestic firms may have connections among regional authorities, which is not the least important factor in Russia. Hence, joint ventures can avoid many problems of fully foreign-owned subsidiaries. Apart from that, the attitude of local administrations to joint ventures can be better than to 100% foreign firms. Therefore, the productivity of foreign firms can vary depending on the size of the foreign share. Regression specification, which includes the share of the foreign partner allows us to conclude that the higher is the foreign share, the more productive is the firm. The results of further tests of this hypothesis for the years 1996 and 1997 are reported in Table 2-2.<sup>16</sup> The specifications, which we report in this table, allow non-linearities in the ownership effect to be controlled for. We divided all foreign firms into 4 groups according to the size of the foreign stake: firms where the foreign share is smaller than 30%, firms with a foreign ownership of 30% to 49%, firms with the foreign share between 50% and 90%, and 90% foreign-owned firms. The results are as follows. The productivity increases with the size of the foreign share. However, the difference is significant only in two cases. First of all, firms, where foreign owners have a minority stake, i.e., less than 30%, are significantly less productive than other firms. This result is the same in all specifications, which we tried. Hence, a smaller than 30% foreign stake is not sufficient to enforce fast restructuring or make foreign owner interested in installing modern technologies. On the other hand, firms with more than 90% of foreign stake are significantly more productive than others. This is an interesting result, as it contradicts the wide-spread belief that fully foreign-owned firms are less efficient than joint ventures since foreigners do not have sufficient knowledge of local market. Advantages of being the only owner

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<sup>16</sup> The results for other years are very similar. We proxy capital in 1997 with 1996 capital.

of the firm, who has full control over the enterprise and does not have to look for a compromise with the Russian side seem to have outweighed the lack of knowledge of the market.

**Table 2-2. Productivity of Foreign-Owned Firms by the Size of Foreign Ownership. Log of Labor Productivity as a Dependent Variable.**

	[1] OLS 96	[2] OLS 96	[3] OLS 96	[4] OLS 97	[5] OLS 97	[6] OLS 97
Capital Intensity	0.16 [23.11]*	0.10 [15.31]*	0.15 [21.42]*	0.11 [14.44]*	0.06 [8.06]**	0.10 [12.55]*
Foreign Share less than	0.63 [3.99]**	0.55 [3.93]**	0.21 [1.31]	0.31 [1.78]	0.28 [1.77]	0.00 [0.00]
Foreign Share in 30%-	0.83 [12.90]*	0.83 [14.42]*	0.48 [7.03]**	0.74 [9.95]**	0.77 [11.57]*	0.45 [5.64]**
Foreign Share in 49%-	0.92 [15.23]*	0.82 [15.22]*	0.57 [8.41]**	0.91 [13.43]*	0.82 [13.54]*	0.61 [7.86]**
Foreign Share more	1.12 [11.24]*	1.07 [11.99]*	0.76 [7.20]**	1.13 [9.85]**	1.05 [10.21]*	0.79 [6.47]**
Industry Dummies	Inc.			inc.		
Regional Dummies				inc.		
Observations	14759	14759	14759	13425	13425	13425
R-squared	0.06	0.25	0.11	0.03	0.23	0.09

Capital for 1996 was used in all regressions.

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

We also tested for differences in productivity between foreign-owned firms of different size. Small firms tend to be easier for a foreign owner to manage. Moreover, it is likely that most of small foreign-owned firms in our database are start-up firms, while large firms are privatized ones. Therefore, small firms can be more productive than larger ones. To test this hypothesis, we divided all foreign firms into three groups according to size based on the number of employees: the group of small firms, which includes the lower 30% of all firms in the industry, the group of large firms, which comprises 30% of firms with the biggest number of

employees, and the medium size group, which includes the rest of the firms. Table 2-3 reports the results of production function estimation (1), where the *fdi* dummy was replaced with three different dummies for small, medium-sized and large foreign-owned firms, and a capital to labor ratio was allowed to differ across different groups of firms. Surprisingly, large and medium-sized firms are found to be more efficient than small ones in all specifications. Productivity increases with the size of a firm, and the difference in productivity between all size groups is significant. Hence, in contrast to our conjecture, small firms are not more but less productive than larger ones.

**Table 2-3. Productivity of Foreign-Owned Firms by Employment Size. Log of Labor Productivity as a Dependent Variable.**

	[1]	[2]	[3]	[4]	[5]	[6]
	OLS 96	OLS 96	OLS 96	OLS 97	OLS 97	OLS 97
Cap.Intensity(Smal)	0.16 [14.97]*	0.11 [11.65]	0.15 [14.42]**	0.13 [10.51]*	0.09 [7.99]**	0.12 [9.72]**
Cap.Intensity(Medi)	0.16 [14.58]*	0.10 [10.19]	0.15 [13.35]**	0.10 [7.84]**	0.05 [4.14]**	0.08 [6.74]**
Cap.Intensity(Big)	0.15 [10.59]*	0.06 [4.18]*	0.14 [9.64]**	0.09 [5.72]**	0.01 [0.42]	0.07 [4.51]**
Small FDI firms	0.77 [14.41]*	0.75 [15.63]	0.41 [6.53]**	0.62 [10.01]*	0.61 [11.08]*	0.28 [3.92]**
Medium FDI firms	0.94 [12.19]*	0.93 [13.45]	0.60 [7.33]**	1.03 [11.53]*	1.00 [12.57]*	0.70 [7.44]**
Large FDI firms	1.36 [12.88]*	1.21 [12.77]	1.01 [9.29]**	1.42 [13.07]*	1.29 [13.30]*	1.10 [9.79]**
Industry Dummies	inc.			inc.		
Regional Dummies	inc.			inc.		
Observations	14759	14759	14759	13425	13425	13425
R-squared	0.06	0.25	0.11	0.04	0.24	0.09

Capital for 1996 was used in all regressions

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

The quality of human capital in the region may put restraints on the scope of technologies that foreign owners can install in their domestic affiliates. If it is

difficult to find workers and managers with the required level of skills, then foreign investors may prefer to install less advanced technologies. On the other hand, education is a signal of intelligence and ability to learn - it is easier to train better educated people. Therefore, we can expect foreign firms to be more productive if they work in a region with better educated labor. To test this conjecture, we included in the production function the interaction term between the variable controlling for FDI, i.e. the *fdi* dummy or the *fdi* share, and the percentage of adults with secondary education in the region. This variable is insignificant in OLS specifications for both the 1996 and 1997 regressions, independently of whether the *fdi* dummy or the *fdi* share is used as an independent variable. (see Table 2-4, Table 2-5, specifications 1-6). The possible explanation of this result is that Russian labor force is on average very well educated, so human capital is not among the factors affecting foreign investors' decisions. Incidentally, the coefficient at the education variable is positive and highly significant in absolutely all the specifications, confirming the hypothesis of the modern growth theory that human capital is an important factor of production.

Finally, we tested for the differences between the productivity of foreign-owned firms operating in more or less reform-oriented regions. We believe that firms in more reform-oriented regions face less harassment from the regional authorities. Thus, they can introduce more advanced technologies and manage their firms more efficiently, as they do not have to comply with labor hoarding requirements or other local regulations imposed by the regional or local authorities.<sup>17</sup> To test this hypothesis, we included into the regressions an interaction term between the dummy for foreign-owned firms or the share of the

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<sup>17</sup> When Phillips decided to change the structure of the labor force of its plant in Voronezh, regional government intervened and did not allow most of the changes Phillips wanted to implement.

foreign partner, and the index of economic reform progress. The reform progress index was constructed as a weighted average of the degree of regulation of food prices, the proportion of goods and services with regulated prices (both measures were included in the index with the negative sign), the share of private enterprises in trade, catering and household services (all three measures are as of 1996), growth in the number of enterprises, and the number of small businesses per capita. The weights are equal to the Russian average figure for the corresponding variable. The results for 1997 show that foreign firms located in more reform-oriented regions are more productive than others (see Table 2-4, Table 2-5, specification 7-12). In the 1996 regressions, this coefficient is significant only in the specification with the *fdi* dummy as a controlling variable for FDI, which we estimated using simple OLS without controlling for industry-specific fixed effect. Hence, we have a weak evidence that not only do reform-oriented regions attract more FDI, as is shown by Manaenkov (2000), but those FDI are also more productive. The reform progress variable itself is positive in all the regressions, and significant almost everywhere. Therefore, reform progress seems to be positively associated with the productivity of firms in the region.

**Table 2-4. Education and Reforms effects on FDI productivity in 1996-7. Log of Labor Productivity as a Dependent Variable.**

	1996			1997		
	Treatreg	OLS	OLS	Treatreg	OLS	OLS
<b>Secondary education</b>	[1]	[2]	[3]	[4]	[5]	[6]
Capital Intensity	0.091 [14.18]*	0.155 [22.17]*	0.094 [14.60]*	0.048 [6.76]**	0.104 [13.40]*	0.053 [7.34]**
<i>fdi</i> Dummy	0.268 [2.49]*	0.657 [14.79]*	0.644 [16.10]*	-1.499 [3.10]**	0.612 [1.54]	0.56 [1.56]
<i>fdi</i>	0.011 [2.13]*	0.006 [1.19]	0.002 [0.53]	0.020 [3.42]**	0 [0.01]	0.001 [0.14]
Secondary Education	0.034 [15.58]*	0.038 [15.39]*	0.034 [15.51]*	0.033 [13.61]*	0.039 [14.49]*	0.032 [13.39]*
<b>Economic reforms</b>	[7]	[8]	[9]	[10]	[11]	[12]
Capital Intensity	0.099	0.162	0.099	0.055	0.112	0.058

<i>fdi</i> Dummy	[15.23]* 0.801	[22.98]* 0.881	[15.31]* 0.834	[7.58]** 0.155	[14.31]* 0.78	[8.02]** 0.75
<i>fdi</i>	[9.79]** 0.02	[21.67]* 0.035	[22.80]* 0.017	[0.89] 0.131	[16.50]* 0.093	[17.60]* 0.067
Index of Economic	[1.18] 0.017	[1.98]* 0.022	[1.08] 0.017	[5.39]** 0.014	[4.60]** 0.011	[3.72]** 0.014
Industry Dummies	inc.		inc.	inc.		inc.
Observations	14738	14738	14738	13411	13411	13411

Absolute value of t-statistics in brackets.

\* significant at the 5% level; \*\* significant at the 1% level

Treatment variables: Restricted Industries, Big Enterprises, Index of Reforms ( for Education regressions ), dummy for Moscow.

**Table 2-5. Education and Reforms effects on FDI productivity in 1996-7. Log of Labor Productivity as a Dependent Variable.**

	1996			1997		
	Ivreg [1]	OLS [2]	OLS [3]	Ivreg [4]	OLS [5]	OLS [6]
<b>Secondary</b>						
Capital Intensity	0.034 [3.23]**	0.152 [21.83]*	0.09 [14.14]*	-0.011 [0.95]	0.103 [13.26]*	0.05 [7.04]**
<i>fdi</i> Share	-2.287 [4.69]**	1.074 [14.22]*	1.037 [15.28]*	-2.809 [4.91]**	1.031 [11.89]*	0.998 [12.79]*
<i>Fdi</i>	0.142 [6.59]**	0.009 [1.05]	0.005 [0.60]	0.164 [6.38]**	0 [0.02]	0.002 [0.28]
Secondary Education	0.042 [16.76]*	0.039 [16.44]*	0.035 [16.48]*	0.041 [14.53]*	0.039 [15.10]*	0.033 [13.99]*
<b>Economic reforms</b>	[7]	[8]	[9]	[10]	[11]	[12]
Capital Intensity	0.095 [14.69]*	0.159 [22.50]*	0.095 [14.69]*	0.044 [5.25]**	0.109 [13.98]*	0.054 [7.56]**
<i>Fdi</i> Share	1.347 [21.92]*	1.434 [20.96]*	1.347 [21.92]*	0.685 [2.75]**	1.301 [16.22]*	1.226 [17.01]*
<i>Fdi</i>	0.011 [0.41]	0.028 [0.95]	0.011 [0.41]	0.150 [3.86]**	0.126 [3.69]**	0.095 [3.13]**
Index of Economic	0.018 [4.53]**	0.024 [5.36]**	0.018 [4.53]**	0.018 [3.57]**	0.014 [2.46]*	0.016 [3.18]**
Industry Dummies	inc.		inc.	inc.		inc.
Observations	14738	14738	14738	13411	13411	13411

Absolute value of t-statistics in brackets.

\* significant at the 5% level; \*\* significant at the 1% level

Instruments: Restricted Industries, Big Enterprises, Index of Reforms (for Education regressions), dummy for Moscow.

### **3. Spillovers from Foreign-Owned Firms**

The governments of many developing and transition economies try to attract FDI to their countries because they expect FDI to have a positive effect on domestic firms. Such expectations are based on the common belief that entry of foreign firms increases the extent of technological diffusion from foreign to domestic firms. FDI increase availability of information regarding foreign technologies, production methods, and product design. It also facilitates copying of foreign technologies by domestic firms, as it is usually easier for domestic firms to imitate the technology and products of a nearby competitor than those of a firm located abroad. One of the channels of technology diffusion is labor mobility between foreign-owned and domestic firms. Workers and managers who work at foreign-owned firms, acquire knowledge of western technologies, which they can bring to domestic firms. In the case of transition economies, FDI can be beneficial to domestic firms not only because of technology diffusion, but also because of diffusion of managerial techniques. Domestic firms can copy the organizational structure of foreign-owned firms and their managerial style and organizational methods. Additionally, they can hire managers who previously worked at a foreign-owned firm. By doing so, domestic firms can benefit from managerial experience of and training by foreign firms.

The second channel through which the entry of foreign-owned firms can affect domestic firms is an increase in competition. Increased competition forces domestic firms to restructure faster and, therefore, positively affects their productivity. Restructuring does not have to be limited to copying foreign products. On a market for differentiated products, domestic companies can reoptimize their

products structure in such a way that will enables them to find a product niche where they can exploit local taste peculiarities and supply goods undersupplied by the foreign companies.

However, the effect of competition can be negative, particularly in the first years after foreign investments were made. Since foreign firms are more competitive, they can drive domestic firms out of the market or force them to produce at less than efficient capacity, thus adversely affecting productivity of domestic firms.

In this section we test whether spillovers from foreign firms to domestic ones is positive or negative, i.e., we test whether the positive effect of technology transfer and restructuring outweighs the negative effect of increased competition. Coe and Helpman (1995) and Coe, Helpman and Hoffmaister (1997) argue that the effect of foreign R&D capital on total factor productivity can be captured by regressing total factor productivity on the sum of R&D expenditures of foreign trade partners weighted by trade shares. Using similar logic, we can measure the effect of foreign technological capital and managerial experience on total factor productivity of domestic firms by introducing in the equation (1) a proxy for foreign firms' presence in the industry. Following Blomstrom and Sjöholm (1999), we use the share of foreign-owned firms in the output of a 4-digit industry as such a proxy.

Since the share of foreign firms in industrial production was changing over time, we do not have difficulty estimating the firm level fixed effect regressions as was the case in the productivity regressions. We test for spillovers from foreign firms, using the following equation:<sup>18</sup>

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<sup>18</sup> We do the test for the entire sample of firms, which includes both foreign-owned and domestic firms. The exclusion of the foreign-owned companies from the sample does not affect the results much.

$$(2) \quad \frac{y_{it}}{l_{it}} = \alpha_1 + \alpha_2 \frac{k_{it}}{l_{it}} + \alpha_6 spill_{it} + e_{it}$$

where *spill* is the proxy for foreign presence defined above.

Notice that the *fdi* dummy and *fdi* share drop out of the equation because they are constant over time.

In the first specification we follow Aitken and Harrison (1999) and Konings (1999) and estimate a specification of equation (2) for 1993-1997, which only controls for the firm-specific fixed effect. The results are presented in column (1) of Table 3-1. The spillover coefficient is negative and significant, which is consistent with the results of Aitken and Harrison (1999), and Konings (1999). However, this specification can be incorrect in the Russian case. During the period under study industrial output was declining. On the other hand, firms used a labor hoarding strategy, so labor productivity, measured by the output to employment ratio, was declining as well. At the same time, the share of output of the foreign-owned firms in the industry was increasing in most of the industries (see Figure 2). Therefore, instead of reflecting the effect of the presence of foreign firms on domestic firms' productivity, the negative sign at our proxy for spillovers can pick up the downward productivity time trend. To correct this misspecification, we reestimated equation (2) controlling not only for the firm fixed effect, but also for the time-specific fixed effect. Column (2) of Table 3-1 reports these results. The coefficients at the year dummies are negative and significant. The absolute size of the year dummies coefficients increases over time, which reflect the downward trend in productivity. On the other hand, the spillover coefficient became positive but insignificant. Insignificance of the coefficient can be justified in two ways. First of all, it is conceivable that there were no spillovers from foreign-owned to domestic firms in Russia. The inflow of FDI was rather modest, so it is not impossible that it

did not affect the behavior of domestic firms. However, it is also possible that foreign entry had positive influence on some firms and negative influence on others, while the average effect on all firms was insignificant. To test for such possibility, we divided the sample into two groups of firms: small firms with less than 200 employees, and other firms, with employment between 200 and 1000 people. We chose these two groups for the following reasons. First of all, privatization and control over firms with less than 200 employees was usually performed by the local administrations. On the other hand, foreign-owned firms are usually rather small ( see Table 4-1 which presents summary statistics for the three groups of firms). Therefore, if entry of foreign firms increases competition, than small firms are expected to suffer more than large ones. Additionally, while outside financing is a big problem for all Russian firms, small firms seem to suffer from it even more then the large ones.<sup>19</sup> The regression results for the sample of medium-sized domestic firms are summarized in Table 3-2 , and those for small firms are in Table 3-3. Column (1) of each table presents the basic results. The spillover effect seem to differ substantially between samples. While coefficient at the variable *spill* is positive and significant in the sample of medium-sized firms, it is negative and significant in the other sample. This result is quite robust, and remains true in different specifications. Therefore, it appears in our regressions that foreign entry has different effect on firms of different size. Small firms, can not sustain foreign competition, and are driven out of the market, while larger firms seem to benefit from foreign entry. As was mentioned above, financial difficulties of small firms can be responsible for such differences.

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<sup>19</sup> More on this issue is in Volchkova (2000).

**Table 3-1. Effect of Foreign Ownership on Productivity of Domestic Firms: Fixed Effect Estimation with Log Productivity as a Dependent Variable.**

	[1]	[2]	[3]	[4]	[5]	[6]
Capital Intensity	-0.32 [137.59]	0.05 [10.86]*	0.05 [10.88]*	0.04 [10.70]*	0.04 [10.72]*	0.04 [10.72]*
Industry Spillovers	-2.85 [36.92]*	0.12 [1.60]	0.20 [2.61]**	0.17 [2.14]*	0.11 [1.43]	0.26 [3.22]**
Regional Spillovers			-0.32 [6.58]**			-0.38 [7.56]**
Spillovers*SecEducatio				0.07 [5.31]**		0.09 [6.82]**
Spillovers*Index of					-0.025 [1.11]	-0.039 [1.68]
Year dummies		inc.	inc.	inc.	inc.	inc.
Observations	102707	102707	102707	102598	102598	102598
Number of firms	29059	29059	29059	29021	29021	29021
R-squared	0.25	0.37	0.37	0.37	0.37	0.37

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

**Table 3-2. Effect of Foreign Ownership on Productivity of Domestic Medium Firms: Fixed Effect Estimation with Log Productivity as a Dependent Variable.**

	[1]	[2]	[3]	[4]	[5]
Capital Intensity	0.07 [10.54]**	0.07 [10.55]**	0.07 [10.43]**	0.07 [10.43]**	0.07 [10.43]**
Industry Spillovers	0.58 [5.09]**	0.71 [6.10]**	0.59 [5.12]**	0.59 [5.10]**	0.73 [6.26]**
Regional Spillovers		-0.44 [6.05]**			-0.51 [6.87]**
Spillovers*SecEducati			0.05 [3.00]**		0.08 [4.37]**
Spillovers*Index of				0.008 [0.24]	-0.004 [0.11]
Year dummies	Inc.	inc.	inc.	inc.	inc.
Observations	47795	47795	47749	47749	47749
Number of firms	11954	11954	11938	11938	11938
R-squared	0.37	0.37	0.37	0.37	0.37

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

**Table 3-3. Effect of Foreign Ownership on Productivity of Domestic Small Firms: Fixed Effect Estimation with Log Productivity as a Dependent Variable.**

	[1]	[2]	[3]	[4]	[5]
Capital Intensity	0.026 [4.96]**	0.026 [4.96]**	0.026 [4.90]**	0.025 [4.88]**	0.026 [4.91]**
Industry Spillovers	-0.38 [3.62]**	-0.33 [3.14]**	-0.28 [2.66]**	-0.41 [3.92]**	-0.25 [2.32]*
Regional Spillovers		-0.22 [3.27]**			-0.25 [3.65]**
Spillovers*SecEducati			0.077 [4.12]**		0.09 [4.84]**
Spillovers*Index of				-0.064 [1.98]*	-0.075 [2.28]*
Year dummies	inc.	inc.	inc.	inc.	inc.
Observations	54912	54912	54849	54849	54849
Number of firms	17105	17105	17083	17083	17083
R-squared	0.38	0.38	0.38	0.38	0.38

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

It has been argued (Aitken and Harrison (1999) and Aitken, Hanson, and Harrison (1997)) that spillovers from foreign firms can be more extensive on the local level than on the country level. It may be easier for domestic firms to copy technologies of their nearby competitors, than of the firms, located far away. In such a large country as Russia, distance can play an important role for technology spillovers. On the other hand, labor mobility inside Russian regions is higher than interregional mobility, so labor and management turnover between domestic and foreign firms located in the same region can be higher than between firms in different regions. We test this hypothesis by introducing into equation (2) the variable which measures the share of foreign-owned firms' output in the total output of firms from the same industry within the same region. The coefficient at this variable (see column (3) of Table 3-1 and column (2) of Table 3-2 and Table 3-3) is negative and significant at the 1% level. Hence spillovers are negative on the local level, and this is true of both small and medium-sized firms. This result is

consistent with the results of Aitken and Harrison (1999), who also did not find any positive local spillovers in the sample of Venezuelan firms. After introduction of the variable for the local spillovers, the coefficient at the overall spillovers in the sample of all firms becomes positive and significant at the 1% level, the absolute value of the corresponding positive coefficient in the sample of medium-sized firms increases, and the absolute size of negative spillovers on the small firms decreases. Therefore, our estimation results suggest that most of the negative spillover effect from increase competition is realized on the local level.

**Table 3-4. Test of the Effect of Foreign Competition on Output of Domestic Firms.**

	(1) ALL	(2) BIG	(3) SMALL
Industry	0.84 [10.14]**	1.54 [11.99]**	0.066 [0.61]
Regional	-0.30 [5.94]**	-0.50 [6.51]**	-0.11 [1.71]
D94	-0.66 [104.9]**	-0.69 [71.71]**	-0.63 [76.79]**
D95	-1.07 [167.0]**	-1.08 [110.5]**	-1.05 [124.7]**
D96	-1.39 [201.1]**	-1.45 [143.3]**	-1.32 [139.5]**
D97	-1.58 [211.6]**	-1.68 [156.5]**	-1.47 [140.3]**
Constant	4.54 [887.0]**	5.53 [710.8]**	3.70 [550.1]**
Observations	110758	50838	59920
Number of firms	29983	12122	17861
R-squared	0.45	0.47	0.43

Absolute value of t-statistics in brackets.

\* significant at the 5% level, \*\* significant at the 1% level

Following Aitken and Harrison (1999), we conducted a direct test of the effect of increased competition on firms output. If increased competition forces domestic firms to decrease output or quit the industry, than regressing output on foreign competition measures should produce negative coefficients at the

competition measure. We report the results of such regressions in Table 3-4. The coefficient at the regional spillovers is negative and significant at least at the 10% level both in the overall sample and in each subgroup of the firms. This result additionally confirms our hypothesis that foreign entry forces local firms to decrease their output at least in the short run.

Borensztein, De Grigorio and Lee (1995) has shown that the effect of FDI on domestic productivity depends crucially on the stock of human capital in the host country. A similar argument can be found in Blomstrom (1986) or Blomstrom, Globerman and Kokko (1999), who claim that spillover effect depends on the technological gap between the firms in the host countries and the foreign firms. To test for importance of this effect in Russia we included in the regression an interaction term between the industrial spillovers and the variable, controlling for the population education level in the region. The above variable was computed as the difference between the percentage of adult population with secondary education in the region, and Russian average percentage of adult population with secondary education. The Russian labor market is very segmented, and interregional labor mobility is rather limited, so we believe that it is regional human capital stock that is relevant in this analysis.<sup>20</sup> The results for the overall sample are presented in the fourth column of Table 3-1, and similar regressions for the samples of small and medium-sized firms separately are reported in the third columns of Table 3-2 and Table 3-3. The coefficient at the spillovers variable in the overall sample is positive and significant, suggesting that Russian average level of education is high enough to guarantee positive spillovers from foreign-owned firms. The coefficient at the cross-term between education attainment and spillovers is positive and highly significant and all three samples. Hence, an increase in the share of educated people

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<sup>20</sup>We can not control for educational level in the industry, because such data are unavailable.

in the total population of the region increases the ability of firms located in this region to benefit from foreign direct investment.<sup>21</sup>

One can argue that in the faster reforming regions there are better conditions for spillovers from foreign to domestic firms. For example, regional governments' subsidies to domestic firms can be smaller in such regions. Hence, domestic firms in faster reforming regions can have stronger incentives to restructure and compete with foreign owned firms than domestic firms in the non-reforming regions, which, instead of restructuring, can bargain with the local governments for higher protection from foreign entrants and for larger subsidies. We test this conjecture in the following way. We introduce into the regression an interaction term between spillovers and the index of reform progress in the region. Introduction of this term into regression does not change the results of the previous estimation, and the interaction term itself is negative but insignificant in the overall sample, positive but insignificant, in the sample of medium-sized firms, and negative and significant in the sample of small firms. Therefore, there is no difference between the spillovers from foreign firms in faster and slower reforming regions in the case of the medium-sized firms. As far as small firms are concerned, they suffer more from foreign competition in the regions, which reform faster. More reform-oriented regions tend to provide less protection against foreign competition to domestic firms, located on its territory, which can explain our finding.

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<sup>21</sup> The education attainment variable we have does not vary over time during the period of consideration, so it drops out of the fixed effect regression.

## 4. Conclusions

This paper studies the effect of foreign direct investment on Russian firms. It compares productivity between fully domestically and at least partially foreign-owned firm, and it also looks at spillovers from foreign-owned to domestic firms.

The comparative analysis of productivity shows that foreign firms are more productive than Russian ones.<sup>22</sup> This finding confirms the hypothesis that foreign-owned firms have advantage over domestic ones in terms of access to technologies and better management. This technological and managerial advantage seems to be more important than knowledge of the local market, since firms with more than 90% of foreign ownership are more productive than joint ventures with a smaller foreign share. Too small a foreign share ( below 30%) provides little productivity advantage over domestically-owned firms. If the foreign partner does not have sufficient control over the firm, then he lacks incentives to introduce new technologies, and power to force the efficient restructuring of the firm. Therefore, productivity of such firms is lower than that of other joint ventures.

Additionally, we find that productivity of foreign-owned firms depends positively on the size of firms.

Education level of Russian personnel seems to be sufficient for successful installation of new technologies: there is no difference between productivity of foreign owned firms in regions with higher or lower education level.

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<sup>22</sup> However, there is no difference between the rates of productivity growth of domestic and foreign-owned firms. Moreover, productivity growth is often slower at foreign than at domestic firms. Given that the former are considerably more productive than the latter, and that they appear in the dataset only after foreign investments were made, we can conclude that restructuring of foreign-owned firms right after foreign investment took the form of a productivity jump followed by slow growth, while the restructuring of domestic firms is a slow process.

Reform orientation of the region seems to be one of the major factors affecting foreign direct investment. Daniil Manaenkov (2000) has shown that the index of reform progress of the region is one of the most significant determinants of foreign investment in Russia. The higher is the index, the higher is the probability of investment in the region. In this paper we show that the difference in productivity of domestic and foreign firms also depends on the index of reform progress in the region. In more reform-oriented regions, foreign firms are more productive than in other regions. Anecdotal evidence suggests that in the slowly reforming regions regional and local authorities try to heavily regulate foreign-owned firms. Authorities intervene in hiring and firing process of foreign-owned firms, thus slowing down restructuring. In addition, taxes and bribes are higher in less reform-oriented regions, and the threat of expropriation of firms from foreign investors is also quite serious. Such policies can scare off foreign investors, and negatively affect their decision to import new technologies into Russia.

In addition to direct benefits of FDI in terms of faster restructuring of foreign-owned firms, foreign direct investment is often expected to yield indirect benefits, i.e., to have a positive spillover effect on domestic firms. It is easier for domestic firms to copy technologies and managerial practices from the foreign-owned firms located in the same country than from those located abroad. Labor turnover between foreign-owned and domestic firms is one of the main spillover channels. However, competition can drive domestic firms out of the market or force them to decrease output below the cost-minimizing level. Therefore, as a result of competition, productivity of domestic firms may decrease. We find that the effect of foreign entry on productivity of domestic firms depends on the location and size of the firms. Firms located in the same region and small firms, have to decrease their output as a response to increased foreign competition. At the same time, productivity of medium-sized firms goes up with an increase in the foreign share of

production in the same industry. Therefore, we have indirect evidence that foreign entry facilitates technological and managerial techniques leakages and forces domestic firms to restructure faster. The size and quality of human capital in the regions seems to be one of the main determinants of the size of the spillover effect. The level of education of adult population in Russia is quite high, so spillovers are positive in almost all the regions. However, regions with higher educational level benefit from FDI to a greater extent.

The speed of reforms seems to have no effect on spillovers, and benefits of domestic firms from presence of foreign-owned firms are not significantly different between faster and slower reforming regions.

Our results allow important conclusions regarding economic policy to be made. We show that Russian industry benefits from foreign direct investment both directly and indirectly. Direct benefits come from technological and managerial improvements in the firms that have received foreign direct investment, while indirect benefits result from positive spillovers to domestic firms. This result suggests that Russia can benefit a lot if it succeeds in attracting a substantial inflow of FDI. We also show that bad policies can not only prevent foreign firms from investing in Russia, but also negatively affect the quality of investment. In the reform-resistant regions, the productivity of foreign-owned firms is significantly lower than in other regions. Hence, further reforms will result not only in the overall higher volume of foreign investment but also in the inflow of more productive investments. Finally, the role of education and human capital should not be underestimated. The skills level of Russian labor is high enough to attract modern technologies, but the spillover effect depends crucially on the level of human capital in a particular region. Hence, preserving and strengthening the education system will allow Russia to benefit from FDI to an even greater extent.

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## Appendix

**Table 4-1. Sample characteristics.**

	1993	1994	1995	1996	1997
<b>Foreign-owned firms</b>					
Number of firms	1256	1560	1804	1714	1576
average employment,	96	83	83	84	93
average output, mln Rubles	1601	4070	11404	17752	25210
<b>Domestic firms</b>					
number of firms	21785	22990	24878	21375	19823
average employment,	247	229	203	209	202
average output, mln Rubles	1559	4505	9706	13290	14885
average capital, mln Rubles	191	5388	15065	38110	41264
<b>Domestic firms Medium-</b>					
number of firms	9729	10245	10279	8018	9524
average employment,	430	396	372	355	335
average output, mln Rubles	2898	8321	18667	24535	26841
average capital, mln Rubles	348	10040	28281	68422	70216
<b>Domestic firms Small-sized</b>					
number of firms	11781	12270	13057	8758	9046
average employment,	96	91	81	73	73
average output, mln Rubles	452	1350	3223	4915	5728
average capital, mln Rubles	60	1473	4579	12005	10741

\* Medium-sized firms are those with maximum employment across years greater than 200 and less than 1000.

Average figures are taken from the regression sample.