Foreign Direct Investment in Transition Countries: a Dynamic Analysis at Firm Level

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Abstract. In this paper we argue that foreign direct investment in the transition countries has a dynamic nature, by using firm level data for nine transition countries for the period 1996-2002. Moreover, we differentiate the sectors of activity by the degree of technology involved, using the OECD classification based on technology. By doing this, our empirical model proves that there is some heterogeneity at sector level in the behavior of the foreign firms that invest in the transition countries. Foreign firms that invest in low-technology manufacturing activities and are profitable will invest more in the next year. However, profits do not matter for foreign firms that invest in services and in high-technology manufacturing activities .

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1. Introduction

When deciding to invest in a foreign country, investors analyze different factors, that we could call a "mix" of opportunities they will find on the new market. This "mix" includes aspects like the costs of the labor force, the level of bureaucracy and corruption, the credibility of the business environment, the macroeconomic stability of the host country, etc. Also, an important feature of the inflows of foreign direct investment (FDI) is that they are more industry than country-specific (Buigues and Jacquemin, 1994, Resmini, 2000). In this paper, we try to provide empirical evidence on the mix of opportunities that the foreign investors from the **European Union (EU)**[1] find in the **transition countries**[2]. Additionally, we differentiate in our analysis the industries by the degree of technology involved, following the classification from the Organization for Economic Cooperation and Development (OECD, 2001 and 2003) and we check whether foreign companies that invest in the transition countries act differently according to the sector of activity.

TABLE 1
Distribution of foreign companies in the sectors of activity, classified according to OECD

Manufacturing 55%	High-technology	**4.09%**
	Medium-high technology	**20.74%**
	Medium-low technology	**21.76%**
	Low-technology	**53.42%**
Services 45%	High-technology	**19.15%**
	Low-technology	**80.85%**

Source: Amadeus database, own calculations.
A sample of 1726 foreign companies in nine transition countries

Examining our data (Table 1 above), we remark that FDI from EU in the transition

[1] In this paper, by European Union we mean the member states before 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. We chose to work with this sample of countries from EU because data was available until 2002.

[2] Our sample of transition countries is formed by: Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovak Republic, Slovenia. Except of Romania, all these countries are currently members of EU.

countries are investments mostly done in low-technology sectors of activity (both manufacturing and services)[3]. Foreign firms do not invest a lot in high-technology manufacturing sectors in the transition countries because of the lack of marketing and technical innovation in such fields. Industries that imply a higher level of technology require also more stability and more certainty at macroeconomic and microeconomic level in the host country (Resmini, 2000). In the case of manufacturing, 75% of the foreign companies that we included in our analysis are active in low and medium-low technology manufacturing sectors of activity, and only 25% invested in high and medium-high technology sectors of activity. Among the low-technology manufacturing industries, the best represented are manufacturing of textile and textile products and manufacturing of food products, beverages and tobacco. In the case of services, 81% of the foreign companies that invested in services are active in low-technology sectors of activity and only 19% in high-technology services. Among the low-technology services, wholesale and retail trade represent 61% from the total of services. However, there are signs that in high-technology industries that imply a very accelerated rhythm of development, more and more investors are attracted in this region as well[4]. This uneven distribution of FDI in the sectors of activity of the transition countries shows that there exists an industrial specialization in the orientation of FDI in these countries.

Therefore, the interesting questions that the data reveals are: why do multinationals from EU mostly invest in low-technology sectors in the transition countries? What are the factors that drive such a decision? Are there differences in the patterns of behavior of foreign investors, according to the sector of activity they are active in? We will attempt to answer some of these questions and we will check whether foreign companies behave differently according to the sector of activity. We believe that a firm and sector approach is important for the transition countries in particular. The fact that FDI is concentrated in certain industries can affect substantially the process of economic transition and the rhythm of economic development of these countries. FDI is usually viewed as a transfer of new technologies, skills and managerial know-how between countries, but this transfer differs according to the sector of activity and it is more obvious for the high-technology sectors of activity. However, our analysis only opens the road. There are still many aspects

[3] See Table 2 in the paper for the OECD classification of the sectors of activity according to the degree of technology involved.

[4] In Romania, for example, in 2004, most of the investments concentrated in the auto industry, furniture, electrics and computers, immobilaries, that are considered high and medium–high technology sectors of activity, according to OECD classification.

and questions to be clarified.

Previous papers on FDI in the transition countries investigated the question whether FDI is sector-specific. Altomonte (1998) points out that different sectors imply different and peculiar investment strategies by multinationals in the countries in transition. He uses a balanced panel data set and estimates a random-effects probit model by generalized estimating equations approach. He introduces in the estimation four dummies for the sectors classified according to their advertising or R&D intensity: advertising intensive, R&D intensive, both R&D and advertising intensive, neither R&D nor advertising intensive. These dummy variables measure an increasing degree of irreversibility of the investment. However, they were not significant and he concludes that it would be advisable to test his model using different sector classifications.

Resmini (2000) provides empirical evidence for the fact that sector-specific effects can affect the distribution of European firms' foreign investments in manufacturing sector. Her aim is to investigate whether and to what extent FDI in different sectors reacts to the same characteristics of the host countries. She uses a panel data set for European FDI in the manufacturing sectors from ten transition countries. The observations are divided into four homogeneous sectors according to Pavitt (1984) classification: scale-intensive, high-tech, specialized producers and traditional sectors. Her analysis is at sector and country level and the technique that she uses is a three-way fixed effects. She concludes that FDI in scale-intensive and high-tech manufacturing sectors concentrates in those countries further advanced in the transition process, while FDI in the traditional manufacturing sectors locates in the less advanced countries of the region.

In a recent paper, Smarzynska (2004), using an unique firm-level data set from Eastern Europe and the former Soviet Union, finds empirical evidence for the fact that the strength of the patent laws and the overall level of intellectual property rights (IPR) protection affect FDI inflows in several high-technology sectors where IPR plays an important role (drugs, cosmetics, and health care products; chemicals; machinery and equipment; and electrical equipment). However, her approach is different, because she looks at the impact of the intellectual property protection on the composition of FDI in the transition countries.

In our study, we attempt to extend these previous works on FDI at sector level, along other many important dimensions. Firstly, we work with data at firm level and we prove that the different and complex patterns of FDI inflows in the transition countries are determined by both factors that are sector and firm specific (they characterize the microeconomic environment) and factors that are country specific (they characterize the macroeconomic

environment). And secondly, we include in our analysis both manufacturing and services sectors of activity and we use a different sector classification, i.e OECD classification based on technology. Technological effort and technological differences between countries are considered as determinants of productivity growth and international competitiveness, therefore the use of a classification that attaches importance to the technological criteria is needed.

The methodology that we use is a **dynamic panel analysis**, in particular Arellano-Bond GMM estimation technique**.** This will show the dynamic nature of the investment process and of some of the determinants of the FDI in the transition countries. In this respect, our paper is related to the paper by Carstensen and Toubal (2004). They use dynamic panel data methods (Blundell-Bond GMM estimator) to study the determinants of FDI into some of the transition countries. However, they work with data aggregated at country level from Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia. Our approach distinguishes itself from this study by employing a **dynamic analysis at firm level.** We think that a dynamic analysis at company level provides a more realistic image of the mechanism that drives foreign companies to invest into transition countries, as it allows to relate the FDI stock of a company from a year to its FDI stock from the previous year. The volume of FDI stocks requires time to adjust to the desired levels and this will depend on the specific constraints faced by the foreign companies investing in the transition countries.

We believe that the two main contributions of our paper are: capturing the dynamic nature of the investment process at company level by using Arellano-Bond GMM estimation technique and disaggregating at firm and sector level the investments done by foreign companies in the transition countries which would allow a better comprehension of the behavior of the foreign investors. We think that aspects like the type of industry that is mostly preferred by foreign investors in the transition countries have not received enough attention in the literature dedicated to this topic.

The rest of the paper is organized as follows: Section 2 explains the classification of the sectors of activity according to OECD. Section 3 describes the firm level data. Section 4 describes the empirical model and the econometric methodology and it explains in detail the dependent and the explanatory variables. Section 5 presents the empirical estimates. Section 6 concludes and suggests some possible directions for future research.

2. CLASSIFICATION OF SECTORS OF ACTIVITY ACCORDING TO OECD

In this paper, we follow the criteria from OECD (2001, 2003) in classifying the manufacturing sector and the services sector according to the technological intensity. By this classification, OECD facilitates comparisons of the data at international level. Table 2 below contains this classification.

Table 2
Classification of manufacturing industries and services based on technology (OECD)

			ISIC Rev.3	NACE Rev. 1.1
Manufacturing	High technology	Aircraft and spacecraft	353	353
		Pharmaceuticals	2423	244
		Office, accounting and computing machinery	30	30
		Radio, TV and communications equipment	32	32
		Medical, precision and optical instruments	33	33
	Medium-high technology	Electrical machinery and apparatus, n.e.c.	31	31
		Motor vehicles, trailers and semi-trailers	34	34
		Chemicals excluding pharmaceuticals	24 excl. 2423	24 excl. 244
		Railroad equipment and transport equipment, n.e.c.	352 + 359	352, 354, 355
		Machinery and equipment, n.e.c.	29	29
	Medium-low technology	Building and repairing of ships and boats	351	351
		Rubber and plastics products		
		Coke, refined petroleum products and nuclear fuel	25	25
			23	23
		Other non-metallic mineral products	26	26
		Basic metals and fabricated metal products	27-28	27-28
	Low technology	Manufacturing, n.e.c.; Recycling	36-37	36-37
		Wood, pulp, paper, paper products, printing and publishing	20-22	20-22
		Food products, beverages and tobacco	15-16	15-16
		Textiles, textile products, leather and footwear	17-19	17-19
Services	High technology	Post and telecommunications	64	64
		Financial intermediation	65-67	65-67
		Renting and business activities	71-74	71-74
		Education, health and social work	80, 85	80, 85
	Low technology	The rest of services	50-63, 70, 75, 90-99, 40-45	50-63, 70, 75, 90-99, 40-45

Notes: NACE: Classification of Economic Activities in the European Community
ISIC: International Standard Industrial Classification of all Economic Activities

In the case of manufacturing activities, the methodology constructed by OECD uses two indicators of technology intensity reflecting to different degrees "technology-producer" or "technology-user" aspects: 1) R&D expenditures divided by value added; 2) R&D expenditures divided by production (OECD 2001, 2003). In general, R&D expenditures capture the innovative and absorptive capacity of a firm.

The classification of manufacturing sectors into high-technology, medium-high technology, medium-low technology and low-technology groups is made after ranking the industries according to their average over 1991-1999 against aggregate OECD R&D intensities [5]. Industries classified to higher categories have a higher average intensity for both indicators than industries in lower categories.

In the case of services, the OECD methodology uses as criteria the use of incorporated technologies, R&D intensities and the qualification (skillness) of the workers (OECD 2001).

The classification from OECD uses ISIC Rev. 3 classification of economic activities. Our data provider, Amadeus, uses another classification, NACE Rev.1.1, so we had to make the equivalence of the codes. However, this was not a difficult task, as we had information on NACE for four digits, so, we did not lose at all the precision of the classification from OECD.

3. Description of the firm level data

The data proceeds from a commercial database called Amadeus, collected by the consulting agency Bureau van Dijck. We use the version of Amadeus that contains information on the top 250 000 companies from Europe that satisfy basically the following criteria: operating revenue equal to at least 10 million euros, total assets equal to at least 20 million euros and number of employees equal to at least 150. However, for the transition countries, these criteria are more relaxed (see Appendix 1).

We select the foreign companies located in each one of the transition countries from our sample. In Amadeus database, a company is considered foreign if its shareholder(s) located in the region designated (the member states of EU, in our case) is its ultimate owner (that is, the company from the transition country is ultimately owned by a foreign shareholder from EU) or it is owned by one, or several, shareholders that are not ultimate but must own a minimum percentage of ownership (alone or together). We select only those foreign

[5] The aggregate R&D intensities are calculated after converting countries' R&D expenditures, value added and production using GDP PPPs. They are based on data for 12 OECD countries: United States, Canada, Japan, Denmark, Finland, France, Germany, Ireland, Italy, Spain, Sweden, United Kingdom (OECD 2001, 2003).

companies that do not have any recorded shareholder located in the home country. Thus, our sample consists entirely of foreign companies.

Amadeus provides information about the country of the foreign company, the industry (NACE Rev.1.1 with four digits), the percentage of ownership of the foreign company and other firm-specific variables which are explained in the next section.

From this database, we construct an unbalanced panel data set that spans from 1996 to 2002. We had information for companies from the following countries: Czech Republic (248 companies), Estonia (93 companies), Hungary (141 companies), Latvia (56 companies), Lithuania (22 companies), Poland (751 companies), Romania (392 companies), Slovakia (10 companies), Slovenia (13 companies). Thus, our sample contains 1726 foreign companies[6]. Nevertheless, due to missing observations, the sample is reduced to a maximum of 1305 companies in our estimations.

All the data at firm level are in US dollars, and we deflate them by the GDP deflator, corresponding to each year.

4. The empirical specification

Our empirical analysis uses an unbalanced panel data set on companies from EU that invested in the transition countries. In general, panel data (for firms, industries, or countries) are preferable to time series or cross section data, because they capture actually some of the heterogeneity at these different levels and allow to look at dynamic relations (Wooldridge, 2002). The use of panel data to study FDI in the transition countries is quite new and the econometric studies that have been using them are a few, mostly because of the lack of reliable data until recent years.

We estimate the following benchmark specification:

$$\begin{aligned}\ln FDI_{ijt} &= \beta_0 + \beta_1 * \ln FDI_{ijt-1} + \beta_2^s * (\text{dummy}_s * \text{Profits}_{ijt-1}) + \beta_3^s * (\text{dummy}_s * \ln \text{Size}_{ijt}) \\ &\quad + \beta_4 * (\text{Country variables})_{jt} + \lambda_t d_t + c_i + u_{ijt}\end{aligned}$$

where i denotes the firm, s denotes one of the six sectors of activity defined above: low-technology (LT) manufacturing, medium-low technology (MLT) manufacturing, medium-high technology (MHT) manufacturing, high-technology (HT) manufacturing, low-technology (LT) services, high-technology (HT) services; j denotes the country and t denotes the time

[6] See Appendix 2 for more details about the sample selection.

(it can have values in the interval 1996-2002). Following the notation from Wooldridge (2002), we denote by c_i the unobserved or fixed effect, which in this case could be called the firm effect or the firm heterogeneity. In addition, we include year-specific dummies d_t, in order to account for common trends in the volume of FDI stock of the companies.

In this specification we introduce the past value of the dependent variable among the regressors. The significance of this term will demonstrate that the investment process at company level is a dynamic one[7]. We also allow for sub-group specific heterogeneity across the parameters of the micro variables, by including multiplicative dummies for these regressors. These parameters will indicate eventually different behaviors of the foreign investors.

4.1. The dependent variable. We follow Smarzynska and Spatareanu (2004) and Aitken and Harrison (1999) in constructing our dependent variable. These authors proposed the percentage of subscribed capital (equity) owned by the foreign company in the domestic company as a measure of the FDI stock. Likewise, OECD defines FDI stock as the contribution of the multinational enterprise (MNE) to the total assets of their foreign affiliates or as financing provided by the MNE to their affiliates in the form of either equity or debt (OECD, 2003). This definition implies that the international companies own a sufficient part of a foreign company's assets to control their activities and their management. The minimum threshold that assures this control is basically the same across countries. It is fixed generally at 10% of the voting securities of the company. Below this value, such an international participation is considered portfolio investment [8]. Thus, in our specification, the dependent variable is the logarithm of the volume of FDI stock of each company from our sample.

Amadeus provides information on the total assets[9] of a company, in thousands of US dollars. If the company is a subsidiary of another company (foreign or domestic) Amadeus has information on the percentage of ownership that the parent company (ies) owns. By the criterion mentioned in the previous section, we chose only the companies from the

[7] Bond (2002) argues that even when coefficients on the lagged dependent variables are not of direct interest, allowing for dynamics in the underlying process may be crucial for recovering consistent estimates of other parameters.

[8] According to OECD (2003), "a foreign investment is considered as direct investment if the foreign investor holds at least 10% of the ordinary shares or voting power in an enterprise and exerts some influence over its management. Any investment amounting to less than 10% of ordinary shares is posted as portfolio investment".

[9] Total assets include: fixed assets (tangible fixed assets, intangible fixed assets and other fixed assets) and current assets (stocks, debtors and other current assets).

transition countries that are owned by companies from EU. Thus, we can calculate the volume of FDI stock from a year by multiplying the percentage of ownership of the foreign company by the total assets of its subsidiary located in a certain country. Unfortunately, there was no information available on ownership for different years, so we were forced to assume the same percentage of ownership for each of the years from our panel[10]. Next, we deflate this number by the GDP deflator. Therefore, our dependent variable reflects the capital stock abroad of the foreign company.

4.2. The independent variables. The OLI paradigm of Dunning (1977, 1993) integrates all of the main determinants of the international production in general. His theory explains the activities of MNEs in terms of ownership (O), localization (L) and internalization (I) advantages. The ownership advantages state that the company that decides to go abroad must have a product or a production process such that it has an advantage on the foreign market and it enjoys some market power on the foreign market. These advantages could be superior technologies, reputation, trademarks, brand names, or other intangible assets. The localization advantages impose that the company must have a reason why to locate its production abroad and not in the home country, that is, it must evaluate the opportunities of the foreign country and compare them with those of the home country. They refer usually to differences between countries in factor endowments (usually labour costs), proximity between markets, infrastructure, the legal, social and political framework, etc. Finally, the internalization advantages show that the company must have a reason why to exploit its ownership advantage internally and not by licensing it to some other firms.

From a microeconomic point of view, a foreign company will choose its location according to the relative profitability that it would get. It must be profitable for a foreign company to invest in a certain location and not in others. That is why we believe that the profits a foreign company gets are an important determinant of its FDI stock.

Therefore, in our paper we distinguish two types of explanatory variables: firm-specific variables (micro variables) and host country-specific variables (macro variables). In this way, we control for both micro and macro factors that affect how much a foreign company invests in a country. The motivation for the choice of variables follows and more details regarding the definitions, the source and the construction of the variables are provided in Appendices 3 and 4.

[10] We believe that this is not a strong assumption, as usually the percentage of ownership is established when the foreign company takes the decision to invest in a country and there are extremely few cases when this changes over the years. Damijan et al. (2003) make the same assumption.

The firm-specific variables are the number of employees and profits or losses after tax in millions of US dollars, lagged one period. The number of employees will control for the firm size and we expect a positive sign for this variable: the larger the firm, the larger the amount of FDI stock. We believe that profits/losses are an important determinant of the behavior of investors for two reasons: firstly, the decision to locate in a certain country is taken considering also the expected profits (among other determinants), and, secondly, firms usually have the choice of reinvesting their profits or relocating them to other subsidiaries or to their parent company. We expect a positive sign for this variable: the higher the profits that a company gets at the end of the year, the more it will invest next year.

These micro-variables will be disaggregated in a first stage, according to the classification of sectors from OECD that we defined above. By doing this, we want to check whether firms investing in transition countries behave differently according to the type of industry they are active in.

The host country-specific variables are labor costs, inflation rate, GDP per capita, growth rate of GDP, openness to trade, an index of corruption and an indicator that measures the progress in transition of these countries. All these variables refer to characteristics of the host countries.

According to the localization advantages from Dunning's paradigm, multinationals will locate in countries that have a comparative advantage in terms of factor endowments, and in particular in terms of labor costs. Therefore, we introduce lagged labour costs of the host country in US dollars, deflated by the GDP deflator. We include the lagged value of labor costs in order to be consistent with the lagged profits. High labor costs are expected to be a barrier for the foreign investors in the transition countries, therefore a negative sign is expected.

The existing theoretical and empirical literature on FDI shows that host country's market size is an important determinant of FDI, regardless of the sector of activity they are active in (Dunning, 1993; Braunerhjelm and Svensson, 1996; Resmini, 2000). Our model includes GDP per capita, in US dollars, which is a proxy for the purchasing power of local consumers (local demand). We expect a positive sign for this variable: countries with higher purchasing power of their consumers are expected to attract more foreign investors.

Culem (1988) obtained empirical evidence for the fact that foreign investors are attracted to faster growing markets. A higher rate of growth of GDP is expected to attract

more FDI because it is a sign of stability of that economy. Therefore, we expect a positive sign for this variable[11]. Likewise, the ability of a government to control inflation is expected to reduce investment risks and, consequently, to enhance FDI. Inflation is also a measure of economic stability, therefore we expect a negative coefficient.

The relation between FDI and the degree of openness of a country proxies the liberalization of the trade regime in the host country and in part it indicates the propensity to export for multinational firms. Generally, liberalization of trade could be closely related to FDI, because it could make the country more attractive for foreign investors. The measure of real openness proposed by Alcalá and Ciccone (2004)[12] was used. It is defined as exports plus imports in exchange rate US dollars relative to GDP in purchasing power parity (PPP) US dollars. A positive estimated coefficient for this variable is interpreted as evidence that FDI is used to serve other markets and not only the market of the host country (Resmini, 2000; Filippaios et al., 2003; Smarzynska, 2004). A negative estimated coefficient suggests that FDI is destinate to serve mostly the market of the host country (Filippaios et al., 2003).

Further, a measure of the extent of corruption practices in the host country is included. We use the index of Transparency International, which combines information from different surveys of business executives and risk analysts and it ranges from 10 (highly clean) to 0 (highly corrupt). To simplify the interpretation, we rescale this index in the following way: 10 - index from Transparency International, so a high value of the new index corresponds to a high level of corruption (Smarzynska, 2004). Therefore, we expect a negative sign for the estimated coefficient of this variable[13].

Finally, investment decisions in the transition countries are also influenced by the progress of reforms, the stability and the perceived riskiness in this region (Smarzynska, 2004; Carstensen and Toubal, 2004; Merlevede and Schoors, 2005). Consequently, we include one of the transition indicators formulated by the European Bank for Reconstruction and Development (EBRD), that have been used to track reform developments in all 27 transition countries since the beginning of transition: the reform of enterprises, as measured by two indicators for privatization (large scale privatization and small scale privatization) and

[11] We include both GDP per capita and the growth rate of GDP to control for actual and potential market size.

[12] In their paper, they provide a careful justification for this PPP-adjusted trade ratio as a measure of trade openness.

[13] However, the methodology of constructing this index changes at a certain extent each year, that is why there might be some measurement error problems with this variable.

a measure of governance and enterprise restructuring, which indicates progress in cutting production subsidies, introducing effective bankruptcy procedures and applying sound corporate governance practices. Progress is measured against the standards of industrialized market economies. The measurement scale for the indicator ranges from 1 to 4+, where 1 represents little or no change from a rigid centrally planned economy and 4+ represents the standards of an industrialized market economy (EBRD, 2004). Therefore, one would expect a positive coefficient for this indicators.

5. Methodology and Empirical Results

The inclusion of a lagged dependent variable at the right hand side of our benchmark specification causes OLS estimators to be biased and inconsistent. The fixed effects estimator and the random effects estimators will also be biased (Bond, 2002; Baltagi, 2005). Therefore, our estimations need to correct for the bias created by the presence of the lagged dependent variable as a regressor. Arellano and Bond (1991) propose a generalized method of moments (GMM) procedure that is applied to the equation in first differences. Their estimator treats the model as a system of equations, one for each time period. The differences in the endogenous and the predetermined variables are instrumented with suitable lags of their own levels[14]. We compute the more general two-step GMM estimator and we use Windmeijer (2000) finite-sample correction for the asymptotic variance of this estimator (Bond, 2002)[15].

The methodology developed by Arellano and Bond assumes that there is no second order autocorrelation in the first-differenced errors, so we will validate this assumption by performing Arellano and Bond's test of no second-order serial correlation. Additionally, Arellano and Bond (1991) proposed the standard GMM test of overidentifying restrictions to ensure the validity of the instruments. For two-step robust estimation we report the Hansen J statistic, which is the minimized value of the two-step GMM criterion function.

We perform our empirical analysis in stages. In the first stage, we allow for different coefficients across the six groups of industries that we identified above, in order to check how the effects of these variables vary according to the sector of activity. This is the most general specification. In the second stage, we test whether we should really allow for different coefficients. In particular, we test the following hypotheses: coefficient for

[14] For technical details, see Arellano and Bond (1991) and Baltagi (2005).

[15] *xtabond2* command from Stata was used. Roodman, D., 2005, "xtabond2: Stata module to extend xtabond dynamic panel data estimator", Center for Global Development, Washington. http://econpapers.repec.org/software/bocbocode/s435901.htm

LT manufacturing sector=coefficient for MLT technology manufacturing sector; coefficient for HT manufacturing sector=coefficient for MHT manufacturing sector; coefficient for LT services sector=coefficient for HT services sector. This would tell us whether we should aggregate more the sectors of activity and it would allow the identification of different behaviors of the foreign companies investing in different sectors. In the third stage, we reestimate the model by imposing the restrictions tested in the previous stage.

The key estimates in our specifications will be the coefficient of the lagged dependent variable (β_1) and the coefficients of the control variables profits and logarithm of size (β_2^s and β_3^s). They will indicate whether FDI has a dynamic nature at company level and whether FDI is heterogeneous across sectors in the transition countries.

Table 3 below presents the results of the estimation for the first stage of our analysis. The difference between the four specifications consists of adding sequentially different variables for the macroeconomic environment, in order to test the sensitivity of the coefficients. Another reason for performing these robustness checks is that the additional variables bring more explanation to the model. In specification (2) we add the index of corruption, in specification (3) we add both the index of corruption and the logarithm of trade openness and in specification (4) we add the index of corruption, the logarithm of trade openness and the EBRD index of enterprises. The coefficients for the micro variables do not differ much in magnitude and their significance does not change considerably across the three specifications. As for the coefficients of the macro variables, corruption has the expected sign in specifications (2) and (3), but it is statistically significant only in the third specification; the logarithm of trade openness is positive and significant in the third and the fourth specification and the EBRD index is positive and significant in the last specification.

Table 3
Arellano-Bond estimation of the unbalanced panel
Dependent variable: Logarithm of the amount of investment (FDI stock)

	(1)	(2)	(3)	(4)
$Log(investment)_{t-1}$	0.380***	0.373***	0.350***	0.331***
	(8.30)	(8.17)	(7.27)	(7.14)
Profits LT sector $manufacturing_{t-1}$	0.001	0.001	0.001	0.001
	(0.94)	(0.97)	(0.90)	(1.00)
Profits MLT sector $manufacturing_{t-1}$	0.002***	0.002***	0.002***	0.002***
	(2.86)	(2.96)	(3.05)	(3.05)
Profits MHT sector $manufacturing_{t-1}$	-0.002	-0.002	-0.002	-0.002
	(1.27)	(1.33)	(1.52)	(1.49)
Profits HT sector $manufacturing_{t-1}$	0.001	0.001	0.001	0.002
	(0.36)	(0.43)	(0.54)	(0.63)
Profits LT sector $services_{t-1}$	0.001	0.001	0.001	0.001
	(0.70)	(0.67)	(0.74)	(0.85)
Profits HT sector $services_{t-1}$	-0.0001	-0.0001	-0.0001	-0.0001
	(0.62)	(0.64)	(0.81)	(0.78)
Log(Size LT sector $manufacturing)_t$	0.144***	0.136***	0.141***	0.141***
	(2.59)	(2.68)	(2.79)	(2.92)
Log(Size MLT sector $manufacturing)_t$	0.075*	0.074*	0.078*	0.079*
	(1.75)	(1.71)	(1.75)	(1.71)
Log(Size MHT sector $manufacturing)_t$	0.190*	0.192*	0.206*	0.223**
	(1.59)	(1.68)	(1.82)	(1.98)
Log(Size HT sector $manufacturing)_t$	0.087	0.095	0.116	0.112
	(0.66)	(0.74)	(0.88)	(0.88)
Log(Size LT sector $services)_t$	0.145***	0.145***	0.153***	0.153***
	(3.40)	(3.48)	(3.65)	(3.70)
Log(Size HT sector $services)_t$	-0.006	-0.009	-0.004	0.012
	(0.09)	(0.13)	(0.06)	(0.16)
$Log(Labor\ costs)_{t-1}$	-0.662***	-0.742**	-0.486**	0.054
	(3.90)	(4.00)	(2.83)	(0.28)
$Inflation_t$	0.0002	0.0004	-0.0002	-0.001*
	(0.55)	(0.70)	(0.32)	(1.94)
Log(GDP per $capita)_t$	-0.208	-0.193	0.190	1.400***
	(0.71)	(0.64)	(0.64)	(3.59)
Growth rate of GDP_t	0.021**	0.024**	0.012**	-0.006
	(5.45)	(5.65)	(2.86)	(1.24)
$Corruption_t$		-0.028	-0.060*	0.029
		(0.87)	(1.75)	(0.87)
Log(Trade $openness)_t$			0.835**	1.188***
			(3.84)	(5.22)
EBRD index of enterprises				1.243**
				(6.13)
Observations	3876	3863	3863	3863
Number of companies	1305	1304	1304	1304
P-value for Hansen test of overidentifying restrictions	0.034	0.062	0.105	0.25
P-value for Arellano-Bond test for second-order autocorrelation	0.991	0.987	0.901	0.772

Note: Robust t statistics are reported in parentheses. All regressions include a constant and time dummies (not reported in the table). Arellano-Bond test for second-order autocorrelation tests the first-differenced residuals. Hansen test is a test of the overidentifying restrictions for the GMM estimators, asymptotically χ^2.
*significant at 10% level; **significant at 5% level; ***significant at 1% level.

Next, we proceed to the second stage of our analysis and test the coefficient restrictions. Table 4 contains the results of the χ^2 test for each of the four specifications.

Table 4
χ^2 for coefficient restrictions

	Restrictions	(1)	(2)	(3)	(4)
Coefficients of Profits$_{t-1}$	$\hat{\beta}_2^{\text{LTmanufacturing}} = \hat{\beta}_2^{\text{MLTmanufacturing}}$	0.39 (0.5307)	0.42 (0.5164)	0.50 (0.4793)	0.45 (0.5001)
	$\hat{\beta}_2^{\text{MHT manufacturing}} = \hat{\beta}_2^{\text{HTmanufacturing}}$	0.66 (0.4173)	0.84 (0.3607)	1.18 (0.2764)	1.30 (0.2533)
	$\hat{\beta}_2^{\text{LT services}} = \hat{\beta}_2^{\text{HTservices}}$	0.58 (0.4448)	0.55 (0.4586)	0.70 (0.4044)	0.89 (0.3453)
Coefficients of Ln(size)$_t$	$\hat{\beta}_3^{\text{LTmanufacturing}} = \hat{\beta}_3^{\text{MLTmanufacturing}}$	0.90 (0.3419)	1.00 (0.3183)	1.02 (0.3117)	0.97 (0.3253)
	$\hat{\beta}_3^{\text{MHT manufacturing}} = \hat{\beta}_3^{\text{HTmanufacturing}}$	0.36 (0.5485)	0.34 (0.5578)	0.29 (0.5871)	0.46 (0.4970)
	$\hat{\beta}_3^{\text{LT services}} = \hat{\beta}_3^{\text{HTservices}}$	3.53 (0.0603)	4.01 (0.0452)	4.06 (0.0440)	2.84 (0.0917)

Note: p-values in parentheses

The results of the test are robust across all the specifications. Except the last row of the table, all the values of the χ^2 test illustrate that we have to aggregate more the sectors of activity (we cannot reject the null hypothesis of the equality of coefficients). In the third stage of our analysis, we re-estimate the model imposing the restrictions. To save space, we did not include in the paper the results of this estimation[16].

After this second estimation, we test again the equality of the coefficients across the different sectors of activity, in order to check whether we should aggregate even more the sectors of activity. Then, we re-estimate the model imposing the new restrictions. The results of the final estimation are in Table 5.

Tables 3 and 5 contain the Arellano-Bond test for second order autocorrelation. As already mentioned in this paper, the consistency of the Arellano-Bond GMM estimator

[16] These results are available upon request.

Table 5
Arellano-Bond estimation of the unbalanced panel –restricted regressions
Dependent variable: Logarithm of the amount of investment (FDI stock)

	(1)	(2)	(3)	(4)
$Log(investment)_{t-1}$	0.382***	0.375***	0.353***	0.333***
	(8.50)	(8.34)	(7.43)	(7.29)
Profits LT and MLT $manufacturing_{t-1}$	0.001***	0.001***	0.001***	0.001***
	(2.41)	(2.49)	(2.45)	(2.50)
Profits MHT and HT $manufacturing_{t-1}$	-0.002	-0.002	-0.002	-0.002
	(1.21)	(1.28)	(1.44)	(1.34)
Profits LT and HT $services_{t-1}$	-0.00002	-0.00002	-0.00004	-0.00004
	(0.39)	(0.41)	(0.54)	(0.49)
$Log(size\ manufacturing)_t$	0.128***	0.131***	0.137***	0.140***
	(3.03)	(3.14)	(3.29)	(3.48)
$Log(size\ LT\ services)_t$	0.143***	0.144***	0.152***	0.152***
	(3.39)	(3.46)	(3.64)	(3.72)
$Log(size\ HT\ services)_t$	-0.006	-0.009	-0.004	0.013
	(0.09)	(0.13)	(0.06)	(0.16)
$Log(Labour\ costs)_{t-1}$	-0.667***	-0.747***	-0.491***	0.051
	(3.91)	(4.01)	(2.86)	(0.26)
$Inflation_t$	0.0001	0.0001	-0.0001	-0.001*
	(0.57)	(0.71)	(0.31)	(1.94)
$Log(GDP\ per\ capita)_t$	-0.218	-0.203	0.178	1.386***
	(0.74)	(0.68)	(0.60)	(3.56)
Growth rate of GDP_t	0.021***	0.024***	0.012***	-0.006
	(5.45)	(5.66)	(2.93)	(1.17)
$Corruption_t$		-0.028	-0.060*	0.030
		(0.87)	(1.74)	(0.87)
$Log(Trade\ openness)_t$			0.833***	1.190***
			(3.81)	(5.20)
EBRD index of $enterprises_t$				1.244***
				(6.12)
Observations	3876	3863	3863	3863
Number of companies	1305	1304	1304	1304
P-value for Hansen test of overidentifying restrictions	0.036	0.066	0.11	0.252
P-value for Arellano-Bond test for second order autocorrelation	0.937	0.933	0.963	0.702

Note: Robust t statistics are reported in parentheses. All regressions include a constant and time dummies (not reported in the table). Arellano-Bond test for second-order autocorrelation tests the first-differenced residuals. Hansen test is a test of the overidentifying restrictions for the GMM estimators, asymptotically χ^2.
*significant at 10% level; **significant at 5% level; ***significant at 1% level.

relies on the absence of no second-order serial correlation in the differenced errors. In all the specifications, we cannot reject the null hypothesis of no second order autocorrelation. Therefore, we can conclude that there is no strong evidence against consistency. To assess the validity of the overidentifying restrictions, Hansen test is computed in all the four specifications. Except the first specification, the overidentifying restrictions cannot be rejected at the 5% level in the other three specifications.

For the estimates from Table 5 we test again the null hypothesis of equality of coefficients across sectors and we reject them in all the cases[17]. Thus, although it is not possible to identify the behavior of the foreign companies in each sector, our results illustrate that some differences arise at sector level. The specifications from Table 5 show that in the case of profits the final aggregations at the sector level are the followings: firms active in LT and MLT manufacturing, firms active in MHT and HT manufacturing and firms active in LT and HT services. In the case of the size of the companies, the results show that there is no need to differentiate the manufacturing sector by the degree of technology, but we should consider separately the foreign firms that are active in the LT service sector and in HT service sector, respectively.

The key estimates in our paper are the coefficients of the lagged term of FDI stock and the coefficients of the variables that describe the microeconomic environment. Next, we will interpret the estimates corresponding to Table 5. However, this should be done with caution. First differencing our benchmark specification has interesting empirical properties, because we end up with a model in which the dependent variable will be in growth rates (because the variable is set in logarithms)[18]. Hence, changes in the explanatory variables will affect the growth rate of the volume of FDI stock.

In all the specifications the lagged term of the dependent variable is highly significant and its estimated coefficient is stable, regardless of the control variables. This confirms that FDI at firm level has a dynamic nature. An increase of one percent in the growth rate of FDI stock in a year generates an increase in the growth rate of FDI stock in the next year by approximately 0,35 percent. The estimated coefficient evidences a strong, but not overwhelming effect of the past value of the dependent variable on its current value. These estimates are in line with the estimates from Carstensen and Toubal (2004). They found coefficients close to 0.33, but for data aggregated at country level.

[17] Results of χ^2 test for the coefficient restrictions are not included in order to save space. They are available upon request.

[18] Explanatory variables that are in logarithm will also be growth rates.

The estimated coefficient of the profits of the foreign companies active in LT and MLT manufacturing activities is positive and statistically significant. This indicates that the higher the profits of the foreign companies in a year, the larger the amount of FDI stock in the next year. An increase of 1 million US dollars in the profits in a year will be equivalent to an increase in the growth rate of the stock of FDI in the next year by 0.1%[19]. The coefficients of profits for the firms investing in MHT and HT manufacturing and for the firms investing in services are negative, but they are not statistically different from zero. The negative coefficient might imply that even if these companies get smaller profits or losses in the previous year, they will still invest next year. A possible explanation for this behavior is that the time horizon of the expected future profits of investments in high-technology sectors is longer, so maybe foreign companies that invest in these sectors of activity expect losses in the short run. Sectors that use high-technologies are also more capital intensive than the low-technology ones and they have higher fixed capital costs (for example they need more sophisticated machines, more knowledge and more know-how transferred to the host country, etc.). Consequently, this indicates that they will recuperate their initial investment in the long-run and the fact that they get losses or less profits than expected will not deter them from continuing to invest.

The size of the companies is statistically significant and has a positive sign in the case of the foreign firms active in manufacturing and in LT services. This shows that larger firms active in these sectors of activity invest more. However, size is not significant in the case of the foreign companies from HT services.

Regarding the macro variables, in general the signs of their estimated coefficients are as expected. The lagged value of the logarithm of labour costs has the expected negative coefficient and it is statistically significant in the first three specifications. Its impact on the volume of FDI stock is substantial: a decrease of 1% in the growth rate of labour costs in a year will generate an increase in the growth rate of the volume of FDI stock by approximately 0,7%. This can be viewed as empirical evidence for the well-known fact that firms invest in transition countries in order to secure better access to certain inputs and especially to cheap labour and it is in line with previous studies on FDI in the transition countries (Resmini, 2000; Carstensen and Toubal, 2003).

The growth rate of GDP is significant in the first three specifications, and it has the expected positive sign. Surprisingly, the GDP per capita and the inflation rate do not have

[19]Note that profits are measured in millions of US dollars and we deal with a semilog model with respect to the variable profits, therefore the effect of this variable is calculated as 0.001*100.

a significant impact on the volume of FDI stock of the companies. They have a significant impact only in the last specification (GDP per capita has a positive impact and inflation has a negative impact). The corruption index is negative and significant only in the third specification. The growth rate of trade openness affects positively the growth rate of the volume of FDI stock in specifications (3) and (4), implying that FDI is used to serve other markets as well, not only the local market.

To summarize, the following main points result from our empirical analysis:

a) FDI at company level has a dynamic nature[20]. The larger the amount of FDI stock of the foreign firms in the transition countries in a year, the larger this amount will be in the next year. In other words, foreign firms that already have tradition and experience in the transition countries will continue to invest there.

b) Foreign firms that invest in the transition countries have different patterns of behavior, according to the sector of activity they are active in. From our empirical analysis, we can distinguish some differences between firms investing in low-technology manufacturing sectors (LT and MLT manufacturing) and firms investing in services and high-technology manufacturing sectors (MHT and HT manufacturing). Foreign companies that invest in LT and MLT manufacturing sectors and are profitable will invest more in the next year. However, for foreign companies that invest in MHT and HT manufacturing sectors and in LT and HT service profits do not matter.

c) Foreign firms that invest in the transition countries and benefit from low labour costs will invest more. The less they will spend with their employees in a year (the lower the labour costs in a year), the more they will invest in the next year.

d) Foreign firms that invest in the transition countries are sensitive to the macroeconomic environment of these countries. They will decide whether to continue investing or not by checking the main macroeconomic indicators of the host countries: the growth rate of GDP, the index of corruption as a measure of the quality of institutions from a country, the degree of openness to trade and the progress of economic reforms in these countries. This is in line with previous empirical studies on FDI in the transition countries at country level (Lansbury et al., 1996; Carstensen and Toubal, 2004; Clausing and Dorobantu, 2005; Merlevede and Schoors, 2005).

[20] Carstensen and Toubal (2004) proved empirically that FDI has a dynamic nature at country level.

6. Conclusions

In a dynamic panel model, we find empirical evidence for the effect of some of the micro and macro determinants of FDI at firm level. We also distinguish between different sectors of activity by using the OECD classification based on technology and we detect some heterogeneity at sector level. Unlike previous papers that used data aggregated at country or sector level, we use data at firm level, from nine transition countries.

Our analysis proves the dynamic nature of the FDI stock at firm level. Traditional control variables that characterize the macroeconomic and institutional environment of the transition countries have plausible and significant effects on FDI: the amount of FDI stock is higher in countries that have higher growth rates of GDP, are more open to trade, enjoy a better control of the degree of corruption and have achieved a substantial progress in the transition process.

We also find empirical evidence that variables at firm level affect the amount of FDI stock: profits or losses after tax lagged one period and the size of the firms, as measured by the number of employees. These variables affect the amount of FDI stock in different manners, according to the sector of activity the company is active in: for the case of firms active in low-technology manufacturing industries, profits influence positively the amount of FDI stock. Also, larger firms active in manufacturing and in low technology services will have larger amounts of FDI stock.

We believe that our study sheds some light on several interesting issues in the literature of FDI in the transition countries, like for example accounting for heterogeneity at firm level and distinguishing between sectors of activity according to their degree of technology. One interesting extension of our paper would be to check whether these results still hold when using a different classification of the sectors of activity, for instance, a classification more focused on economies of scale or on labor skills. Also, some of the variables at country level could be sensitive according to the sector of activity: for example, cheap labour costs might be an industry specific phenomenon (low factor costs are likely to be extremely important in textile and clothing industry).

The results of this paper suggest that more research is needed in order to better understand the determinants of the FDI stock at firm and sector level. A deeper analysis would allow also to understand the inability of transition countries to attract more high-technology investments and to suggest some stronger policy implications for the governments of the transition countries. This is important, because more FDI in high-technology

sectors would mean more transfers of new high technologies, management skills and marketing know-how. More specifically, it would be useful to study the characteristics of actual technologies transferred by multinationals to their subsidiaries in the transition countries and to check the relative conditions and the specialization of each country in a certain industry.

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A. APPENDIX 1

Amadeus : details about collection of company accounts

Country	Which companies have to file accounts?	How many companies does that represent?	Do companies generally comply with the legal obligation ?	Data provider for AMADEUS
Czech Republic	Limited liability companies and cooperatives if they meet at least one of the following two legal conditions in the previous year: a. Equity (total assets) more than 20 mil. CZK b.Turnover (operating revenue and sales) more than 40 mil. CZK	Joint stock companies, Governmental Companies, Limited liability companies and Cooperatives (about 200,000).	There is no control	Albertina Data
Estonia	Public & private limited companies, co-operatives	Ca 25,000 – 30,000	Yes	Krediidiinfo
Hungary	All companies have to file accounts, except private enterprises. The companies have to send the accounts to the Ministry of Justice and to the Registry Court. The one-person firms and the limited deposit companies do not have to send it to the Ministry of Justice.	About 40%	Creditreform updates the information frequently from various sources.	Creditreform Hungary
Latvia	All companies, except sole proprietor enterprises and peasant farms, whose annual turnover does not exceed LVL 45,000 (EUR 82,000)	27,000 enterprises according to the estimation of the Register of Enterprises	80-90% of active companies	Creditreform Latvia
Lithuania	All the types of companies.	All companies are obliged to do so.	Opened type companies are just obliged to publish balances closed type comp. - by agreement	Patikimo Verslo Sistema
Poland	All companies that are subjected to commercial law + private firms and non-commercial partnerships complying with the following criteria : -average annual employment > 50 -total assets at the end of a financial year > 1 mil. EURO -annual net profit > 3 mil. EURO	In total about 7,000 companies	Generally, the companies take as much time as they can or they don't file the accounts at all as the legal costs of that are very low	InfoCredit

Romania	Joint stock companies, partnerships limited by shares and limited liability companies.	600,000	Yes	Chamber of Commerce and Industry of Romania
Slovak Republic	Full statements have to be filled by joint stock companies, Governmental companies (GO), Limited liability companies and Cooperatives if they meet two of the following three conditions in the previous year : A. Equity (total assets) > 20 mil. SKK B. Turnover (operating revenue and sales) > 40 mil. SKK C. Average number of employees > 20	About 70,000	There is no control	Albertina Data
Slovenia	All 30,000	-	Yes	Intercredit Ljubljana

Source: Amadeus database

B. APPENDIX 2

Construction of the database

Amadeus concentrates on private companies and it does not cover financial institutions and insurance companies[21]. The data is collected by the Information Providers (IPs) of Amadeus at each national official public body in charge of collecting the annual accounts in its country. In some East-European countries where the data is difficult to get from a central source, IPs might collect it directly from the companies.

We constructed our sample by performing the following quality checks. For each country, we excluded those companies for which there was no information available on the percentage of ownership of the shareholders. Companies that invested in the primary sector were also excluded, because they represent a very small part of the investments done in these countries and they would need a special treatment as well. There were very few observations for companies from Hungary for which there was no data available for the type of industry they were active in, so we dropped them from the sample.

[21] These are covered by another product database of Amadeus, that is called BankScope.

For the companies that had more shareholders, we considered the one with the highest participation of shares.

In case the information on ownership was on the form: wholly-owned or majority-owned, we assumed 100% percentage of ownership for wholly-owned and 50% percentage of ownership for majority-owned (following the definitions from Amadeus database: wholly-owned>=98%, majority-owned>=50,01%).

For Bulgaria, there was no information available for the GDP deflator. Therefore, we could not include the foreign companies from Bulgaria in our sample.

The final sample of countries is: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

C. APPENDIX 3

Data sources and construction of the variables

Variable	*Description and source*
FDI stock	Percentage of ownership * Total assets. It is measured in thousands of US dollars and deflated by the GDP deflator. *Source: Amadeus database, own calculations.*
Profits (losses) after tax	Profit (loss) after taxation (Operating profit/loss+Financial profit/loss-Taxation). They are measured in millions of US dollars, and deflated by the GDP deflator. *Source: Amadeus database*
Size of the company	Number of employees. *Source: Amadeus database*
Labor costs	Average monthly labor costs, defined as total labor costs per month divided by the corresponding number of employees, expressed as full-time units. Original data was in euro, and we transformed it in US dollars, using the exchange rate from the Board of Governors of the Federal Reserve System *Source: Eurostat webpage*
Inflation rate	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. *Source: World Development Indicators (International Monetary Fund, International Financial Statistics and data files).*
GDP per capita (constant 1995 US$)	GDP per capita is gross domestic product divided by midyear population. Data are in constant U.S. dollars. *Source: World Development Indicators (World Bank national accounts data, and OECD National Accounts data files).*
GDP growth (annual %)	Annual percentage growth rate of GDP at market prices based on constant local currency. *Source: World Development Indicators (World Bank national accounts data, and OECD National Accounts data files).*
Corruption index	Corruption Perceptions Index relates to the perceptions of the degree of corruption as seen by business people and risk analysts, and ranges between 10 (highly clean) and 0 (highly corrupt). *Source: Transparency International*
Exports of goods and services (constant 1995 US$)	The value of all goods and other market services provided to the rest of the world. Data are in constant 1995 U.S. dollars. *Source: World Development Indicators (World Bank national accounts data, and OECD National Accounts data files).*
Imports of goods and services (constant 1995 US$)	The value of all goods and other market services received from the rest of the world. Data are in constant 1995 U.S. dollars. *Source: World Development Indicators (World Bank national accounts data, and OECD National Accounts data files).*
GDP, PPP (constant 1995 international $)	PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. Data are in constant 1995 international dollars. *Source: World Development Indicators (World Bank, International Comparison Programme database).*
Trade openness	The ratio of trade, calculated as the sum of exports and imports, to GDP in PPP.
EBRD index of enterprises	The reform of enterprises includes two indicators for privatization and a measure of governance and enterprise restructuring, which indicates progress in cutting production subsidies, introducing effective bankruptcy procedures and applying sound corporate governance practices. The measurement scale for the indicators ranges from 1 to 4+, where 1 represents little or no change from a rigid centrally planned economy and 4+ represents the standards of an industrialized market economy. *Source: EBRD Transition Report, 2004*
GDP Deflator	GDP Deflators are not direct measurement of prices but are derived implicitly: the GDP series at current prices is divided by constant price GDP series referenced to 1995. The latter series is constructed by multiplying the 1995 current price GDP level by the GDP volume index (1995=100). The deflator is expressed in index form with 1995=100 *Source: International Financial Statistics, International Monetary Fund, December 2003*

D. APPENDIX 4

Descriptive statistics of the variables

Series	No.of obs.	No. of companies	Mean	Standard deviation	Min.	Max.
FDI stock	8379	1721	67614.27	270305.3	2.78	1.08e+07
Profits/losses (all sectors)	**8267**	**1710**	**1603.686**	**45000.89**	**-1297668**	**1783171**
Profits LT sector manufacturing	8267	1710	204.119	10139.3	-446382	154245.4
Profits MLT sector manufacturing	8267	1710	-182.313	18466.42	-1297668	144171.9
Profits MHT sector manufacturing	8267	1710	687.458	14044.84	-122552.1	682168.6
Profits HT sector manufacturing	8267	1710	138.389	3985.814	-25314.64	277160.3
Profits LT sector services	8267	1710	159.827	12512.45	-509054.3	453972.3
Profits HT sector services	8267	1710	596.204	34830.81	-806767.4	1783171
Size (all sectors)	**7360**	**1585**	**483.359**	**1591.582**	**1**	**53588**
Size LT sector manufacturing	7360	1585	125.898	310.839	0	4824
Size MLT sector manufacturing	7360	1585	80.973	492.245	0	15862
Size MHT sector manufacturing	7360	1585	98.706	679.988	0	15000
Size HT sector manufacturing	7360	1585	11.543	158.313	0	5561
Size LT sector services	7360	1585	107.841	504.128	0	11810
Size HT sector services	7360	1585	58.395	1280.215	0	53588
Labour costs	12026	1726	502.126	198.543	175.41	1376.444
Inflation rate	12082	1726	20.160	28.556	0.296	154.763
GDP per capita	12082	1726	3468.333	1467.768	1451.255	12513.39
Growth rate of GDP	12082	1726	2.954	3.197	-6.102	9.789
Corruption index	11280	1726	5.720	0.876	4	7.4 |
Trade openness	12082	1726	0.396	0.214	0.172	1.046
EBRD index of enterprises	12082	1726	3.452	0.392	2.556	3.886

Note: The sample period is 1996-2002.