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ABSTRACT

Composition of Foreign Direct Investment and Protection of Intellectual Property Rights in Transition Economies*

Using a unique firm-level dataset this study shows that, contrary to the hopes of transition economies, foreign investors in the region are characterized by low, rather than high, R&D intensity. The results also indicate that investors with higher R&D spending are more likely to engage in non-manufacturing projects than in local production. The empirical analysis links these findings to weak protection of intellectual property rights (IPRs). It shows that weak protection deters foreign investment. This negative effect is especially strong in those technology-intensive sectors that, according to surveys, rely heavily on IPRs. Weak IPR protection also encourages investors to undertake non-manufacturing projects rather than local production. The study contributes to the literature on transition, in which the issue of IPR protection has been neglected. It also adds to the literature on IPRs by providing empirical evidence on the effect of IPR protection on the composition of Foreign Direct Investment (FDI) inflows.

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Keywords: foreign direct investment, intellectual property rights, transition economies

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NON-TECHNICAL SUMMARY

Governments all over the world compete to attract foreign direct investment (FDI), especially inflows into technology-intensive sectors, which they perceive as the most beneficial to their economies. This is also true of policy makers in Central and Eastern Europe and the former Soviet Union who hope that FDI will contribute to upgrading production technologies in their countries. Leaving aside the question of whether this type of FDI is indeed the most desirable, this study shows that transition economies are not receiving large investment inflows in high technology industries.

Using a unique firm-level dataset, this paper examines the nature of FDI in the region in more detail than was possible in earlier research. The dataset used in this study is based on a worldwide survey of companies conducted by the European Bank for Reconstruction and Development (EBRD) in 1995. It covers 25 transition economies and contains information on western firms and their investment projects as well as host countries.

Contrary to the results of studies focusing on other parts of the world, the empirical analysis indicates that firms characterized by low expenditure on R&D (relative to sales) are more likely to invest in transition economies than firms with large R&D spending. It also shows that investors with higher R&D outlays tend to limit the scope of their projects: they are less willing to undertake local production and prefer to engage in distributional projects or open representative offices. Moreover, firms with low R&D intensity are more likely to view their involvement in the region as important to their company strategy. Thus, the hopes of transition economies for FDI inflows into technology-intensive sectors are not reflected in the reality.

The examination of country characteristics indicates that a large market size, as measured by population, per capita income and GDP growth rate, increases the attractiveness of a host country to foreign investors. Low trade barriers, captured by a membership or applicant status in WTO, also have a positive impact on FDI inflows. On the other hand, slow progress in reform, more complicated entry procedures, underdeveloped infrastructure, and regional tensions all act as deterrents to foreign investment.

An index capturing the strength of intellectual property protection in the region is constructed and included in the empirical analysis. The results show that weak protection of intellectual property rights (IPRs) discourages foreign investors. The deterring effect of an inadequate IPR regime is particularly strong in four technology-intensive sectors: drugs, cosmetics and health care products; chemicals; machinery and equipment; and electrical equipment. As survey evidence shows, firms in these sectors tend to view intellectual

property rights as more important than their counterparts in other industries. The difference in the estimated coefficient of IPR protection for these four sectors and for the other industries is statistically significant at the 1% level.

Additionally, the empirical analysis indicates that weak protection of intellectual property encourages investors to engage in non-manufacturing projects rather than in local production. This finding can be related to the greater scope for technology theft in the case of manufacturing FDI. The results also show that foreign investment in manufacturing facilities is encouraged by a larger market size.

This study contributes to the literature on intellectual property rights by presenting empirical evidence indicating that the composition of FDI inflows is sensitive to the strength of intellectual property protection in a host country. It adds to the transition literature by demonstrating empirically the positive impact of reform progress on the probability of a country being chosen as an FDI destination. It also draws attention to the issue of IPR protection in the region, which has been neglected in the earlier literature on transition.

Since transition economies had been almost completely closed to foreign investment until the end of the last decade, they present a rare opportunity for studying factors affecting FDI in a virtual absence of investment history. Recent empirical literature has demonstrated that investment history has a significant effect on a foreign investor's choice of a host country. Therefore, the results of this study suggest that the importance of IPR protection in developing countries may have been understated in the earlier literature, where the lack of controls for past policy variables and investment history may have obscured the impact of IPR protection on FDI.

The findings presented in this paper have policy implications for economies trying to attract foreign investors and target specific kinds of FDI. They indicate that countries which continue their reform process; strengthen IPR protection; simplify registration procedures; lower trade barriers; and improve their infrastructure may hope for larger FDI inflows. They also suggest that improving IPR protection may promote foreign investment inflows into technology-intensive sectors and manufacturing activities.

I. INTRODUCTION

After the collapse of communism, the countries of Central and Eastern Europe (CEECs) and the successor states of the Soviet Union (FSU) began their transformation to a market economy in the hope of achieving economic growth and higher living standards. Upgrading production technologies is one of the crucial challenges facing the reforming countries.[1] Policy-makers in the region perceive foreign direct investment (FDI) as a means of obtaining capital and new technologies (see EBRD, 1994; World Bank, 1992 and 1996; Dunning and Rojec, 1993). Leaving aside the issue of what type of FDI is the most beneficial for a host country and whether there exist technology spillovers from FDI,[2] this study provides evidence that the expectations of transition economies are not reflected in the reality. We find that the limited progress in reform and the lack of adequate protection of intellectual property rights (IPRs) deter FDI inflows into the region. A weak IPR regime and relatively low domestic demand discourage the kinds of FDI considered by the governments as the most desirable, namely inflows in manufacturing and technology-intensive sectors.

Thanks to a unique firm-level dataset, we are able to examine the nature of FDI in the region in greater depth than earlier research, which concentrated mostly on aggregate inflows and case studies. The dataset, compiled from a worldwide survey of companies conducted by the European Bank for Reconstruction and Development (EBRD) in 1995, covers twenty-five transition economies. It contains information on both firm and host country characteristics as well as on types of investment projects.

Contrary to studies of FDI in other parts of the world, we find that firms with low, rather than high, R&D outlays relative to sales are more likely to invest in transition economies. We observe that investors with characteristics typical of multinational corporations (MNCs), such as high R&D and advertising intensity, are more willing to engage in distribution or open a representative office than to undertake local production. An increase

[1] The technological lag between transition economies and developed countries is quite substantial. For example, in 1985 engineering exports from CEECs earned less than thirty percent of the average unit value received by all exporters of similar products, and technology of the exported goods was often twenty years behind (World Bank, 1996, p. 3).

[2] While Blomstrom and Wolff (1994) find evidence of technology spillovers from FDI in Mexico, Haddad and Harrison (1993) do not observe such effects in Morocco. Using data from Uruguay, Kokko, Tansini and Zejan (1996) show that spillovers take place in plants with moderate gaps vis-à-vis foreign firms, but not when the gap is large.

of one standard deviation in the firm's R&D outlays relative to sales decreases the probability of a manufacturing investment by sixteen percent and increases the probability of a distributional project or a representative office by six and ten percent, respectively.

We extend Rodrik's (1991) model of investment and use it in the investigation of factors affecting FDI inflows. The model predicts that a firm's decision to undertake FDI is positively correlated with the host country's market size, progress in reform and trade barriers, and negatively related to entry costs, regional tensions and lack of IPR protection. The econometric analysis confirms most of the model's predictions. We show that progress in reform is an important factor attracting foreign investors. We find that a larger market size (as captured by the population size, GDP per capita and GDP growth rates) encourages foreign investment. An increase in GDP per capita of one standard deviation is associated with a fifteen percent increase in the probability of FDI. As anticipated, higher entry costs and regional tensions deter foreign investors. Contrary to the conclusions of the model, however, low trade barriers, proxied by a member and applicant status at the WTO, attract FDI.

We construct an index of IPR protection for transition economies and find that the lack of an adequate IPR regime discourages foreign investment. Weak IPR protection has the largest deterring effect on FDI in four technology-intensive sectors: drugs, cosmetics and health care products; chemicals; machinery and equipment; and electrical equipment. These are the sectors in which, according to survey studies, IPRs play a particularly prominent role (see Mansfield, 1995 and Baldwin, 1996). The difference in the size of deterring effects for these four sectors and the other industries is significant at the one percent level.

Additionally, the results indicate that weak IPR protection encourages investors to engage in non-manufacturing projects rather than in local production. This finding can be related to the greater scope for technology theft in the case of manufacturing FDI. It is consistent with the conclusions of Mansfield's (1994) survey, which showed that U.S. firms are much more concerned about IPR protection in a host country when they consider manufacturing FDI than when they plan investments in sales and distribution outlets. We also observe that a larger market size increases the probability of foreign investment in manufacturing facilities, while the effects of transition progress and unit labor costs are not statistically significant.

We contribute to the literature on intellectual property rights by presenting empirical evidence on the impact of IPR protection on the composition of foreign direct investment. While studies of aggregate FDI flows have produced mostly inconclusive results, our firm-level analysis shows that foreign direct investment is sensitive to the strength of IPR protection. Furthermore, we add to the transition literature by demonstrating empirically the positive impact of the transformation progress on the probability of a country being chosen as an FDI destination. We also address the issue of IPR protection in the region, which has been neglected in the earlier literature on transition.[3]

In addition to an intrinsic interest in transition, a focus on this region can offer insights into the broader question of the role of FDI in economic development throughout the world. While investment in other developing regions has been studied extensively, one finding of that research has been the importance of previous investment experience as a determinant of current FDI flows (see Hallward-Driemeier, 1996). Thus, the impact of current policy variables may be obscured and overcome by a long history of past policies, for which it is difficult to control. CEECs and the FSU offer almost a natural control since FDI in the region was negligible prior to 1989.[4]

This paper's results suggest that the importance of IPR protection in developing countries may have been understated in past research. Thus further investigation of the relationship between IPR regimes and FDI inflows is recommended. The future research should distinguish between inflows into sectors heavily relying on IPRs and those where

[3] For instance, the stepwise transformation prescribed by McKinnon (1993) does not include changes to the IPR regime. A discussion by Erickson (1997) is an exception.

[4] "Several CEECs had already allowed minority foreign participation in joint ventures in the 1970s and 1980s, but this opportunity was not attractive enough to foreign investors. Except for a few showpieces, foreign investment started to flow only after the transformation to market economy had been launched" (Hunya, 1997, p. 286). The figures presented in the table below reflect this situation.

	No. of Joint Ventures on Jan 1, 1989
Hungary	270
Poland	55
Czechoslovakia	16
Bulgaria	25
Romania	5
USSR	291
TOTAL	662

Source: Dunning (1991)

intellectual property plays a less significant role. A greater effort should be directed towards understanding the implications of weak IPR regime for the composition of FDI inflows in developing countries.

The plan of this study is as follows: in the next section, we briefly review the theoretical and empirical literature on FDI, the evidence on the relationship between foreign investment and IPR protection and the findings on FDI in transition economies. In Section III, we discuss aggregate FDI inflows into the region. Section IV describes the dataset and examines characteristics of firms undertaking investment in transition economies and their choice of different project functions. Section V outlines the model used to investigate the impact of country characteristics on FDI inflows and presents the estimation results. In Section VI, we examine factors influencing the choice of manufacturing versus non-manufacturing FDI and the differences in determinants of inflows into high and low technology sectors. Section VII concludes the study. Appendix I describes the variables used, Appendix II cites examples from case studies demonstrating the effect of IPR protection on decisions of foreign investors, and Appendix III presents an infinite horizon version of the model.

II. RELATED LITERATURE

The connection between technological capabilities of a firm and its decision to undertake FDI is highlighted in Dunning's (1988a) OLI paradigm, which explains activities of multinational corporations in terms of ownership (O), localization (L) and internalization advantages (I).[5] When selling its products abroad, a firm is at least initially disadvantaged relative to local producers. Thus, in order to compete effectively with indigenous firms, a foreign producer must possess some *ownership advantages.* They can take the form of a superior production technology or improved organizational and marketing systems, innovatory capacity, trademarks, reputation, or other assets. Ownership advantages assure a firm's ability to enter the host country's market, but do not explain why the foreign presence should be established through production rather than exports. This issue is, in turn, addressed

[5] Other theories of FDI can be found in the surveys of Dunning (1992), Caves (1996) and Markusen (1995).

by *localization advantages* that arise due to differences in factor quality, costs and endowments, international transport and communication costs, overcoming trade restrictions, and host government policies. The last advantage, *internalization*, explains why a foreign firm prefers to retain full control over the production process instead of licensing its intangible assets to local firms. This decision may be attributable to high transaction costs involved in regulating and enforcing licensing contracts.

Weak IPR protection increases the probability of imitation, which erodes a firm's ownership advantages and decreases localization advantages of a host country. At the same time, a weak IPR system increases the benefits of internalization, since it is associated with a larger risk of the licensee's breaching the contract and acting in direct competition with the seller. An inadequate IPR regime, therefore, deters FDI and encourages exporting. A strong IPR system may also have a negative impact on FDI by making licensing a viable alternative to direct investment. Thus, the overall relationship between the level of IPR protection and FDI is ambiguous.

The empirical studies of FDI show that

> "multinationals tend to be important in industries and firms with four characteristics: high levels of R&D relative to sales; a large share of professional and technical workers in their workforce; products that are new and/or technically complex; and high levels of product differentiation and advertising. These characteristics appear in many studies, and I have never seen any of them contradicted in any study" (Markusen, 1995, p. 172).[6]

Lipsey, Blomström and Kravis (1990) find that high levels of R&D relative to sales are also typical of MNCs investing in less developed countries (LDCs). Their examination of U.S. companies indicates that firms undertaking investments in LDCs are more R&D-intensive than investors in developed countries. This is the case in manufacturing as a whole as well as in every industry. It is particularly true for Asian developing countries.[7] The econometric analysis performed by Yu (1990) on a sample of U.S. MNCs confirms the

[6] For references to specific studies where these characteristics have been examined see Dunning (1992).

[7] As the authors point out, larger parent companies may have higher R&D intensities and while developed countries attract both small and large U.S. firms, mainly large U.S. companies invest in developing countries. Also, in some industries (e.g., semiconductors) the companies are able to split their production process into a labor-intensive stage carried out in LDCs and skill- and technology-intensive operations performed in developed economies.

positive relationship between R&D intensity and the probability of a firm investing in LDCs. Furthermore, Dunning (1988b) points out that within manufacturing industry, the pattern of involvement by MNCs in LDCs as a whole is broadly comparable to that in developed countries. In both groups, MNCs are most frequently present in sectors characterized either by above average technological intensity or product differentiation.[8] FDI activities are also found to be positively associated with a firm's size (see e.g., Grubaugh, 1987; UNCTC, 1992; Meyer, 1995) and a firm's previous exporting and investment experience (Braunerjelm and Svensson, 1996; Hallward-Driemeier, 1996).

On the host country side, the results of empirical studies indicate that FDI is positively related to national income, population size and national income per capita (Dunning, 1992; Caves, 1996; Braunerjelm and Svensson, 1996; Hallward-Driemeier, 1996). The first two variables reflect market size and scale effects while the third controls for the purchasing power of local consumers. The investigations of the relationship between real wage costs and FDI produce mixed conclusions (see references in Dunning, 1992). Balance of payments deficits and the rate of domestic inflation, which are presumably seen by potential investors as symptoms of economic and political vulnerability, tend to deter FDI inflows (Schneider and Frey, 1985).

The results of empirical studies exploring the impact of IPR protection on FDI are mostly inconclusive. Ferrantino (1993) finds no statistically significant relationship between the extent of U.S. affiliate sales in a foreign country and that country's membership in an international patent or copyright convention. Similarly, Maskus and Konan (1994), who employ the Rapp and Rozek (1990) index of IPR protection, do not obtain statistically significant results.[9] Lee and Mansfield (1996), on the other hand, find that the strength of a country's IPR protection, as perceived by 100 U.S. firms surveyed, is positively correlated with the volume of U.S. FDI inflows into that country. Moreover, they show that the percentage of a firm's investment devoted to sales and distribution outlets or rudimentary production and assembly facilities is positively related to the perceived weakness of the

[8] Dunning mentions, however, that there are differences among countries within the developing world. He also notes the possibility that within the sectors dominated by MNCs, the activities carried out in LDCs may actually be labor-intensive while those performed in developed economies capital- or technology-intensive.

[9] Note that the Rapp and Rozek (1990) index is based on existing laws but not on their enforcement or implementation.

host's IPR protection. The latter conclusion, however, should be treated with caution since it is based on figures for fourteen U.S. chemical firms only.

Research on FDI in transition economies is mostly limited to discussions of the magnitude of aggregate inflows or presentation of case studies. The exceptions are Meyer (1995, 1998) and Lankes and Venables (1996). Among other issues, Meyer examines the characteristics of investing firms (but not of host countries) and determines that FDI in the region is not motivated by low labor costs. The study by Lankes and Venables is based on interviews with 117 Western companies and employs very limited econometric analysis. It concludes that the progress of transition in a host country, political stability and perceived risk influence the choice of investment type.

III. FDI INFLOWS INTO CEECs AND THE FSU: EVIDENCE FROM AGGREGATE DATA

> "Western economists, policymakers, and the leaders of the fifteen nations that have emerged from the former Soviet Union concur that foreign investment can contribute greatly to the transition from central planning to market economies. Although foreign investment generally accounts for a small share of gross investment, *it is a key means of obtaining technologies*, capital, management skills, and access to export markets" (World Bank, 1992, p. ix, emphasis added).

Attracting FDI has become a policy objective of governments throughout Central and Eastern Europe and the FSU.[10] Transition economies hope that FDI will contribute to upgrading of their production technologies. Since multinational corporations (MNCs) generally transfer their most recent technologies to their affiliates, while only older ones are sold or licensed outside the corporation, FDI may be the only way for many countries to gain access to the latest and especially to certain key technologies. Additionally, FDI inflows can produce indirect benefits through the movement of personnel trained by MNCs and the technical assistance that MNCs provide to local suppliers. MNCs also demonstrate to local

[10] Romania's President Emil Constantinescu stressed during his inauguration speech that increasing FDI inflows was a top priority for his country (*New York Times*, 1996). The Russian State Investment Corp. requested the assistance of Arthur Andersen & Co. in their efforts to bring more foreign investment to Russia (*Wall Street Journal*, 1993).

firms the existence of new technologies and products and thus speed up technology transfer (see Blomström, 1991 and UNCTAD, 1992). Governments tend to view FDI in technology-intensive sectors as the most beneficial to their countries. This perception is reflected in the greater bargaining power of MNCs with higher R&D spending in negotiations with local authorities (UNCTAD, 1992).[11] Leaving aside the question of whether such beliefs are justified, this study investigates whether transition economies indeed receive the kind of FDI they are hoping for.

The highly skilled labor force and engineering traditions combined with low labor costs in the region are perceived as magnets that should attract foreign investment into technology-intensive sectors (Zloch-Christy, 1995a).[12] The number of scientists and engineers engaged in R&D activities (per 100,000 population) is larger in CEECs and the FSU than in Latin America and many East Asian countries. The figures for some transition economies are comparable to Western European levels (see Table 1 and figures in UN, 1997, pp. 688-91). The extent of R&D activities in the CEECs, measured in terms of US patents, is equal to or greater than in Southern Europe. R&D spending in the region (as a percentage of GNP) is also high when compared to Southern European countries (Radosevic, 1996).[13] Thus, the hopes of transition economies to receive technology-intensive FDI have some justification.

Overall, however, the achievements of transition economies in terms of attracting FDI have been mixed (see World Bank, 1996; UNCTAD, 1995 and 1997; Radosevic and Dyker, 1997; Druzic, 1997). Apart from the success stories of Hungary and the Czech Republic, FDI inflows have been quite modest. The magnitude of investment flows was very small in the first years of transition. The situation improved in 1995 when the inflows almost doubled relative to the previous year. Nevertheless, transition economies have received little FDI by

[11] Note that the growth of technology-intensive sectors (i.e., sectors with high R&D spending relative to sales) is also viewed as important by some policy-makers in developed countries (see for example Tyson, 1992).

[12] These advantages of CEECs and the FSU are echoed in the Western press:

> "The emergence of a low-cost, highly trained labor market in central Europe is one reason why, despite the economic recovery, unemployment in the western part of the Continent remains high" (*New York Times*, 1995).

[13] One has to keep in mind, however, that in the Soviet innovation system a large share of R&D funds was committed to the military and space exploration without many technological spillovers to other industries. In contrast to Japan or Western Europe, enterprise R&D accounted for only a small fraction of total R&D outlays in the Soviet Union (Knell, 1996).

international standards. The entire region's inward FDI stock in 1996, at $46 billion, was less than that of Indonesia ($59 billion) (UNCTAD, 1997).

Intra-regional differences in the distribution of foreign investment are overwhelming. For instance, while in 1995 Georgia and Belarus attracted six and seven million dollars of FDI, respectively, Hungary received more than 4.4 billion. In per capita terms, these figures range from one dollar in Georgia and Belarus to 432 dollars in Hungary. The Czech Republic, Hungary, Poland and Russia accounted for almost three-quarters of cumulative FDI inflows during 1989-95. Many former Soviet Republics, on the other hand, were totally marginalized and received less than one percent of all FDI in the region (see Table 1).

According to Estrin, Hughes and Todd (1997), who draw their conclusions from limited aggregate figures available, FDI inflows in CEECs are concentrated in low technology sectors. In countries less successful in attracting FDI, only 30-40 percent of the foreign capital is invested in local production, suggesting unwillingness on the part of investors to initiate larger and longer-term projects and indicating their preference for trade and services that provide faster returns (Hunya, 1997, p. 287).

IV. NATURE OF FDI INFLOWS: EVIDENCE FROM FIRM-LEVEL DATA

Data

While the aggregate figures show the amount and distribution of FDI across the region, they can provide only limited insights about the nature of investment flows. This study compensates for the deficiency of aggregate figures by employing a unique firm-level dataset based on the EBRD Foreign Investment Survey. In January 1995, a brief questionnaire was sent out to all companies (about 9,500) listed in the *Worldscope* database.[14] Responses were obtained from 1,405 firms that answered questions regarding undertaken and planned investments in CEECs and the FSU. Additionally, information on function of the projects (manufacturing, distribution, representative office) was collected. 117 of the survey

[14] *Worldscope* is a commercial database that provides detailed financial statements, business descriptions, and historical pricing information on thousands of public companies located in more than fifty countries.

respondents were chosen for in-depth interviews whose results are discussed in Lankes and Venables (1996).

The dataset does not include any information on the time when each investment was undertaken. Since the magnitude of FDI inflows was marginal before 1989, the information collected pertains mostly to the period 1989-94.[15] Thus, the dataset is well suited for making inferences about the nature of FDI inflows and host country policies that influenced them during the first six years of transition. The data obtained from the survey were supplemented with firm specific information from *Worldscope*. Table 1 presents the distribution of projects in the sample by destination country.

Response bias

The response rate in the survey was close to fifteen percent. We suspected that firms which perceived the survey as more relevant (for instance, firms that had invested or considered investing in transition economies) were more likely to respond. To check this hypothesis, we examined a list of major foreign investors in Poland compiled by the Polish State Investment Agency (PAIZ, 1995). We chose Poland for this exercise because it was the most popular destination country in the sample. We found that out of 329 firms on the list, 118 received the EBRD survey and fifty percent of them responded. Statistical tests show that the means of firm specific variables in the respondent and non-respondent groups were not significantly different from each other (see Table 2). Thus among the investing firms, the decision to respond to the survey was not systematically related to firm characteristics. Unfortunately, we were not able to identify which among the firms that did not respond to the survey were not interested in undertaking investment in CEECs and the FSU. We have no reason, however, to suspect that in the case of these firms, the decision to answer the survey was systematically related to their characteristics. Therefore, we treat the dataset as if the investing firms had been oversampled.

[15] CEECs and the FSU were virtually closed to foreign investment before 1989 (see Meyer, 1995; Dunning and Rojec, 1993; Hunya, 1997).

Empirical results

We begin our examination of firms investing in transition economies with a brief look at the distribution of investors across industries. In addition to the sectoral breakdown of investing firms, Table 3 presents the average value of firm R&D outlays relative to sales in each sector, first for all firms listed in *Worldscope* and then for investors in the sample. Both high and low technology sectors seem to attract FDI.[16] In the majority of high technology sectors, however, investing firms are less R&D-intensive than the average firm in their industry. In electronics (the second most R&D-intensive sector), the R&D outlays of an average investor (relative to sales) are equal to about 61 percent of the corresponding figure for the whole sector. In the most research oriented industry, drugs, cosmetics and health care products, the R&D intensity of an average investor reaches only 38 percent of the industry mean. The situation is similar in the case of machinery and equipment or electrical products. The exceptions include chemical and automotive sectors. The mean R&D outlays of investors amount to 3.07 percent of sales, as compared to 4.53 percent for the population of firms. Thus, on average investors tend to be less R&D-intensive.

To learn more about the characteristics of investors, we estimate a probit model with the dependent variable equal to one if a firm has undertaken investment in the region and zero otherwise:

$$Y_i^* = X_i\beta + u_i$$
$$Y_i = 1 \text{ if } Y_i^* > 0$$
$$Y_i = 0 \text{ otherwise}$$

Following Dunning's theory and the empirical literature, the independent variables include: firm size (measured by sales), proxies for ownership advantages (advertising intensity and R&D intensity), a dummy for regional sales experience before the transition, a measure of multinational experience (share of foreign assets in a firm's total assets), and a proxy for labor intensity of production process (sales per employee). Detailed descriptions of variables are presented in Appendix I. All variables pertain to 1993 with the exception of multinational

[16] In this and subsequent exercises, we use the term "high technology sectors" to refer to industries with average R&D spending exceeding in value one percent of sales. These industry averages were calculated for the population of firms in *Worldscope*. Half of the sectors qualify as high technology under this definition.

experience which refers to 1989 to avoid endogeneity problems.[17] We also include industry dummies to control for industry specific effects that make FDI more prevalent in some sectors as well as source country dummies.

Because of different response rates of investors and non-investors, estimating an ordinary probit would lead to inconsistent results; fortunately this problem can be corrected by applying weights. We assume that the response rate for all investors was equal to the rate at which firms with FDI in Poland answered the survey (i.e., fifty percent). Furthermore, we assume that all non-investors had the same probability of responding, equal to twelve percent. We estimated this figure from the overall and the investor response rate. For each group, the inverse of their response rate is used as a weight. The results, presented in terms of marginal effects evaluated at the weighted sample means, can be found in Table 4. For dummy variables, we report the change in probability as the value of the dummy increases from zero to one.

As anticipated, we find that a firm's size is positively related to the probability of investing in CEECs and the FSU. Large firms are likely to be better endowed with tangible and intangible assets necessary for investment. They may be more interested in finding new markets since they are more likely to outgrow their domestic market. In transition economies, larger firms also tend to have greater bargaining power in negotiations with local authorities (Csaki, 1995). Consistent with earlier studies, we observe that higher advertising efforts increase the probability of investing. Multinational experience and labor intensity, on the other hand, do not appear to have a statistically significant impact on the investment decision. Thus, we confirm Meyer's (1995) finding that firms with more labor-intensive production are not more inclined to engage in FDI in the region.

Furthermore, the results show that firms with previous sales experience in the region are more likely to invest than their inexperienced counterparts. One should keep in mind, however, that the experience gained by exporting to pre-transition CEECs and the Soviet Union differed from that acquired in the Western world. Since the potential to learn about consumer tastes in centrally-planned economies was very limited, foreign firms benefited

[17] The share of foreign assets in a firm's total assets would obviously be affected by its investment in transition economies. Since, however, CEECs and the FSU were virtually closed to foreign investment until late 1989, including the 1989 share of foreign assets does not pose such problems. The 1988 value might be even more appropriate but we refrained from using it since it would increase the number of missing observations.

mostly from making personal contacts with local officials and managers and learning about socioeconomic peculiarities of the region.[18]

Unlike studies of FDI in other parts of the world, we find that R&D intensity is a significant negative predictor of investment in transition economies. The higher are R&D outlays relative to sales, the lower is the probability of a firm undertaking FDI in the region. Thus, our findings contradict the widespread view that the skilled and inexpensive labor force would attract technology-intensive FDI into transition economies.[19] Our results are consistent with Dunning's theory of ownership advantages since it is technological superiority *relative to local producers* that enables a foreign firm to compete successfully. Given the technological gap between transition economies and developed countries, it is quite likely that even firms with R&D spending below their industry average can be successful in the region. Our results, however, are surprising in the light of the findings of Lipsey et al. (1990), Yu (1990), and Dunning (1988b) that high levels of R&D relative to sales are typical of firms investing in LDCs. We will address potential explanations of our results later in the study.

We continue the investigation by examining characteristics of investors choosing different project functions. We estimate a multinomial logit with the project type as the dependent variable. The project types include: manufacturing (possibly accompanied by distribution); distribution (but no manufacturing); and representative office only.[20] The

[18] For the importance of experience in transition economies as source of personal contacts see King (1997) and Bakos (1995), for the role of previous trading relationship in the context of Japanese FDI see Michalet (1997) and OECD (1994), for the evidence from case studies see Estrin et al. (1997).

[19] When the measure of multinational experience is included in the model, the number of observations drops due to missing values. It is conceivable that the R&D intensity becomes statistically significant only because of the decreased number of observations rather than because of the new model specification. This is, however, not the case. In the original model (presented in Column 1), R&D intensity is significant at the 12 percent level of confidence. When we decrease the number of observations to 134 and use the same model specification, the R&D variable appears to be significant at the 10 percent level. After the measure of multinational experience is included, R&D achieves the 5 percent significance level. Note that this regression includes the oil, gas and coal sector (which has been removed from other models in this study) because our goal is to draw conclusions about *all* investors in the region. Excluding this sector from the sample, however, does not affect the signs or significance levels of marginal effects.

[20] The survey did not include excavation activities as a possible answer to the question about the function of an investment project. We suspect that firms engaged in excavation of natural resources referred to their activities as manufacturing for the purposes of the survey. Since we are specifically interested in the characteristics of investors undertaking local production, we excluded the oil, gas and coal sector to avoid taking into account excavation projects. However, when this sector is included in the regression, the sign patterns and significance levels remain the same, and the magnitudes of the

Hausman test could not reject the assumption of the independence of irrelevant alternatives, thus confirming that it is appropriate to use the multinomial logit. The results are presented in terms of marginal effects evaluated at sample means (see Tables 5 and 6). The marginal effect of variable *k* on the probability of the outcome *m* is computed in the following way:

$$\frac{\partial \Pr(y = m \mid x)}{\partial x_k} = \Pr(y = m \mid x)[\beta_{km} - \sum_{j=1}^{J} \beta_{kj} \Pr(y = j \mid x)]$$

where j=1,…,J are all possible outcomes (see Long, 1997, p. 165).

The findings indicate that an increase of one standard deviation in R&D outlays relative to sales decreases the probability of manufacturing investment by sixteen percent and increases the probabilities of a distributional project and a representative office by six and ten percent, respectively. Similarly, an increase in advertising intensity discourages local production and encourages representative offices. Thus firms with characteristics typical of MNCs (i.e., large spending on advertising and R&D relative to sales) are most likely to have only a representative office. As Meyer (1995) suggests, it may be more difficult for firms with a less diversified product portfolio to alter their production profile in response to competitive pressures in the market. Thus, such firms may be forced to increase their competitiveness by moving production to countries with lower labor costs. Although we obtain a negative marginal effect of product diversification in the case of manufacturing investment, it is not statistically significant. Similarly, the marginal effects of firm size do not appear to be statistically significant.

In search of an explanation, we estimate marginal effects for high and low R&D and high and low advertising industries separately (see Tables 7 and 8).[21] Again, we find that high advertising and high R&D efforts make a representative office more likely in all categories. In high technology sectors, firms with larger R&D outlays are less likely to engage in manufacturing. The marginal effect for low technology sectors also bears a negative sign but is not significant. Similarly, in advertising-intensive sectors, firms spending relatively more on advertising have a lower probability of undertaking local production. In low advertising

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marginal effects are barely affected. The only exception is the firm size, which is positively related to the probability of manufacturing FDI with the effect being significant at the ten percent level.

[21] We accomplish this by interacting the R&D and advertising variables with dummies indicating whether a given industry belongs to a high or low R&D and a high or low advertising category. As R&D-intensive, we consider sectors where R&D spending equals at least one percent of sales. For advertising, the corresponding figure is twenty percent.

industries, the marginal effect also bears a negative sign but it is significant only if production diversification is included in the model. Firms with smaller product portfolios are more likely to engage in local manufacturing, while more diversified firms have a higher probability of opening a representative office. Both marginal effects are statistically significant. The effect of a firm's size remains insignificant. Unfortunately, the sample does not contain enough observations to estimate the equation for each industry separately. This set of results, however, gives us some indication that it is not only firms in less R&D- and advertising-intensive industries that choose manufacturing but also less R&D- and advertising-intensive firms *within industries* that undertake local production.

As mentioned before, governments tend to view manufacturing in technology-intensive sectors as the most desirable form of FDI. We find evidence that transition economies fail to attract this kind of investment. There are several possible explanations for this finding. First, foreign firms may try to take advantage of low labor cost in the region and undertake production of low technology, labor-intensive goods for exports. This explanation, however, does not seem very plausible. Surveys of foreign investors in CEECs and the FSU indicate that labor costs are of only secondary importance (see the summary of survey studies in Lankes and Venables, 1996). In Table 4, we show that labor intensity of the production process does not affect a firm's decision to invest in the region and thus confirm Meyer's (1995) result that foreign investors in transition economies are mostly not motivated by labor costs. Furthermore, the information collected during interviews with a subsample of the surveyed firms indicates that foreign investors producing mainly for exports are on average more R&D-intensive than those targeting local markets. A vast majority of interviewed firms also indicated that the production process employed in transition economies is comparable in terms of skill intensity to the one used in the home country. Finally, foreign investors in transition economies tend to target primarily domestic markets. For instance, in 1994, 84.5 percent of sales revenues of foreign investors in Poland came from local sales (Polish News Bulletin, July 31, 1998).[22]

[22] Note that our results are not likely to be influenced by outward processing trade (OPT) with the European Union, which is quite prevalent in the apparel industry. Since OPT does not usually imply any capital involvement on the part of the contractor, it is not considered to be FDI. It has also been pointed out that FDI is not an important element in the strategies of EU companies towards the textile and clothing sector in CEECs (ECE, 1995, Ch. 5).

A second hypothesis is that weak protection of intellectual property rights deters investors with more sophisticated technologies from engaging in local production. Investors may fear that locating production facilities in a country with a weak IPR regime may increase the probability of technology theft. Our results are consistent with the findings of Mansfield (1994) who surveyed U.S. manufacturing firms about the importance of IPR protection for their investment decisions. He found that in the case of investment in sales and distribution outlets, only about 20 percent of respondents were concerned with IPR protection. In the case of investment in rudimentary production (i.e., involving basic technologies) and assembly facilities, 30 percent of respondents viewed IPR protection as important. This percentage increased to 50-60 for investments in manufacturing components and complete products and to 80 in the case of R&D facilities. The concerns of foreign investors about weak IPR regimes in transition economies are echoed in the case studies (see Appendix II for examples).

Finally, technology-intensive sectors may exhibit greater economies of scale since they require a higher initial investment. Thus, manufacturing in these sectors may be deterred by insufficient local demand, which may be a result of the drop in real income experienced by all economies in the region in the initial phase of transformation. Foreign firms in such sectors may, however, be willing to set up a distribution network or a representative office to support their export presence on the market. We will investigate these hypotheses in Section VI.

Before we proceed, it is worth pointing out that less R&D-intensive firms are also more likely to consider it important to invest in transition economies. Table 9 presents the estimation results of a probit model with the dependent variable taking on the value of one if a firm views undertaking FDI in the region to be of significant or moderate importance, and zero if a firm considers the importance to be small.[23] A firm with R&D efforts one standard deviation higher than the mean is about eleven percent less likely to regard its involvement as important. This is consistent with our findings indicating that less R&D-intensive firms are more likely to invest in the region and that they are more likely to engage in local production. Table 9 also indicates a larger importance of FDI in the region to less advertising-intensive and less diversified firms. Firms with these characteristics might find it increasingly difficult to compete in developed countries and thus might be more pressed to search for new markets.

[23] Since this question was answered by both investors and non-investors, we use weights to make the appropriate correction in the estimation.

Reaching new consumers may also be a high priority for large firms that have outgrown their current markets. Indeed, we find that larger firms view the importance of FDI in CEECs and the FSU as more significant. Finally, European companies are more likely to perceive their involvement in transition economies as important, which is probably due to their geographical proximity.

Summing up, this section presented evidence that FDI inflows into transition economies are not only of small magnitude by world standards but they are also concentrated in low technology activities. It showed that low R&D firms tend to engage in manufacturing while research-intensive investors are more likely to open representative offices. The results also indicate that firms with low R&D intensity are more likely to view their involvement in the region as important to their company's strategy.

V. THE IMPACT OF HOST COUNTRY CHARACTERISTICS ON FDI INFLOWS

Model

As we have seen in Section III, the experiences of transition economies in terms of FDI have been very diverse, ranging from impressive inflows into Hungary and the Czech Republic to hardly any foreign investment in several former Soviet Republics. Thus, an examination of characteristics of transition economies can provide us with valuable insights about factors influencing FDI inflows. In what follows, we extend Rodrik's (1991) model of investment and use it as a framework in the investigation of host country characteristics affecting FDI inflows.

The opening of a new country or region to foreign goods presents a firm with the choice of supplying the new market by means of exports or local production. While engaging in FDI has the potential for yielding higher profits because of proximity to customers, savings on transportation costs, tariffs, labor cost differentials, etc., it also involves higher risk. We assume that a firm's profit from exporting is equal to E each period, while that from FDI amounts to R. When undertaking production in a foreign country, a firm has to incur a fixed cost. There are two components of the fixed cost: a country specific cost η that is the same for all firms (as for instance, registration fees and procedures) and a firm specific cost ε that can be thought of as the cost of organizing foreign production (lowered by the existence of prior

sales in the region and previous multinational experience). Since we assume that a firm has production facilities in the home country, there is no fixed cost in the case of exporting.

Further, we assume that an investor decides how to supply the market at the beginning of the first period and immediately executes the plan. Events adversely affecting profits from FDI can only take place in the second period. With probability π, the returns to FDI drop to zero in the second period and the firm is forced to exit incurring a cost s.[24] This sudden drop in returns may be attributable to expropriation, unexpected changes in tax code or other regulations, bureaucratic delays, corruption, crime, violation of intellectual property rights or regional tensions. A firm will choose FDI over exporting if

$$R - \eta - \varepsilon + \pi\left(\frac{0-s}{1+r}\right) + (1-\pi)\left(\frac{R}{1+r}\right) > E + \frac{E}{1+r} \qquad (1)$$

$$\Rightarrow (R-E)\left(\frac{2+r}{1+r}\right) - \pi\left(\frac{s+R}{1+r}\right) - \eta > \varepsilon$$

There exists a cut-off value of ε^* such that a firm will undertake FDI only if its fixed cost is below the cut-off, that is, if $\varepsilon < \varepsilon^*$, where

$$\varepsilon^* = (R-E)\left(\frac{2+r}{1+r}\right) - \pi\left(\frac{s+R}{1+r}\right) - \eta \qquad (2)$$

We assume that R is sufficiently greater than E to make ε^* positive, since otherwise FDI would never take place. The model implies that the difference between the returns to FDI and exporting must be greater in countries with a positive probability of profits from FDI dropping to zero than in host economies where this threat does not exist. Thus π can be viewed as equivalent to a tax on direct investment.

A modified version

We make the model more explicit by assuming that a foreign firm enjoys a monopoly power in the host country and faces an inverse demand function $p=a-bx$; where p denotes price, x quantity (x_E or x_R depending on whether a firm exports or undertakes FDI), and a is a parameter related to host country size. We assume that $a>0$ and $b>0$. An exporting firm's

[24] Appendix III presents a version of the model under the assumptions of an infinite horizon and the probability π being independent each period.

profit is equal to $E = \left[\frac{p}{(1+\tau)} - w(1+t) \right] x_E$ each period, where w is the home country wage rate, τ is a proportional tariff, and t denotes transportation cost. Thus, the firm will export x_E = [a – w(1+t)(1+τ)] / 2b units and receive each period a profit equal to $E = \frac{[a - w(1+t)(1+\tau)]^2}{4b(1+\tau)}$.

A firm that undertakes FDI receives each period R = (p – w*)x_R, where w^* is the host country wage rate.[25] Thus, it produces x_R = (a-w*) / 2b units and its profit equals R = (a – w*)^2 / 4b. We assume that both FDI and exporting are profitable undertakings, thus $x_E > 0$ and $x_R > 0$. This implies that a>w(1+t)(1+τ) and a>w*.[26] Again, a firm will choose FDI if $\varepsilon < \varepsilon^*$, where ε^* can now be written as

$$\varepsilon^* = \frac{2+r}{4b(1+r)} \left\{ (a-w^*)^2 - \frac{\left[a - w(1+t)(1+\tau)\right]^2}{(1+\tau)} \right\} - \frac{\pi}{4b(1+r)} \left[4bs + (a-w^*)^2 \right] - \eta \qquad (3)$$

We can normalize w to one and rewrite the above expression in terms of the relative wage ratio

W = w*/w=w*/1=w* to get

$$\varepsilon^* = \frac{2+r}{4b(1+r)} \left\{ (a-W)^2 - \frac{\left[a - (1+t)(1+\tau)\right]^2}{(1+\tau)} \right\} - \frac{\pi}{4b(1+r)} \left[4bs + (a-W) \right]^2 - \eta \qquad (4)$$

We assume that there are many firms that differ only by their fixed cost ε and that all firms with the cost below the cut-off undertake FDI. Thus the lower the cut-off cost is, the larger is the total investment in a host country. We also find that

[25] Note that we do not include fixed costs here, since they are incurred only once.

[26] These assumptions will be used to sign some of the derivatives presented below.

$$\frac{\partial \varepsilon^*}{\partial \pi} = -\left[\frac{4bs + (a-W)^2}{4b(1+r)}\right] < 0 \quad (5)$$

$$\frac{\partial \varepsilon^*}{\partial W} = -\left[\frac{(a-W)}{2b(1+r)}(r+2-\pi)\right] < 0 \quad (6)$$

since $\pi < 1 \Rightarrow r + 2 - \pi > 0$

$$\frac{\partial \varepsilon^*}{\partial t} = \frac{(2+r)\left[a-(1+t)(1+\tau)\right]}{2b(1+r)} > 0 \quad (7)$$

$$\frac{\partial \varepsilon^*}{\partial \tau} = \frac{(2+r)}{4b(1+r)(1+\tau)^2}[a-(1+t)(1+\tau)][a+(1+t)(1+\tau)] > 0 \quad (8)$$

$$\frac{\partial \varepsilon^*}{\partial a} = \frac{[2+r-\pi](a-W)(1+\tau)-[a-(1+t)(1+\tau)](2+r)}{2b(1+r)(1+\tau)} \quad (9)$$

$$\frac{\partial \varepsilon^*}{\partial a} > 0 \text{ if } \frac{[a\tau+(1+\tau)(1+t-W)](2+r)}{(a-W)(1+\tau)} > \pi \quad (10)$$

$$\frac{\partial \varepsilon^*}{\partial \eta} = -1 < 0 \quad (11)$$

Thus, the cut-off cost (and the number of foreign investors) decreases as the risk associated with undertaking FDI (π) goes up, as the country specific entry cost (η) increases, and as host country wages go up relative to the home wage rate (W). The number of investors rises with increasing tariffs (τ) and transportation costs (t). It also increases with host country size (a) if the probability of returns to FDI dropping to zero is not very large, that is if the condition (10) above is true. The intuition for this finding is the following. An increase in the market size of a host country makes FDI more profitable relative to exporting because of tariffs, savings on transportation and possibly labor costs. However, as the market size becomes larger the expected loss incurred in the case of FDI also increases. When the probability of the adverse shock is small, the increase in the benefits of FDI relative to exporting outweighs the increase in the expected loss. Therefore, undertaking local production becomes more profitable and a large number of investors choose this option. Note that the left hand side of the inequality (10) is always positive if wages in the host country are lower than those in the home country, which is certainly true in the case of transition economies.

Empirical results

We test the model's predictions by examining the relationship between a firm's decision to choose a country as an FDI destination and the host country's market size (corresponding to *a* in the model); risks associated with engaging in FDI there which include lack of reform progress, weak IPR protection and regional tensions (π); an index of registration procedures (a proxy for the country specific entry cost η), and dummies for membership and applicant status in WTO (reflecting the impact of trade barriers, τ).

Previous empirical studies have found the host country's market size to be an important determinant of FDI inflows (see Section II). Since many transition economies have experienced significant declines in real incomes, GDP may not be an appropriate measure of their potential market size. Therefore, in the estimation we employ three variables: population size (reflecting market potential), GDP per capita (measuring actual purchasing power of local consumers) and GDP growth rate (taking into account changes in the market size).

Uncertainty about the returns to FDI can arise from the risk of expropriation as well as from new legislation adversely affecting repatriation of profits and tax rates, bureaucratic delays, etc. The perceived riskiness of CEECs and the FSU has often been cited as a factor discouraging foreign capital inflows.[27] Lankes and Venables (1996) find a negative association between EBRD transition indicators and country risk as perceived by the interviewed firms, with the rank correlation coefficient equal to -.89.[28] Thus, in the empirical analysis, we employ the average of the EBRD indicators as a proxy for risks associated with undertaking FDI in a given host country. Additionally, we include dummy variables for countries affected by regional tensions.

Weak IPR protection can also be a source of uncertainty about the returns to FDI. This is mostly the case in R&D-intensive industries and for firms possessing innovative technologies. The lack or inadequacy of IPR protection in transition economies is reflected by the fact that many of them have been placed on the U.S. Special 301 Watch List. It is possible that the fear of IPR infringement has discouraged foreign companies from undertaking FDI in

[27] See, for example, Zloch-Christy (1995b), World Bank (1996), Estrin et al. (1997), and Hunya (1997).

[28] See Appendix I for a description of EBRD indicators.

the region.[29] To investigate this issue empirically, we construct an index capturing the strength of IPR legislation and its enforcement in CEECs and the FSU. Although the data cover the period until January 1995, we use the end of that year as a reference point in the rating to take into account the anticipation of the changes. The table below presents the rating criteria. A higher value of the index corresponds to weaker IPR protection.

Index of Intellectual Property Protection	
Points	**Description**
1	Close to adequate IPR legislation present by the end of 1995; some enforcement efforts undertaken
2	Close to adequate IPR legislation present by the end of 1995; no enforcement efforts undertaken
3	No reform of IPR legislation undertaken by the end of 1995

Source: constructed by the author based on IIPA Special 301 Recommendations

To capture the size of entry costs we include an index reflecting the complexity of the registration procedures. Entry costs might have played a significant role in an investor's decision since, at least in the initial period of the transformation, the registration procedures in CEECs and the FSU were not very straightforward and varied across the region.[30] Since detailed data on tariffs and other trade barriers are not available for most of the transition economies, we employ dummy variables for membership and applicant status in WTO.

The model also suggests including relative wages in the regression analysis. Since the productivity of the labor force in CEECs and the FSU is lower than in developed countries, using unit labor costs would be more appropriate. Unit labor costs are, however, available

[29] Several Western law firms active in CEECs and the FSU (contacted by the author) confirmed that their clients, who were potential or actual foreign investors, expressed concerns about weak IPR protection in the region. Two firms represented foreign clients in patent infringement cases in transition economies.

It is also likely that firms planning to invest in countries with low IPR protection find it more difficult to obtain funds, since banks take the IPR regime into account when estimating potential returns to investment.

[30] For instance, one EBRD-supported FDI project in the region required seventy signatures of officials to clear all applicable licensing and regulatory hurdles (Lankes and Stern, 1997, Annex I, p. 2).

only for a few countries and they are strongly correlated with the GDP per capita (the correlation is equal to .90). Therefore, we do not use them in the estimation.[31]

Foreign investment can also be attracted by the presence of natural resources. Since we are primarily interested in exploring the impact of government policies on the magnitude and nature of FDI inflows, we exclude firms in the oil, gas and coal sector from the estimations. Even if such firms were only engaged in the distribution of imported products at the time the survey, these activities may have been undertaken as a prelude to exploitation of the host country's natural resource endowment.

To control for unobserved firm characteristics, we use dummy variables for all firms. The Hausman test confirms that including firm fixed effects is more appropriate than employing a random effect model. The dependent variable takes on the value of one if firm *i* has invested in country *c*, and zero otherwise. Thus the model is estimated in the following form:

$$Y_{ic}^{*} = d_i + X_c\beta + u_{ic}$$
$$Y_{ic} = 1 \text{ if } Y_{ic}^{*} > 0$$
$$Y_{ic} = 0 \text{ otherwise}$$

where d_i represents firm dummies and X_c is a vector of host country characteristics: population size, GDP per capita, GDP growth, transition progress, IPR protection, entry costs, number of telephone lines per hundred inhabitants and dummies for regional tensions, WTO membership and WTO applicant status. Firms without any projects in the region drop out of the estimation because of dummy variables. Thus, the regression is estimated on the subsample of investors only, and it is not necessary to employ weights.

Table 10 presents the estimation results from several variants of the model. We find that all three variables measuring market size have a significant and positive impact on the probability of a country being chosen as an investment destination. An increase in the GDP per capita of one standard deviation above the mean is associated with a 15.1 percent increase in the probability that the country received FDI. It is conceivable that GDP per capita represents not only the purchasing power of the population but also the quality of

[31] Note that the OECD survey (1994) showed that only 9.3 percent of investors view low labor costs as the prime reason for the attractiveness of the region, as compared to 80 percent who point to the actual and potential market size. Low labor costs in transition economies are perceived by many investors as short term benefits.

infrastructure in a host country. To examine this issue, we include in the estimation the number of telephone lines per hundred inhabitants and find that its marginal effect is positive and significant. This modification, however, does not affect the magnitude of the marginal effect or the significance level of GDP per capita and produces only slight changes in the marginal effects of other variables. In general, FDI inflows can affect the growth rate of a host country's GDP. One of the advantages of this study is that it is not the case here. CEECs and the FSU had been virtually closed to FDI until the end of 1989 and the aggregate FDI inflows remained very small throughout the period covered by the dataset (i.e., until the end of 1994).[32]

As expected, we find the marginal effect of transition progress to be positive and statistically significant. Thus, we empirically confirm the widespread belief that countries more advanced in transformation are more attractive FDI destinations.[33] We also find that regional tensions decrease the probability of foreign investment. Furthermore, the results show that inadequate IPR protection discourages foreign investors. This effect is statistically significant at the one percent level. A change in IPR protection from the Romanian level to that of Poland increases the probability of FDI by more than eleven percent. With the exception of Erickson (1997), protection of intellectual property rights has been a neglected issue in the earlier literature on transition economies.[34]

As anticipated, more liberal entry procedures attract foreign investors. Contrary to the model's predictions, however, we find that lower trade barriers (to the extent that they are reflected by membership or application for membership in WTO) encourage FDI. The impact of both dummy variables is statistically significant. This situation may arise from the fact that foreign investors tend to import equipment as well as many of their inputs, at least in the

[32] See EBRD (1997) for an annual breakdown of FDI inflows into transition economies.

[33] Note that none of the earlier studies has gone beyond looking at correlations between aggregate FDI inflows and progress in transition.

[34] One could suspect that the improvement in IPR protection achieved by Hungary, the Czech Republic and Poland might be a result of the pressure exercised on these countries by the U.S. government. These three countries were among the top FDI destinations in the region and American companies accounted for a large portion of FDI inflows in each of them. While some pressure was exercised in the case of Poland, which was placed on the Priority Watch List in 1992 and 1993 and on the Watch List in 1994 and 1995, neither Hungary nor the Czech Republic or Czechoslovakia found themselves on either of the lists in the same period. Hungary and the U.S. did not even sign their bilateral Intellectual Property Rights Agreement until September 1993.

initial period.[35] It is also possible that the access to the WTO Dispute Settlement has a positive impact on a firm's decision to undertake FDI.

Next we reestimate the model taking into account foreign investment in manufacturing facilities only. The dependent variable takes on the value of one if firm *i* has undertaken production in country *c* or had concrete plans for such an investment, and zero otherwise. The results, presented in Table 11, are similar in terms of the sign patterns and the significance levels to those in Table 10. One of the exceptions is the number of telephone lines, which does not appear to be statistically significant.

Note that we also estimated a model that included firm and host country characteristics as well as random effects for firms. The signs and significance levels of country specific variables were found to be similar to those in the fixed effect specification presented in the first column of Table 10 and 11. The only exception was the GDP growth rate, which turned out be statistically insignificant. Since as mentioned before, the Hausman test indicated that it is more appropriate to use the fixed effect model we do not report the results from the random effect specification.

We also experimented with replacing our measure of IPR protection with an updated version of the patent rights index created by Ginarte and Park (1997). This index is highly correlated with our IPR measure (.74) and produces results very similar to those found in Tables 10 through 13. Since it is available for only nine transition economies, we chose to present the results based on our measure.

Additionally, we estimated models in which our IPR index was replaced with a dummy variable for countries with the weakest IPR regimes (corresponding to the index value of three). The results produced by these models were consistent with the findings presented in this and the following sections of the study.

In summary, our empirical analysis provides evidence that slow progress of transition and inadequate IPR protection discourage FDI inflows. Other deterrents to foreign investment include complex registration procedures and regional tensions. Lower trade barriers and better infrastructure, on the other hand, attract foreign investors. Besides having implications for

[35] In Poland, for instance, foreign owned companies generated US$3.9 billion worth of trade deficit in 1994, which constituted 64.6 percent of the country's overall trade deficit (Polish News Bulletin, July 31, 1998). Note that Hallward-Driemeier (1996), who examined Japanese investment in East Asia, also found that openness of a host country attracts FDI.

transition economies, our findings are interesting for other reasons. They are derived under conditions comparable to a natural experiment, in the virtual absence of investment history. This situation offers a significant advantage over other studies that lack controls for past investment and thus face the difficulty of disentangling the effects of policies under investigation from the impacts of prior investment experience. Furthermore, this is the first firm-level study addressing the effect of IPR protection on a firm's decision to choose a country as an FDI destination. While, as mentioned earlier, most studies of aggregate FDI flows have led to inconclusive results about the importance of IPR protection for FDI, we provide evidence that stronger IPR protection has a positive impact on inflows of foreign direct investment.

VI. COMPOSITION OF FDI AND HOST COUNTRY CHARACTERISTICS

In this section, we explore the relationship between host country characteristics and the function of investment projects. We also investigate determinants of inflows into high and low technology sectors. First, we focus on the investor's choice of local production versus non-manufacturing FDI by estimating the following model:

$$Y_{ic}^{*} = X_i\delta + X_c\beta + u_{ic}$$
$$Y_{ic} = 1 \text{ if } Y_{ic}^{*} > 0$$
$$Y_{ic} = 0 \text{ otherwise}$$

where Y_{ic} takes on the value of one if firm i has existing or planned manufacturing investment in country c and zero if the firm has decided to engage in a non-manufacturing project (i.e., distribution or a representative office). X_i denotes firm specific variables: firm size, advertising intensity, R&D intensity and production diversification, while X_c is a vector of host country characteristics: GDP, transition progress, IPR protection and unit labor cost.[36] Since the sample consists of investors only, there is no need for using weights. We correct, however, for the possibility that the errors are correlated across observations for the same firm. We also employ industry dummies and exclude firms in the oil, gas and coal sector.

[36] We include firm specific variables since using fixed effects would cause firms engaged in a single project and firms whose all projects are of the same type to drop out of the estimation.

We anticipate that the sign pattern of firm specific variables will be consistent with the signs obtained in Table 6. In the case of host country characteristics, we expect to observe a positive marginal effect of GDP, since a larger market size encourages local production due to economies of scale and greater savings on transportation costs.[37] According to Mansfield (1994), foreign investors undertaking production in a host country are more concerned about IPR protection than those engaging in distribution only. Therefore, we anticipate that a stronger IPR regime encourages local manufacturing (and thus that the marginal effect of the IPR index will be negative). Higher unit labor costs are likely to have a negative effect on the probability of manufacturing FDI. Deeper reforms may be perceived by foreign firms as less easily reversible. Thus, greater progress in transition may encourage investors to engage in manufacturing projects, which have a longer payoff period.

The results, presented in Table 12, confirm our earlier findings that less R&D- and less advertising-intensive as well as less diversified firms are more likely to engage in local production. As anticipated, market size has a positive marginal effect on the probability of an investor undertaking local production rather than non-manufacturing FDI. We also find that weak IPR protection has a large negative effect on the probability of engaging in manufacturing FDI and that the effect is statistically significant. A decrease in IPR protection from the level of Poland to that of Romania lowers the probability of FDI focusing on local production by 21.5 percent. This result may be due to the greater scope for technology theft in the case of manufacturing projects. The effects of reform progress and unit labor costs are not statistically significant. The latter result is consistent with the evidence, presented earlier, that foreign investors are not motivated by low labor costs in the region.

As mentioned earlier, governments tend to favor foreign investment in technology-intensive sectors. To examine what host country characteristics encourage this type of FDI, we reestimate the model from Section V interacting host country variables with dummies for high and low technology industries. We estimate the model for all FDI and for manufacturing projects only, defining as high technology, sectors where the average R&D expenditure exceeds one percent of sales. We hypothesize that weak IPR protection has a larger deterring effect in the case of technology-intensive sectors. Since undertaking local production in such

[37] Of course, if the production is primarily destined for exports, the size of the local market becomes less important.

sectors may also require a greater initial investment (presumably because the cost of equipment is higher), thus creating economies of scale, we anticipate that market size will have a greater positive effect on technology-intensive FDI.

The results, presented in the first two columns of Table 13, indicate that both high and low technology industries are discouraged by weak IPR protection. The marginal effects are very similar in size, and the difference in the magnitudes of the probit coefficients, from which these marginal effects have been derived, is not statistically significant. One should keep in mind, however, that intellectual property rights do not play an equally important role in all technology-intensive industries. For instance, Mansfield (1995) mentions that IPR protection may be less crucial in sectors such as automobile production, in which firms frequently cannot make use of a competitor's technology without many complex and expensive inputs. Thus, we reestimate the model classifying as high technology only four R&D-intensive sectors which, as surveys indicate, tend to rely heavily on IPRs. They include: drugs, cosmetics and health care products; chemicals; machinery and equipment; and electrical equipment (see Mansfield, 1995 and Baldwin, 1996). When all FDI is taken into account (see Column 3 in Table 13), the deterring impact of inadequate IPR protection is almost twice as large for the IPR sensitive industries than for the other sectors. The marginal effects are significant at the one percent level, and the difference between the underlying probit coefficients is significant at the one percent level as well. However, when we estimate the model for manufacturing FDI alone, weak IPR protection has a larger impact on the four high technology sectors, but the differences between the underlying coefficients is not statistically significant.

As Lall (1997, p. 244) points out, strong protection of intellectual property not only decreases the threat of IPR infringement but also plays a signaling role: "… the 'signaling value' of the intellectual property regime has become extremely important in recent years. In general, countries that seek to attract technology-intensive foreign investment also offer strong protection to those investments." It is likely that potential investors perceive the adequacy of the IPR regime as an indication of the government's attitude towards FDI, which would explain why all kinds of FDI, and not only those in technology-intensive sectors, are deterred by a weak IPR regime.

As anticipated, we find some indication that a host country's GDP has a larger impact on technology-intensive industries than on low technology sectors. This difference appears to be significant at the ten percent level in the first column of Table 13. The progress of reforms, on the other hand, encourages FDI inflows into both sectors with the marginal effect being larger for low technology industries. The difference in magnitudes is statistically significant only in the second column of Table 13.

To sum up, our results provide evidence that stronger IPR protection and a larger market size encourage investors to undertake local production rather than to engage in distribution or open a representative office. Weak IPR protection discourages FDI in both high and low technology sectors, with this effect being significantly stronger for four R&D-intensive sectors in which intellectual property rights play an particularly prominent role.

VII. CONCLUSIONS

Governments all over the world compete fiercely to attract foreign direct investment. This is also true of policy makers in Central and Eastern Europe and the former Soviet Union who hope that FDI can contribute to upgrading production technologies in their countries. Even leaving aside our skepticism about the scope of FDI for technology transfer, we provide evidence that the reality does not live up to the expectations of policy makers in the region. The examination of investor characteristics shows that FDI inflows in transition economies concentrate in low technology activities. We find in our sample that firms characterized by low R&D intensity are more likely to invest in the region than firms with relatively large R&D spending. We also observe that higher R&D outlays increase the probability that an investor will engage in distribution rather than in local production.

Furthermore, our analysis shows that while larger population size, per capita income and GDP growth rate encourage foreign investment, slow progress in reform and regional tensions act as deterrents to FDI. We construct an index of IPR protection and find that a weak IPR regime has a negative impact on foreign investment inflows. It not only deters FDI in general but it also discourages foreign investors from undertaking local production and encourages them to engage in non-manufacturing projects. The negative effect of inadequate IPR protection is particularly strong in four technology-intensive sectors: drugs, cosmetics

and health care products; chemicals; machinery and equipment; and electrical equipment. As survey evidence shows, firms in these sectors tend to view IPRs as more important than their counterparts in other industries.

Since CEECs and the Soviet Union were virtually closed to FDI before 1989, their sudden opening to foreign investment can be compared to a natural experiment. This characteristic of our dataset presents us with a unique opportunity to estimate the effect of IPR protection and other country characteristics on FDI in the absence of investment history. It is possible that in earlier studies, the lack of controls for past policy variables and investment history has obscured the impact of IPR protection on foreign direct investment. Our results, therefore, suggest that more research is needed to improve our understanding of the implications of IPR regimes for the magnitude and composition of FDI inflows. Shedding more light on this issue could potentially encourage many developing countries to reevaluate their policies on IPR protection.

BIBLIOGRAPHY

Baldwin, John. 1996. "The Use of Intellectual Property Rights by Canadian Manufacturing Firms: Findings from the Innovation Survey," mimeo. Statistics Canada.

Bakos, Gabor. 1995. "Magyar Suzuki: Case Study of Japanese Investment" in Zloch-Christy, Iliana, ed. *Privatization and Foreign Investments in Eastern Europe.* Westport, CT and London: Praeger, pp. 197-214.

Blomström, Magnus. 1991. "Host country benefits of foreign investment." NBER Working Paper No. 3615.

Blomström, Magnus and E. Wolff. 1994. "Multinational Corporations and Productivity Convergence in Mexico" in W. Baumol, R. Nelson and E.Wolff, eds. *Convergence of Productivity. Cross-National Studies and Historical Evidence.* Oxford: Oxford University Press.

Braunerhjelm, Pontus and Roger Svensson. 1996. "Host country characteristics and agglomeration in foreign direct investment," *Applied Economics.* 28: 833-840.

Caves, Richard E. 1996. *Multinational Enterprise and Economic Analysis.* Second Edition. Cambridge: Cambridge University Press.

Csaki, Gyorgy. 1995. "Foreign Direct Investments in Hungary" in Zloch-Christy, Iliana, ed. *Privatization and Foreign Investments in Eastern Europe.* Westport, CT and London: Praeger, pp. 107-130.

Druzic, Ivo. 1997. "Regional dispersion of foreign direct investment in Eastern Europe" in Soumitra Sharma, ed. *Restructuring Eastern Europe. The Microeconomics of the Transition Process.* Cheltenham, UK and Lyme, US: Edward Elgar, pp. 97-110.

Dunning, John H. 1988a. *Explaining International Production.* London: Unwin Hyman.

Dunning, John H. 1988b. *Multinationals, Technology and Competitiveness.* London: Unwin Hyman.

Dunning, John H. 1991. *The Prospects for Foreign Direct Investment in Eastern Europe.* Discussion Papers in International Investment and Business Studies, No 155, University of Reading.

Dunning, John H. 1992. *Multinational Enterprises and the Global Economy*. Wokingham, England: Addison-Wesley Publishing Company.

Dunning, John H and Matija Rojec. 1993. *Foreign Privatization in Central & Eastern Europe.* Ljubljana, Slovenia: CEEPN.

EBRD. *Transition Report.* London. Various years.

ECE. 1995. *Economic Bulletin for Europe.* Vol. 47. Geneva.

Estrin, Saul, Kirsty Hughes and Sarah Todd. 1997. *Foreign Direct Investment in Central and Eastern Europe: Multinationals in Transition.* London and Washington: Pinter / Royal Institute for International Affairs.

Ferrantino, Michael J. 1993. "The Effect of Intellectual Property Rights on International Trade and Investment," *Weltwirtschaftliches Archiv.* 129: 300-331.

Ginarte, Juan C. and Walter G. Park. 1997. "Determinants of patent rights: A cross-national study," *Research Policy.* 26. pp. 283-301.

Grubaugh, Stephen G. 1987. "Determinants of Direct Foreign Investment," *Review of Economics and Statistics.* 69: 149-152.

Haddad, Mona and Ann Harrison. 1993. "Are There Positive Spillovers from Direct Foreign Investment? Evidence from Morocco" *Journal of Development Economics.* 42(1). pp. 51-74.

Hallward-Driemeier, Mary. 1996. "Understanding Foreign Direct Investment by Firms: Market Pull, Cost Push and Knowledge Accumulation," mimeo, MIT.

Havlik, Peter. 1996. "Exchange Rates, Competitiveness and Labour Costs in Central and Eastern Europe" *WIIW Research Report* No. 231. Vienna: WIIW.

Hunya, Gabor. 1997. "Large privatisation, restructuring and foreign direct investment" in Salvatore Zecchini, ed., *Lessons from the Economic Transition. Central and Eastern Europe in the 1990s.* Dordrecht, Boston and London: Kluwer Academic Publishers, pp. 275-300.

International Intellectual Property Alliance. *Special 301 Recommendations.* Various years.

International Telecommunication Union and OECD. 1994. *Telecommunication Indicators for Economies in Transition.* Paris: OECD.

Jermakowicz, Wladyslaw and Cecelia Drazek. 1993. "Joint Venture Laws in Eastern Europe: A Comparative Assessment" in Patrick Artisien, Matija Rojec and Marjan Svetlicic, eds., *Foreign Investment in Central and Eastern Europe.* New York: St. Martin's Press, pp. 149-68.

King, Lawrence P. 1997. "Strategic Restructuring: Making Capitalism in Post-Communist Eastern Europe." Paper prepared for the conference *Organization Change in Transition Economies* at The William Davidson Institute, Ann Arbor, September 26-28, 1997.

Knell, Mark. 1996. "Structural Adjustments and Growth: Is Eastern Europe Catching Up?" in Mark Knell, ed. *Economics of Transition. Structural Adjustments and Growth Prospects in Eastern Europe.* Cheltenham, UK and Brookfield, VT: Edward Elgar, pp. 1-24.

Kokko, Ari, Ruben Tansini and Mario C. Zejan. 1996. "Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector" *Journal of Development Studies.* 32(4). pp. 602-11.

Lall, Sanjaya. 1997. "Investment, technology and international competitiveness" in John H. Dunning and Khalil A. Hamdani, eds., *The New Globalism and Developing Countries.* Tokyo, New York and Paris: . United Nations University Press, pp. 232-59.

Lan, Ping and Stephen Young. 1996. "Foreign direct investment and technology transfer: a case-study o foreign direct investment in north-east China," *Transnational Corporations,* 5(1): 57-83.

Lankes, Hans-Peter and Nicholas Stern. 1997. "Capital flows to eastern Europe and the former Soviet Union" EBRD Working Paper No. 27.

Lankes, Hans-Peter and A.J. Venables. 1996. "Foreign direct investment in economic transition: the changing pattern of investments," *Economics of Transition.* 4(2): 331-347.

Lee, Jeong-Yeon and Edwin Mansfield. 1996. "Intellectual property protection and U.S. foreign direct investment," *Review of Economics and Statistics.* 78(2): 181-186.

Lipsey, Robert E., Magnus Blomstrom and Irving B. Kravis. 1990. "R&D by Multinational Firms and Host Country Exports" in Robert E. Evenson and Gustav Ranis, eds. *Science and Technology. Lessons for Development Policy.* Boulder and San Francisco: Westview Press, pp. 271-300.

Long, Scott J. 1997. *Regression Models for Categorical and Limited Dependent Variables.* London: SAGE Publications.

Mansfield, Edwin. 1994. "Intellectual property protection, foreign direct investment and technology transfer," IFC Discussion Paper No. 19.

Mansfield, Edwin. 1995. “Intellectual property protection, foreign direct investment and technology transfer,” IFC Discussion Paper No. 27.

Markusen, James R. 1995. “The Boundaries of Multinational Enterprises and the Theory of International Trade,” *Journal of Economic Perspectives.*9(2): 169-189.

Maskus, K. and D. Konan. 1994. “Trade-Related Intellectual Property Rights: Issues and Exploratory Results,” in A. Deardorff and R. Stern, eds. *Analytical and Negotiating Issues in the Global Trading System.* Ann Arbor: University of Michigan, pp. 401-446.

McKinnon, Ronald I. 1993. *The Order of Economic Liberalization.* Baltimore and London: The Johns Hopkins University Press.

Meyer, Klaus. 1995. “Direct Foreign Investment in Eastern Europe. The Role of Labor Costs,” *Comparative Economic Studies.* 37(3): 69-88.

Meyer, Klaus E. 1998. *Direct Investment in Economies in Transition.* Edward Elgar: Cheltenham, UK and Northampton, MA.

Michalet, Charles-Albert. 1997. “Strategies of Multinationals and Competition for Foreign Direct Investment. The Opening of Central and Eastern Europe,” *Foreign Investment Advisory Service Occasional Paper*, No. 10, Washington, D.C: The World Bank.

The New York Times. 1995. Craig R. Whitney “West European Companies Head East for Labor,” Feb. 9. Sec. D, p. 3.

The New York Times. 1996. Jane Perlez “A New Romania: Neither Communist Nor Godless,” Dec. 1. Sec. A, p. 3.

OECD. 1994. *Assessing Investment Opportunities in Economies in Transition.* Paris.

PAIZ (Polish State Investment Agency). 1995. *Major Investor List*. Warsaw.

Polish News Bulletin. 1998. “Foreign Companies and Trade,” July 31.

Radosevic, Slavo. 1996. “Prospects of Building Science and Technology Capabilities in Central and Eastern Europe” in Mark Knell, ed. *Economics of Transition. Structural Adjustments and Growth Porspects in Eastern Europe.* Cheltenham, UK and Brookfield, VT: Edward Elgar, pp. 185-209.

Radosevic, Slavo and David Dyker. 1997. “Technological integration and global marginalization of Central and East European economies: the role of FDI and alliances” in Soumitra Sharma, ed. *Restructuring Eastern Europe. The Microeconomics of the Transition Process.* Cheltenham, UK and Lyme, US: Edward Elgar, pp. 111-127.

Rapp, Richard T. and Richard P. Rozek. 1990. “Benefits and Costs of Intellectual Property Protection in Developing Countries,” Journal of World Trade. 24(5): 75-102.

Rodrik, Dani. 1991. “Policy uncertainty and private investment in developing countries,” *Journal of Development Economics*, 36(2): 229-242.

Schneider, Friedrich and Bruno S. Frey. 1985. “Economic and Political Determinants of Foreign Direct Investment” *World Development*. 13(2): 161-75.

Sharp, Margaret and Michael Barz. 1997. “Multinational companies and the transfer and diffusion of new technological capabilities in Central and Eastern Europe and the former Soviet Union” in Dyker, David A., ed. *The Technology of Transition. Science and Technology Policies for Transition Countries*. Budapest: Central European University Press, pp. 95-125.

Slater, John. 1996. “Foreign Direct Investment in the Transition to a Market Economy” in Patrick Artisien-Maksimenko and Yuri Adjubei, eds. *Foreign Investment in Russia and Other Soviet Successor States.* New York: St. Martin’s Press, pp. 3-22.

Tyson, Laura D'Andrea. 1992. *Who's Bashing Whom? Trade Conflict in High-Technology Industries.* Washington, DC: Institute for International Economics.
UN. 1992. *World Investment Directory 1992: volume II.* New York: UN Transnational Corporations and Management Division.
UN. 1997. *Statistical Yearbook 42 Issue*. New York: United Nations.
UNCTAD. 1992. *World Investment Report 1992: Transnational Corporations as Engines of Growth.* United Nations.
UNCTAD. 1996. *World Investment Report 1996: Investment, Trade and International Policy Arrangements.* United Nations.
UNCTAD. 1997. *World Investment Report 1997: Transnational Corporations, Market Structure and Competition Policy.* United Nations.
UNCTC. 1992. *The Determinants of Foreign Direct Investment. A Survey of the Evidence.* New York.
The Wall Street Journal. 1993. "Andersen to Advise Russia on Attracting Investment," Oct. 13.
The World Bank. 1992. *Foreign Direct Investment in the States of the Former USSR.* Studies of Economies in Transformation. Paper No. 5. Washington, DC: The World Bank.
The World Bank. 1996. *World Development Report 1996. From Plan to Market.* New York: Oxford University Press.
Yu, Chwo-Ming Joseph. 1990. "The Experience Effect and Foreign Direct Investment" *Weltwirtschaftliches Archiv.* 126 (3): 561-79.
Zloch-Christy, Iliana. 1995a. "Introduction: Foreign Investment and the Transition in Post-Communist Europe" in Zloch-Christy, Iliana, ed. *Privatization and Foreign Investments in Eastern Europe.* Westport, CT and London: Praeger, pp. 1-10.
Zloch-Christy, Iliana. 1995b. "Economic Transformation, External Imbalances, and Political Risk in Post-Communist Eastern Europe" in Zloch-Christy, Iliana, ed. *Privatization and Foreign Investments in Eastern Europe*. Westport, CT and London: Praeger, pp. 215-238.

APPENDIX I
Variables employed in the empirical analysis

Drawing on the theoretical and empirical literatures, the following firm and host country characteristics are examined in the study:

- Firm size (measured by the firm's sales in US dollars)
- R&D intensity (measured by R&D outlays as a percentage of net sales)
- Advertising intensity (proxied by selling, general & administrative expenses as a percentage of net sales; note that this is a standard proxy in the literature and has been used by, for instance, Grubaugh, 1987)
- Product diversification (the number of four-digit SIC codes describing a firm's activities)
- General multinational experience (proxied by the share of foreign assets in a firm's total assets)
- Regional experience (denoted by a dummy variable indicating whether a company had a trading relationship with the region before 1990)
- Capital intensity of production (proxied by sales per employee in US dollars)
- Dummies for high and low R&D and advertising sectors (for the former the cut-off value was one percent of net sales, while for the latter it was equal to twenty percent of net sales)
- The host country's market size (measured by population size); see Table 1
- Purchasing power (measured by GDP per capita); see Table 1
- Change in market size (measured by GDP growth rate); see Table 1
- Transition progress (represented by the average of EBRD transition indicators); transition indicators rate the progress of a country's reforms in the following areas: price liberalization and competition, trade and exchange system, large-scale privatization, small-scale privatization, enterprise restructuring, and banking reform. See EBRD (1994, p. 11) for a detailed description and Table 1
- IPR index (constructed by the author based on the information from Special 301 Recommendations prepared by the International Intellectual Property Alliance); note that lower index values imply stronger IPR protection; the index values are presented in Table 1

- Entry costs (index of required registration procedures derived by Jermakowicz and Drazek (1993, Table 9.4, pp. 158-9); the first half of 1991; see description below; the values are presented in Table 1; note that lower values indicate more complicated registration procedures
- A dummy variable equal to one if a country has been affected by regional tensions and zero otherwise (such tensions have been present in Armenia, Azerbaijan, Croatia, Georgia, FYR Macedonia and Tajikistan, according to World Bank, 1996, p. ix)
- Unit labor costs relative to the Austrian level (source: Havlik, 1996); see Table 1
- Number of main telephone lines per 100 inhabitants (source: International Telecommunication Union and OECD, 1994)
- WTO membership and applicant dummies (as of 1995 according to EBRD, 1997)

All information on firm characteristics other than that from the survey was obtained from the *Worldscope* database and pertains to fiscal year 1993 (from 4/93 to 3/94). Multinational experience, which refers to 1989 to avoid endogeneity, is the only exception.[38] Host country data refer to 1993 and are taken from the *EBRD Transition Report* (EBRD, 1997) unless otherwise noted. The transition indicators pertain to 1994, since it is the earliest year for which they are available. Note that even though the dataset contains 1,405 firms, not all information is available for all firms. Therefore, the number of firms used in the econometric analysis is much smaller, and the number of observations varies among regressions.[39]

Index of registration procedures mandatory for foreign investors	
Points	**Description**
1	Multi-stage process requiring consent of more than one government institution
2	All J-V registrations require consent of a government institution
3	Only majority foreign owned firms require government permit
4	Free registration

Source: Jermakowicz and Drazek (1993, Table 9.3 and 9.4, pp. 156-9).

[38] It is possible that other variables (e.g. advertising intensity) are also subject to the endogeneity problem. To explore this possibility we estimated our models with all of firm specific variables referring to 1989, and the results were not significantly different. Since, there are fewer missing values for 1993, we decided to present the results pertaining to that year.

[39] Note that the proportion of investors in the sample is equal to 27 percent. When we take into account only firms for which all data are available, the proportion of investors equals 29 percent.

APPENDIX II
Examples from Case Studies

The concerns of foreign investors about a weak system of IPR protection are echoed in the case studies:

Case study of ICI/Zeneca (ICI produces synthetic organic chemicals, while Zeneca manufactures pharmaceuticals and agricultural products):

> "Both Zeneca and ICI are worried by the lack of intellectual property rights in these countries [i.e., transition economies], especially in Russia, where pharmaceutical and high-value agricultural chemical patenting is not recognized. As regards technology transfer, both ICI and Zeneca are wary of piracy and doubtful about transferring either product or process know-how to these countries. Both companies, however, recognize that eventually Central and Eastern Europe and the FSU will be important markets. That is why Zeneca is investing in developing its distribution links in high value-added areas such as medical supplies and equipment and healthcare systems" (Sharp and Barz, 1997, p. 110).

Case study of Shell:

> "Shell provides know-how to its Russian partners where necessary, but does not pass on anything it regards as commercially sensitive. A relevant example is Shell's contract with the Russian R&D Institute for Element-Organic Compounds (INEOS) to produce a new construction plastic, called Noril. Shell will supply the chemical intermediates for production, while the technology will be Russian. There is no question of the Russians either supplying the intermediates or obtaining access to the more up-to-date technology used by General Electric for the manufacture of Noril in the United States" (Sharp and Barz, 1997, pp. 107-108).

An example from China:

> "Local staff working in the laboratories of two foreign affiliates manufacturing detergents discovered the contents of production by repeatedly trying the combinations. They then moved out to set up their own firms. In only a few years, more than ten small local firms were manufacturing detergent" (Lan and Young, 1996, p. 73, footnote 9).

APPENDIX III
An infinite horizon model

Under the assumptions of an infinite horizon and the probability π being independent each period, we obtain the same signs of derivatives as in the two period model:

$$R - \eta - \varepsilon + \frac{R(1-\pi) - \pi s}{(r+\pi)} > E\,\frac{(1+r)}{r} \tag{1A}$$

$$\varepsilon^{*} = \frac{R(1+r) - \pi s}{(r+\pi)} - E\,\frac{(1+r)}{r} - \eta \tag{2A}$$

$$\varepsilon^{*} = \frac{(a-W)^{2}(1+r) - 4b\pi s}{4b(r+\pi)} - \frac{\left[a-(1+t)(1+\tau)\right]^{2}(1+r)}{4br(1+\tau)} - \eta \tag{3A}$$

$$\frac{\partial \varepsilon^{*}}{\partial \pi} = -\frac{(a-W)^{2}(1+r) + 4bsr}{4b(r+\pi)^{2}} < 0 \tag{4A}$$

$$\frac{\partial \varepsilon^{*}}{\partial W} = -\frac{(a-W)(1+r)}{2b(r+\pi)} < 0 \tag{5A}$$

$$\frac{\partial \varepsilon^{*}}{\partial t} = \frac{\left[a-(1+t)(1+\tau)\right](1+r)}{2br} > 0 \tag{6A}$$

$$\frac{\partial \varepsilon^{*}}{\partial \tau} = \frac{(1+r)}{4br(1+\tau)^{2}}\left[a-(1+t)(1+\tau)\right]\left[a+(1+t)(1+\tau)\right] > 0 \tag{7A}$$

$$\frac{\partial \varepsilon^{*}}{\partial a} = \frac{(1+r)}{2b}\left[\frac{(a-W)}{(r+\pi)} - \frac{\left[a-(1+t)(1+\tau)\right]}{r(1+\tau)}\right] \tag{8A}$$

$$\frac{\partial \varepsilon^{*}}{\partial a} > 0 \text{ if } \frac{r\left[a\tau + (1+\tau)(1+t-W)\right]}{a-(1+t)(1+\tau)} > \pi \tag{9A}$$

$$\frac{\partial \varepsilon^{*}}{\partial \eta} = -1 < 0 \tag{10A}$$

TABLE 1. FDI distribution and host country characteristics

	Cumulative FDI inflows (mn US$)*	Share of cumulative FDI inflows into the region (%)*	Cumulative FDI inflows per capita (US$)*	No. of projects undertaken or planned	as % of all projects undertaken or planned	Scientists, engineers in R&D (per 100,000 people)**	Average of transition indicators	Population (mn)	GDP per capita (US$)	GDP growth	Entry costs	Index of IPR protection	Unit labor costs
	1989-95	1989-95	1989-95	in the sample	in the sample	Latest avail.	1994	1993	1993	1993	1st half 1991	1990-95	1993
Albania	200	0.7	63	9	0.8	.	2.5	3.2	388	9.6	.	.	.
Armenia	22	0.1	6	1	0.1	.	1.8	3.7	120	-15.0	2.0	3.0	.
Azerbaijan	276	0.9	37	10	0.9	.	1.3	7.4	223	-23.1	2.0	3.0	.
Belarus	85	0.3	8	9	0.8	324	1.7	10.4	300	-10.6	2.0	3.0	.
Bulgaria	302	1.0	36	37	3.3	447	2.5	8.5	1,276	-2.4	4.0	2.0	21.27
Croatia	251	0.8		21	1.8	186	3.2	4.8	2,440	-0.9	.	.	32.10
Czech Republic	5,481	18.2	532	170	14.9	128[3]	3.5	10.3	3,016	-0.9	2.0	1.0	22.32
Estonia	637	2.1	413	43	3.8	339	3.3	1.5	1,105	-8.5	2.0	2.0	.
FYR Macedonia	38	0.1	18	3	0.3	118[2]	2.8	2.2	1,130	-8.4	.	.	.
Georgia	92	0.3	17	7	0.6	.	1.3	5.4	.	-25.4	2.0	3.0	.
Hungary	11,466	38.0	1,113	174	15.3	115[1]	3.3	10.3	3,748	-0.6	4.0	1.0	40.86
Kazakhstan	1,831	6.1	110	26	2.3	.	1.7	16.9	981	-10.4	2.0	3.0	.
Kyrgyzstan	143	0.5	32	2	0.2	.	2.8	4.4	200	-16.0	2.0	3.0	.
Latvia	409	1.4	164	30	2.6	116	2.8	2.6	836	-14.9	2.0	.	.
Lithuania	228	0.8	61	26	2.3	127	3.0	3.7	754	-24.2	2.0	.	.
Moldova	95	0.3	22	6	0.5	.	2.2	4.3	350	-1.0	2.0	2.0	.
Poland	2,423	8.0	63	194	17.0	108[3]	3.3	38.5	2,234	3.8	4.0	1.0	34.45
Romania	879	2.9	39	48	4.2	140	2.7	22.7	1,159	1.3	2.0	3.0	25.21
Russia	3,100	10.3	21	169	14.9	435	2.7	148.3	1,239	-8.7	2.0	2.0	11.89
Slovak Republic	623	2.1	117	66	5.8	193[3]	3.3	5.3	2,258	-3.7	2.0	1.0	21.04
Slovenia	505	1.7	253	36	3.2	289	3.2	2.0	6,368	2.8	.	.	55.75
Tajikistan	29	0.1	5	2	0.2	70	1.7	5.7	131	-11.0	2.0	3.0	.
Turkmenistan	215	0.7	54	4	0.4	.	1.2	4.1	929	-10.0	2.0	2.0	.
Ukraine	581	1.9	11	34	3.0	669	1.3	52.1	269	-14.2	2.0	2.0	9.92
Uzbekistan	287	1.0	13	11	1.0	171	2.0	22.0	254	-2.3	2.0	3.0	.

Data sources are discussed in Appendix I. *Source: EBRD (1996) **Source: United Nations (1997). [1] Not including scientists and engineers engaged in the administration of R&D; of military R&D, only that part carried out in civil establishment is included. [2] Data include part-time personnel. [3] Not including military and defense R&D.

TABLE 2. Firms with FDI in Poland

Mean (latest available year)	Survey non-respondents	Survey respondents	t-stat	Pr > |t |
Assets	30,300,000	38,700,000	-0.68	0.50
Sales (thousands US$)	16,800,000	13,700,000	0.67	0.50
Advertising outlays/Sales (%)	20.90	20.37	0.18	0.85
R&D outlays/Sales (%)	3.03	3.38	-0.43	0.67
Foreign Assets/Total Assets (%)	31.71	31.56	0.03	0.98
Foreign Sales/Total Sales (%)	45.57	51.12	-0.99	0.32
No. of firms	59	59		

Source: Author's calculations based on *Worldscope.*

TABLE 3. Sectoral distribution of investors in the sample

	R&D/Sales*100 (All firms in *Worldscope*)	**R&D/Sales*100 (Investors in the sample)**	**No. of firms with FDI in the region (in the sample)**	**% of all firms with FDI in the region (in the sample)**
Miscellaneous	**4.11**	**2.49**	54	14.17
Financial	.	.	49	12.86
Construction	0.58	2.06	32	8.40
Machinery & equipment	**2.95**	**2.72**	27	7.09
Oil, gas and coal	0.73	1.20	26	6.82
Electronics	**11.23**	**6.90**	23	6.04
Chemicals	**2.98**	**3.86**	21	5.51
Metal & metal products	0.99	1.43	20	5.25
Food & beverages	0.62	0.80	19	4.99
Diversified	**1.72**	**0.89**	16	4.20
Utilities	0.75	0.91	13	3.41
Electrical	**2.38**	**1.67**	11	2.89
Retailers	0.02	0.00	11	2.89
Drugs, cosmetics & health care products	**20.38**	**7.75**	10	2.62
Paper	0.70	0.54	10	2.62
Automotive	**2.31**	**3.81**	9	2.36
Transportation	0.00	0.00	9	2.36
Recreation	0.92	.	7	1.84
Textiles & apparel	0.61	0.36	5	1.31
Printing & publishing	0.12	1.07	4	1.05
Aerospace	**6.03**	**7.54**	3	0.79
Tobacco	0.18	.	2	0.52
TOTAL	**4.53**	**3.07**	381	100

Figures for industries with the average R&D outlays/Sales exceeding one percent are bold.

TABLE 4. Characteristics of investors. Probit model.

	FDI in the region	**FDI in the region**	**FDI in the region**
Firm size (bn USD)	**0.0027*** (0.0009)**	**0.0022** (0.0010)**	**0.0024*** (0.0010)**
R&D intensity	-0.0048 (0.0031)	**-0.0074** (0.0039)**	**-0.0073** (0.0039)**
Advertising intensity	**0.0027*** (0.0010)**	**0.0036*** (0.0013)**	**0.0033*** (0.0012)**
Regional experience	**0.1647*** (0.0378)**	**0.2230*** (0.0786)**	**0.1995*** (0.0777)**
Multinational experience		<0.0001 (0.0006)	<0.0001 (0.0006)
Sales per employee			<0.0001 (0.0001)
No. of obs	305	134	133
Chi^2	81.10	50.61	56.17
d.f.	25	22	23
Prob > Chi^2	0.00	0.00	0.00
Pseudo R^2	0.23	0.28	0.30
Log Likelihood	-80.38	-32.48	-31.65
obs. P	0.11	0.11	0.11
pred. P	0.06	0.05	0.05

Results reported in terms of marginal effects.
<0.0001 denotes coefficients with absolute value smaller than 0.0001.
*** significant at 1% level, ** at 5% level, * at 10% level.
Dummies for industry groups and source countries have been included.

TABLE 5. Choosing project function. Multinomial logit model.

	MANUFACTURING	DISTRIBUTION (BUT NO MANUFACTURING)	REPRESENTATIVE OFFICE ONLY
Firm size (bn US$)	0.0014 (0.0014)	0.0003 (0.0015)	-0.0017 (0.0018)
Advertising intensity	**-0.0076***** **(0.0019)**	-0.0015 (0.0019)	**0.0091***** **(0.0016)**
R&D intensity	**-0.0426***** **(0.0066)**	**0.0162***** **(0.0054)**	**0.0264***** **(0.0048)**
No. of obs.	514		
Chi^2	78.49		
d.f.	6		
Prob > Chi^2	0.00		
Log Likelihood	-515		
obs. P	0.37	0.34	0.29
pred. P	0.35	0.37	0.28

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Significant figures are bold. Oil, coal and gas sector has been excluded.

TABLE 6. Choosing project function. Multinomial logit model.

	MANUFACTURING	DISTRIBUTION (BUT NO MANUFACTURING)	REPRESENTATIVE OFFICE ONLY
Firm size (bn US$)	0.0017 (0.0014)	<0.0001 (0.0016)	-0.0017 (0.0018)
Advertising intensity	**-0.0084***** **(0.0020)**	-0.0009 (0.0019)	**0.0092***** **(0.0017)**
R&D intensity	**-0.0418***** **(0.0065)**	**0.0158***** **(0.0054)**	**0.026***** **(0.0048)**
Product diversification	-0.0169 (0.0108)	0.0144 (0.0102)	0.0024 (0.0099)
No. of obs.	514		
Chi^2	81.61		
d.f.	8		
Prob > Chi^2	0.00		
Log Likelihood	-513.17		
obs. P	0.37	0.34	0.29
pred. P	0.35	0.37	0.28

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. <0.0001 denotes marginal effects with absolute value smaller than 0.0001. Significant figures are bold. Oil, coal and gas sector has been excluded.

TABLE 7. Choosing project function. Multinomial logit model.

	MANUFACTURING	DISTRIBUTION (BUT NO MANUFACTURING)	REPRESENTATIVE OFFICE ONLY
Firm size (bn US$)	-0.0002 (0.0014)	-0.0007 (0.0015)	0.001 (0.0015)
Low ADV sector * Advertising intensity	-0.0036 (0.0024)	-0.0016 (0.0026)	**0.0052**** **(0.0027)**
High ADV sector * Advertising intensity	**-0.0101***** **(0.0023)**	-0.0022 (0.0021)	**0.0122***** **(0.0020)**
Low R&D sector * R&D intensity	-0.0094 (0.0256)	**-0.0714*** **(0.0405)**	**0.0808***** **(0.0223)**
High R&D sector * R&D intensity	**-0.0381***** **(0.0070)**	**0.0175***** **(0.0057)**	**0.0206***** **(0.0052)**
No. of obs.	514		
Chi^2	90.34		
d.f.	10		
Prob > Chi^2	0.00		
Log Likelihood	-495.17		
obs. P	0.37	0.34	0.29
pred. P	0.35	0.36	0.29

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Significant figures are bold. Oil, coal and gas sector has been excluded.

TABLE 8. Choosing project function. Multinomial logit model.

	MANUFACTURING	DISTRIBUTION (BUT NO MANUFACTURING)	REPRESENTATIVE OFFICE ONLY
Firm size (bn US$)	<0.0001 (0.0014)	-0.0008 (0.0015)	0.0007 (0.0016)
Low ADV sector * Advertising intensity	**-0.0048*** **(0.0025)**	-0.0016 (0.0026)	**0.0063**** **(0.0027)**
High ADV sector * Advertising intensity	**-0.0117***** **(0.0025)**	-0.0019 (0.0022)	**0.0137***** **(0.0022)**
Low R&D sector * R&D intensity	-0.0157 (0.0261)	**-0.0734*** **(0.0416)**	**0.0891***** **(0.0231)**
High R&D sector * R&D intensity	**-0.0357***** **(0.0069)**	**0.0162***** **(0.0057)**	**0.0196***** **(0.0052)**
Product diversification	**-0.0253**** **(0.0117)**	0.0029 (0.0107)	**0.0224**** **(0.0106)**
No. of obs.	514		
Chi^2	94.44		
d.f.	12		
Prob > Chi^2	0.00		
Log Likelihood	-492.18		
obs. P	0.37	0.34	0.29
pred. P	0.36	0.36	0.28

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. <0.0001 denotes absolute value smaller than 0.0001. Oil, coal and gas sector has been excluded.

TABLE 9. Importance of FDI in transition economies to the parent firm. Probit model.

	Importance	**Importance**
Firm size (bn US$)	**0.0122* (0.0072)**	**0.0124* (0.0006)**
Advertising intensity	**-0.009* (0.0049)**	**-0.0095** (0.0041)**
R&D intensity	**-0.0272* (0.0143)**	**-0.029** (0.0136)**
Product diversification	**-0.0528* (0.0286)**	**-0.0388* (0.0232)**
European firm		**0.3134* (0.1703)**
North American firm		0.2827 (0.1693)
No. of obs.	134	134
Chi^2	12.98	19.14
d.f.	4	6
Prob > Chi^2	0.01	0.00
Log Likelihood	-83.53	-82.94
obs. P	0.54	0.54
pred. P	0.54	0.55

Results are reported in terms of marginal effects.
*** significant at 1% level, ** at 5% level, * at 10% level.
Oil, coal and gas sector has been excluded.

TABLE 10. Probit estimates of the model.

	All FDI	All FDI	All FDI	All FDI	All FDI
Population (mns)	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**
GDP per capita (thousands US$)	**0.033*** (0.0045)**	**0.033*** (0.0045)**	**0.029*** (0.0050)**	**0.029*** (0.0047)**	**0.028*** (0.0050)**
GDP growth	**0.003*** (0.0005)**	**0.003*** (0.0005)**	**0.002*** (0.0006)**	**0.003*** (0.0006)**	**0.002** (0.0008)**
Transition progress	**0.024*** (0.0056)**	**0.018*** (0.0060)**	**0.025*** (0.0055)**	0.008 (0.0056)	**0.011* (0.0065)**
IPR protection index	**-0.022*** (0.0054)**	**-0.020*** (0.0052)**	**-0.018*** (0.0051)**	**-0.017*** (0.0047)**	**-0.016*** (0.0048)**
Regional tensions			**-0.029** (0.0085)**	-0.014 (0.0127)	-0.018 (0.0123)
Entry cost index			**0.006** (0.0028)**		0.003 (0.0035)
WTO member				**0.040*** (0.0152)**	**0.042*** (0.0158)**
WTO applicant				**0.044*** (0.0132)**	**0.039*** (0.0143)**
Telephone lines (per 100 inhabitants)		**0.001*** (0.0005)**			
No. of obs.	6246	6246	6246	6246	6246
Chi^2	2273	2280	2282	2295	2296
d.f.	351	352	353	354	355
Prob > Chi^2	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.44	0.44	0.44	0.44	0.44
Log Likelihood	-1457	-1453	-1452	-1446	-1445
obs. P	0.15	0.15	0.15	0.15	0.15
pred. P	0.04	0.03	0.03	0.03	0.03

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Firm dummies have been included in all regressions but are not reported. Oil, coal and gas sector has been excluded.

TABLE 11. Probit estimates of the model.

	Manuf FDI	Manuf FDI	Manuf FDI	Manuf FDI	Manuf FDI
Population (mns)	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**	**0.001*** (0.0001)**
GDP per capita (thousands US$)	**0.020*** (0.0045)**	**0.020*** (0.0046)**	**0.016*** (0.0045)**	**0.016*** (0.0047)**	**0.012*** (0.0048)**
GDP growth	**0.002*** (0.0006)**	**0.002*** (0.0006)**	**0.001* (0.0006)**	**0.002*** (0.0007)**	0.001 (0.0009)
Transition progress	**0.019*** (0.0064)**	**0.015** (0.0069)**	**0.019*** (0.0060)**	0.007 (0.0058)	**0.013* (0.0069)**
IPR protection index	**-0.019*** (0.0060)**	**-0.018*** (0.0059)**	**-0.014*** (0.0055)**	**-0.013*** (0.0051)**	**-0.012** (0.0051)**
Regional tensions			**-0.030* (0.0070)**	-0.023 (0.0096)	**-0.029* (0.0080)**
Entry cost index			**0.005* (0.0030)**		**0.006* (0.0037)**
WTO member				**0.031** (0.0162)**	**0.036** (0.0177)**
WTO applicant				**0.027** (0.0131)**	0.016 (0.0129)
Telephone lines (per 100 inhabitants)		0.001 (0.0005)			
No. of obs.	4014	4014	4014	4014	4014
Chi^2	1059	1060	1067	1071	1074
d.f.	227	228	229	230	231
Prob > Chi^2	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.38	0.38	0.38	0.38	0.38
Log Likelihood	-879	-878	-875	-873	-872
obs. P	0.11	0.11	0.11	0.11	0.11
pred. P	0.03	0.03	0.03	0.02	0.02

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Firm dummies have been included in all regressions but are not reported. Oil, coal and gas sector has been excluded.

TABLE 12. Manufacturing vs. non-manufacturing projects. Probit model.

	Manuf./Non manuf.	**Manuf./Non manuf.**	**Manuf./Non manuf.**
Firm size (bn US$)	0.0008 (0.0019)	0.0014 (0.0018)	0.0013 (0.0018)
R&D intensity	**-0.0375***** **(0.0103)**	**-0.0370***** **(0.0097)**	**-0.0344***** **(0.0079)**
Advertising intensity	**-0.0101**** **(0.0046)**	**-0.0132***** **(0.0046)**	**-0.0139***** **(0.0046)**
Product diversification	**-0.0365*** **(0.0202)**	**-0.0364*** **(0.0196)**	**-0.0391**** **(0.0192)**
GDP (bn US$)	**0.0017***** **(0.0005)**	**0.0020***** **(0.0006)**	**0.0017***** **(0.0005)**
Transition progress	-0.0307 (0.0622)	-0.0672 (0.0807)	0.0317 (0.0634)
IPR protection index	**-0.0809*** **(0.0460)**	**-0.1236*** **(0.0660)**	
Unit labor costs		0.0013 (0.0031)	0.0004 (0.0022)
No. of obs.	429	357	387
Chi^2	65.76	70.76	89.88
d.f.	20	20	19
Prob > Chi^2	0.00	0.00	0.00
Pseudo R^2	0.18	0.19	0.19
Log Likelihood	-234	-195	-209
obs. P	0.38	0.40	0.38
pred. P	0.35	0.36	0.35

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Oil, coal and gas sector has been excluded. Industry dummies have been included in all regressions but are not reported. Standard errors have been corrected to take into account possible correlations between errors from the observations for the same firm.

TABLE 13. High and low technology sectors. Probit model.

	All Hi Tech sectors		IPR Sensitive Hi Tech Sectors	
	All FDI	**Manuf. FDI**	**All FDI**	**Manuf. FDI**
Hi Tech sectors * GDP (bn US$)	0.0009*** (0.0000)	0.0007*** (0.0000)	0.0009*** (0.0000)	0.0007*** (0.0000)
Other sectors * GDP (bn US$)	0.0008*** (0.0001)	0.0007*** (0.0001)	0.0008*** (0.0000)	0.0007*** (0.0000)
Hi Tech sectors * transition progress	0.0448*** (0.0065)	***0.0195**** ***(0.0069)***	0.0263** (0.0111)	0.0157 (0.0101)
Other sectors *transition progress	0.0444*** (0.0090)	***0.0501**** ***(0.0099)***	0.0487*** (0.0059)	0.0371*** (0.0069)
Hi Tech sectors * IPR protection index	-0.0564*** (0.0064)	-0.0414*** (0.0069)	**-0.0843*** (0.0119)**	-0.0467*** (0.0102)
Other sectors *IPR protection index	-0.0573*** (0.0086)	-0.0331*** (0.0088)	**-0.0498*** (0.0057)**	-0.0367*** (0.0066)
No. of obs.	6246	4014	6246	4014
Chi^2	2178	1039	2184	1034
d.f.	352	228	352	228
Prob > Chi^2	0.00	0.00	0.00	0.00
Pseudo R^2	0.42	0.37	0.42	0.37
Log Likelihood	-1504	-889	-1501	-892
obs. P	0.15	0.11	0.15	0.11
pred. P	0.04	0.03	0.04	0.03

Results are reported in terms of marginal effects. *** significant at 1% level, ** at 5% level, * at 10% level. Bold figures indicate that the difference between the underlying coefficients is statistically significant at 1% level, bold italics mark a difference significant at 5% level.
Oil, coal and gas sector has been excluded. Firm dummies have been included in all regressions but are not reported.