COMPOSITION OF FOREIGN DIRECT INVESTMENT AND PROTECTION OF INTELLECTUAL PROPERTY RIGHTS: EVIDENCE FROM TRANSITION ECONOMIES

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Abstract: While the earlier literature examined the impact of intellectual property protection on the volume of foreign direct investment (FDI), little is known about its effect on the composition of FDI inflows. This paper addresses this question empirically using a unique firm-level data set from Eastern Europe and the former Soviet Union. It finds that weak protection deters foreign investors in technology-intensive sectors that rely heavily on intellectual property rights. Moreover, the results indicate that a weak intellectual property regime encourages investors to undertake projects focusing on distribution rather than local production.

Keywords: Foreign direct investment, Intellectual property rights, Transition economies, Survey data
JEL classification: F23, O34

I. INTRODUCTION

Protection of intellectual property rights (IPRs) has been a prominent item on international policy agenda. Despite the introduction of the agreement on trade-related aspects of intellectual property rights (TRIPs), many developing economies are not eager to strengthen their IPR legislation and its enforcement fearing that the losses resulting from this action would outweigh its benefits. This paper contributes to a better understanding of potential gains from stronger IPR protection by providing empirical evidence indicating that the extent of IPR protection in a host country affects the composition of foreign direct investment (FDI) it receives. More specifically, this study finds that a weak IPR regime deters foreign investment in high technology sectors where intellectual property rights play an important role. Moreover, its tilts the focus of FDI projects from manufacturing to distribution.

The relationship between IPR protection and FDI is quite complex. On the one hand, a weak IPR regime increases the probability of imitation, which makes a host country a less attractive location for foreign investors. On the other hand, strong protection may shift the preference of multinational corporations from FDI towards licensing. As surveys of multinationals have shown, the importance of IPR protection varies between industries. The concern about the IPR regime also depends on the purpose of an investment project, being the highest in the case of R&D facilities and the lowest for projects focusing exclusively on sales and distribution (see Mansfield, 1994 and 1995).

This paper investigates two hypotheses that emerge from the above studies. First, it tests whether foreign investors in IPR sensitive sectors (as indicated by Mansfield, 1995) are more affected by the extent of intellectual property protection in a host country than investors in general. Second, it examines if the IPR regime influences a foreign investor's choice between setting up production facilities and engaging in activities focused solely on distribution.

A unique firm-level data set used in this study allows for a more in depth examination of this phenomenon than it was possible in the earlier literature which concentrated mostly on aggregate inflows and case studies. The data set was compiled from a worldwide survey of companies conducted by the European Bank for Reconstruction and Development (EBRD) in 1995. The survey recipients were asked whether they had undertaken FDI in twenty-five economies in Eastern Europe and the former Soviet Union and if so, what type of projects they were engaged in. These responses were supplemented with information on firm characteristics and host country specific variables.

This study employs two measures of IPR protection. The first one is the index capturing the strength of patent rights developed by Ginarte and Park (1997) and extended by the author to include more transition economies. While the Ginarte-Park measure is quite detailed, it focuses only on laws present in the books but not their enforcement. Therefore a second index, developed specifically for this study, more crude in nature but taking into account the enforcement issue is also used.

The empirical analysis confirms the hypotheses thus indicating that weak protection of intellectual property rights has a significant impact on the composition of FDI inflows. First, it deters foreign investors 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. Second, weak protection encourages foreign investors to set up distribution facilities rather than to engage in local production. Finally, the results suggest that investors are sensitive to both laws on the books as well as their enforcement. The above findings are robust to controls for privatization, transition progress, corruption level and effectiveness of the legal system.

In addition to an intrinsic interest in transition, a focus on Eastern Europe and the former Soviet Union 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. Transition economies offer almost a natural control since FDI in the region was negligible prior to 1989. Therefore, the results of this paper suggest that the importance of IPR protection in developing countries may have been understated in past research. A further investigation of this issue is certainly needed.

This study is structured as follows. The next section briefly reviews the related literature and formulates the hypotheses to be tested. Section III describes the econometric specifications and the data set. In Section IV, empirical results are presented. Section V concludes the study.

II. RELATED LITERATURE AND HYPOTHESES TO BE TESTED

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).[1] 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 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 greater 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.[2] Thus, the overall relationship between the level of IPR protection and FDI is ambiguous.

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 as well as Primo Braga and Fink (2000) who use Ginarte and Park (1997) index do not obtain statistically significant results. 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.

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. Though, the IPR regime is likely to be important for sectors such as drugs, cosmetics and health care products; chemicals; machinery and equipment; and electrical equipment.[3]

Additionally, a survey of U.S. manufacturing firms conducted by Mansfield (1994) revealed that the importance of IPR regimes for investment decision depends on the purpose of the investment project. For instance, in the case of investment in sales and distribution outlets, only about 20 percent of survey 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

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[1] Other theories of FDI can be found in the surveys of Dunning (1993), Caves (1996) and Markusen (1995).
[2] Indeed Yang and Maskus (2000) find that licensing is more likely to take place in countries with strong IPR protection.
[3] Baldwin (1996) also confirms that these sectors rely heavily on IPR protection.

protection as important. This percentage increased to 50-60 for investments in manufacturing components and complete products and to 80 when R&D facilities were involved.

Case studies from transition economies echo the concerns of foreign investors about weak IPR protection and are consistent with the survey findings. For instance, Sharp and Barz (1997, p. 110) mention that ICI (company producing synthetic organic chemicals) and Zeneca, a pharmaceutical company, "are wary of piracy and doubtful about transferring either product or process know-how to these countries [i.e., transition economies]. Both companies, however, recognize that eventually Central and Eastern Europe and the FSU [former Soviet Union] 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." Similar picture emerges from the 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).

Such examples are obviously not restricted to Eastern Europe and the former Soviet Union. Lan and Young, (1996, p. 73, footnote 9) present a case 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." [4]

In the light of the theoretical prediction presented above as well as the conclusions emerging from interviews with foreign investors, the following testable hypotheses emerge. (1) FDI in sectors relying heavily on protection of intellectual property is likely to be deterred by a weak IPR regime. It is not clear, however, that this should be true for FDI inflows in general. (2) In countries with weak protection of intellectual property, investors may be more inclined to engage only in distribution activities rather than in local production. These two hypotheses are tested in this study.

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[4] Several Western law firms active in Eastern Europe (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.

III. ECONOMETRIC SPECIFICATION AND DATA

Econometric specification

To test the first hypothesis, a probit model of the determinants of investment decision is estimated. The model is of the following form:

$$Y_{ic}^* = d_i + X_c \beta_1 + d_{HT} X_c \beta_2 + u_{ic}$$

$$Y_{ic} = 1 \text{ if } Y_{ic}^* > 0$$

$$Y_{ic} = 0 \text{ otherwise}$$

The dependent variable takes on the value of one if firm i has invested in country c, and zero if a firm has not undertaken FDI in country c. Thus for each firm the number of observations is equal to the number of possible destination countries in the sample. To control for unobserved firm characteristics, firm specific dummy variables d_i are included. Additionally, country specific explanatory variables X_c are included in the model. Since the impact of IPR protection and possibly other variables is expected to differ between sectors, the model allows for a separate coefficient for high technology sectors in which IPRs play a more prominent role. It is achieved by interacting X_c with a dummy variable for these sectors. Following the survey findings of Mansfield (1995), the IPR sensitive sectors include: drugs, cosmetics and health care products; chemicals; machinery and equipment; and electrical equipment. The errors are corrected for a correlation between observations for the same destination country.[5] The results in the tables to follow are presented in terms of marginal effects evaluated at sample means. The significance levels, however, refer to the underlying coefficients since it is more relevant to judge the significance of the relationship between the variables rather than the significance of marginal effects evaluated at a specific point.

To test the second hypothesis, the following probit model is estimated:

$$Y_{ic}^* = X_i \delta + X_c \beta + u_{ic}$$

$$Y_{ic} = 1 \text{ if } Y_{ic}^* > 0$$

$$Y_{ic} = 0 \text{ otherwise}$$

The dependent variable, Y_{ic}, takes on the value of one if the investment project undertaken or planned by firm i in country c involves local production and zero if the projects focuses solely on distribution. On the right hand side, both firm (X_i) and host country (X_c) specific variables are included.[6] Additionally,

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[5] Note that while it could have been useful to estimate a probit model with random effects for host countries, a large number of observations for each host country makes such an estimation computationally infeasible.
[6] Firm specific variables are used since employing 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.

industry dummies are added to the model. Again, the standard errors are corrected for possible correlation for observations for the same host country.

Data

The empirical analysis employs a unique firm-level data set based on the EBRD Foreign Investment Survey. In January 1995, a brief questionnaire was sent to all companies listed in *Worldscope* (about 9,500 firms). *Worldscope* is a commercial database that provides detailed financial statements and business descriptions for about ten thousand public companies located in more than fifty countries. Sending the questionnaire to all of them assured that all major public companies in the world would be included. Responses were obtained from 1,405 firms that answered questions regarding their undertaken and planned investments in Eastern Europe and the former Soviet Union. Additionally, information on the function of the projects (manufacturing, distribution, representative office) was collected.[7] The data set 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.[8] The issue of potential response bias is discussed in Appendix I. Since the objective of this study is to explore the impact of government policies on the magnitude and nature of FDI inflows, firms in the oil, gas and coal sector, which are likely to be attracted to natural resource endowments, are excluded from the estimations.

Measures of IPR protection

The key variable in the regression is a proxy for the IPR regime. The indices of patent rights protection developed by Rapp and Rozek (1990) and Ginarte and Park (1997) are the two most popular measures employed in the literature. The former index, while widely used, is inadequate for the purpose of this paper since it covers only five countries from the data set and pertains to the pre-transition period. The Ginarte-Park measure, on the other hand, covers ten transition economies and includes information

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[7] 117 of the survey respondents were chosen for in-depth interviews whose results are discussed in Lankes and Venables (1996).

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

for 1995.[9] In order to test the hypotheses using the full data set, the Ginarte-Park index was extended to cover nine more countries.[10]

The Ginarte-Park index takes into account five categories of patent laws: (1) extent of coverage, (2) membership in international patent agreements, (3) provisions for loss of protection, (4) enforcement mechanisms, and (5) duration of protection. Each of the categories is assigned a value between 0 and 1, and the unweighted sum of these values constitutes the patent rights index (see Ginarte and Park, 1997 for a detailed description). Thus, the index ranges from zero to five with the higher values indicating a stronger level of protection. The index refers to 1995 or the closest year for which the information was available. Table 1 lists the index values. The highest score in the group of countries under consideration was obtained by Hungary (3.75), while the lowest score of 2.52 belongs to Uzbekistan and former Yugoslav Republic of Macedonia. The average value of the index is 3.04. For comparison, the mean value of the index for 110 countries rated in 1995 was 2.67. A *positive* coefficient on the Ginarte-Park index will indicate that stronger patent laws are associated with a greater probability of FDI being undertaken.

The advantages of the Ginarte-Park index are a great level of detail and taking into account the treatment of foreigners. Its main disadvantage is the fact that it focuses on the laws present on the books but it does not capture their enforcement.

Since the issue of enforcement may have a crucial impact on foreign investors' decisions, the paper also employs another index of IPR protection developed specifically for this study. This simple index captures both the legislative and the enforcement aspect of the IPR regime. It is based on the descriptions of IPR regimes provided by the International Intellectual Property Alliance in their recommendations for countries to be placed on the U.S. Special 301 Watch List. These descriptions include the issue of enforcement and pay special attention to trademark and copyright laws. Note that the actual placements on the Special 301 Watch List have not been used in developing the index, since they depend not only on the extent of IPR violations in a specific country but also on the importance of the country to the U.S. interests. Again 1995 is used as a reference point in the rating. The table below presents the rating criteria. A higher value of the index corresponds to weaker IPR protection, thus a *negative* coefficient on this variable is expected. Table 1 lists the values of the index. The correlation between the Ginarte-Park measure and this index is -.57.

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[9] The author would like to thank Walter Park for kindly sharing the updated version of the index.
[10] The sources used to extend the index include Garrison (various years), Baxter (various years) and websites of the State Intellectual Property Offices in Croatia and Latvia.

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	Lack of adequate IPR legislation at the end of 1995

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

Other control variables

The IPR regime may be correlated with other host country characteristics such as the overall progress in reform, effectiveness of the legal system, corruption level, privatization policies and openness to trade. Therefore, additional variables are included in the regression to control for these factors.

Multinational corporations are less likely to invest in risky and unstable countries, and the perceived riskiness of Eastern Europe and the former Soviet Union has often been cited as a factor discouraging foreign capital inflows.[11] 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. The 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. Thus, in the empirical analysis, the average of the EBRD indicators is used as a proxy for risks associated with undertaking FDI in a given host country. Since the higher values of the transition index indicate a greater progress in reform, one would expect to observe a positive coefficient on this variable.

Further, the effectiveness of the legal system is controlled for using another indicator produced by the EBRD (see EBRD, 1995, p. 103). This indicator, ranging from 1 to 4*, assesses the extent to which legal rules affecting investment are clear and accessible as well as adequately supported administratively and judicially. The value of one is assigned to countries where legal rules are usually very unclear and often contradictory, the availability of independent legal advice is limited, and the administration of the law is substantially deficient. The highest value (4*) is assigned to countries with clear and readily ascertainable laws, sophisticated legal advice available and well functioning courts. Note the maximum score achieved by the countries in the group is 4.

Further, a measure of the extent of corruption is added to the model. The corruption index is based on the information assembled by Neumann (1994) who interviewed German businessmen active in

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

each of the countries. The values of the index range from 0 (little corruption) to 10 (high corruption) and are proportional to the percentage of transactions involving corrupt payments. This index was used in Ades and Di Tella (1997).[12]

Since privatization policies may influence the inflows of FDI, the model also contains the share of GDP accounted for by the private sector. The figures pertain to 1995 and come from the EBRD (1995). Additionally, a measure of openness to trade (the sum exports and imports as a percentage of GDP) is included in the model to control for tariff jumping FDI. The data refer to 1993 and come from the EBRD.

The existing literature finds the host country's market size to be an important determinant of FDI inflows (see Dunning, 1993; Caves, 1996; Braunerjelm and Svensson, 1996). Most studies show that a large market size encourages FDI inflows. Therefore, the model includes GDP per capita which is a proxy for the purchasing power of local consumers and the population size which reflects the potential size of the market. Both variables come from EBRD (1994) and refer to 1993. They are entered in the logarithmic form.

As explained above, it is necessary to include firm specific variables when testing the second hypothesis. Thus, standard variables found in most FDI studies are included in the model. These are firm size (measured by the firm's sales in US dollars, entered as logarithm), 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;[13] and a proxy for production diversification (the number of four-digit SIC codes describing a firm's activities). All information on firm characteristics was obtained from the *Worldscope* database and pertains to fiscal year 1993 (from 4/93 to 3/94).

IV. EMPIRICAL RESULTS

The empirical analysis confirms the first hypothesis of the study. The estimation results with the Ginarte-Park index are presented in Table 2.[14] In four out of five regressions, the extent of intellectual property protection affects the probability of investment in those high technology sectors that rely heavily on IPRs but not in other industries. The marginal effects for the IPR sensitive sectors bear, as expected, positive signs and their underlying coefficients are significant at the five or one percent level. In the last regression, however, both coefficients on the Ginarte-Park index are significant.

The other variables also have the anticipated signs. Population size is found to have a positive impact on FDI inflows in all industries. IPR sensitive sectors do not appear to be affected differently by

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[12] The author would like to thank Rafael Di Tella for kindly providing the index.

[13] Note that this is a standard proxy in the literature and has been used, for instance, by Grubaugh (1987).

[14] Note that the number of observation is equal to the number of firms in the sample times the number of possible destination countries. Because of firm specific dummy variables, firms with no investment in the region drop out of

this variable. GDP per capita is also positively related to FDI inflows and in majority of cases, it does not affect the high technology sectors differently. As expected, progress in transition, greater effectiveness of the legal regulations governing investment and more advanced privatization process increase the probability of FDI in all sectors. The coefficients on the interactions of these variables with a dummy for IPR sensitive sectors are insignificant. The corruption variable does not appear to be significant either. The openness measure has a significant impact only on the IPR sensitive sectors. A possible explanation is that firms in these sectors may be unwilling to transfer large portions of their production process to the region for fear of losing their intangible assets and are therefore more reliant on imports.

Table 3 presents the estimation results with the second IPR measure. Unlike the Ginarte-Park index of patent rights protection, this index captures both the legal and the enforcement aspect of the IPR regime. Since the higher values correspond to weaker protection, the index may be interpreted as capturing the likelihood of 'piracy' (or in other words, the likelihood that patents or trademarks of foreign investors will be misused).[15] As expected, the higher the likelihood of 'piracy,' the lower the probability that multinationals in the four sensitive sectors will undertake FDI. In four, out of five cases, the coefficients are significant at the one percent level. Additionally, in three regressions, the threat of piracy affects not only the sensitive sectors but also all investors. The signs and significance levels of other control variables are similar to those found in Table 2.

The reason why all firms, not just those in IPR sensitive sectors, may be affected by the extent of intellectual property protection is that an IPR regime may also play a signaling role. As Lall (1997, p. 244) points out, "… 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." As the results in Tables 2 and 3 suggest, signaling takes place only if the legislative changes are accompanied by enforcement efforts.

To further test the robustness of the findings, the following exercise was performed. An OLS regression was estimated with the dependent variables equal to the share of firms in the four sensitive sectors that undertook FDI in each of the countries in the sample.[16] The same explanatory variables as those in Tables 2 and 3 were included. The results are presented in Appendix II. They suggest that the earlier findings are quite robust. In eight out of ten regressions, the IPR measure is significant and bears the expected sign. Despite the small number of observations, all regressions have a high explanatory power.

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the estimation. The sample is further reduced by the fact that the Ginarte-Park index covers only 19 countries and the corruption measure is available for 18 out of these 19 economies.

[15] The index captures the likelihood of 'piracy' only partially since it does not take into account the skill level and thus the ability to imitate in a host country.

In summary, the empirical analysis indicates that the strength of patent laws as well as the overall level of IPR protection (both laws on the books and their enforcement) affect FDI inflows in several high technology sectors where, as surveys show, IPRs play an important role. Patent protection alone, however, does not influence the investment decision in other sectors. There exists some weak evidence that the likelihood of IPR violation may discourage all foreign investors, not just those relying heavily on IPRs.

The empirical results from the test of the second hypothesis are presented in Table 4.[17] They show that multinationals are more likely to undertake production (as opposed to engaging in distribution activities alone) in countries with stronger IPR protection. The Ginarte-Park index is significant in all regressions, while the likelihood of 'piracy' matters only in two out of five cases. These findings are consistent with the survey evidence provided by Mansfield (1994) and the Zeneca case study cited above.

Moreover, local production is more likely to take place in countries with a larger population size, which may be explained by the economies of scale enjoyed in large markets. GDP per capita appears to be negatively correlated with the probability of local production in three cases. A possible explanation is that countries with higher GDP per capita tend to have higher labor costs which make local production less attractive. The probability of manufacturing FDI is also positively affected by the transition progress and the extent of privatization. Since setting up a production plant is more costly than setting up a distribution network alone, it is not surprising the foreign investors choose the former option in countries that appear to be more stable due to an advanced reform process. Somewhat unexpectedly, a higher level of corruption is associated with a greater probability of manufacturing. It is possible that in more corrupt countries it is easier to acquire cheaply state owned assets that are being privatized.

Turning to investor characteristics, the findings indicate that firms possessing more intangible assets, as measured by R&D- and advertising-intensity, are less likely to undertake manufacturing. This may be due to the fact that the possibility of knowledge dissipation is greater when the production takes place in a host country than when the final products are imported. Firm size, on the other hand, does not appear to affect the choice between production and distribution. To the extent that larger firms have more resources for investment, this finding would indicate that the choice between the two activities is not affected by financial constraints. Summing up, the empirical results indicate that weaker protection of intellectual property discourages foreign investors from undertaking local production and tilts their preferences towards projects focusing on distribution alone.

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[16] In other words, the dependent variable is equal to the number of firms in IPR sensitive sectors that invested in country *c* divided by the total number of firms in these sectors in the sample.
[17] The number of observations is equal to the number of projects in the sample. Some projects, however, drop out due to missing values for firm or host country specific variables.

V. CONCLUSIONS

Governments all over the world compete fiercely to attract foreign direct investment hoping that multinational corporations will bring new technologies, management skills and marketing know-how. In order to create an investment friendly environment, it is important to understand the factors that influence FDI inflows as well as the determinants of the composition of such flows. This study sheds some light on this issue by examining the impact of IPR protection on the structure of FDI inflows.

Two hypothesis are tested and confirmed by the data. First, the data indicate that investors in sectors relying heavily on protection of intellectual property are deterred by a weak IPR regime in a potential host country. There is also some evidence that weak IPR protection may discourage all investors, not just those in the sensitive sectors. Second, the lack of IPR protection deters investors from undertaking local production and encourages them to focus on distribution of imported products.

Since Eastern Europe and the former Soviet Union were almost virtually closed to FDI before 1989, their sudden opening to foreign investment can be compared to a natural experiment. Therefore, the data set used in this study presents a unique opportunity to estimate the effect of IPR protection 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 FDI. Thus, the results of this study suggest that more research is needed to improve our understanding of the implications of IPR regimes for the magnitude and composition of FDI inflows. Improving the understanding of this issue could potentially encourage many developing countries to reevaluate their policies on IPR protection.

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Table 1. Measures of IPR protection

	Ginarte-Park Patent Rights Index	IPR Index based on IIPA Special 301 recommendations
Armenia		3
Azerbaijan		3
Belarus*	3.19	3
Bulgaria	2.57	2
Croatia*	3.71	
Czech Republic	3.19	1
Estonia*	2.86	2
FYR Macedonia*	2.52	
Georgia*	3.00	3
Hungary	3.75	1
Kazakhstan*	3.19	3
Kyrgyzstan		3
Latvia*	2.88	2
Lithuania	2.57	3
Moldova*	3.00	2
Poland	3.23	1
Romania	2.71	3
Russia	3.04	2
Slovak Republic	3.19	1
Slovenia*	3.52	
Tajikistan		3
Turkmenistan		2
Ukraine	3.04	2
Uzbekistan*	2.52	3
Average	3.04	2.29

* denotes index values calculated by the author
Note that while in the case of the Ginarte-Park higher values correspond to stronger protection, the opposite is true of the other index.

Table 2. Probit results with Ginarte-Park index of patent rights protection

	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects
Ginarte-Park index	0.04	-0.02	-0.01	0.03	**0.04***
	(0.05)	(0.05)	(0.05)	(0.02)	**(0.03)**
IPR sensitive * Ginarte-Park index	**0.05****	**0.05****	**0.06****	**0.06*****	**0.03***
	(0.02)	**(0.02)**	**(0.03)**	**(0.02)**	**(0.02)**
GDP per capita	0.00	**0.07*****	**0.11*****	**0.02*****	0.02
	(0.02)	**(0.02)**	**(0.03)**	**(0.01)**	(0.01)
IPR sensitive * GDP per capita	0.02	0.01	0.00	0.00	**0.03*****
	(0.02)	(0.02)	(0.02)	(0.01)	**(0.01)**
Population	**0.06*****	**0.07*****	**0.07*****	**0.05*****	**0.04*****
	(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**
IPR sensitive * Population	0.00	0.00	0.00	0.00	**0.01****
	(0.01)	(0.01)	(0.01)	(0.00)	**(0.01)**
Progress in reform	**0.13*****				
	(0.03)				
IPR sensitive * Progress in reform	-0.02				
	(0.02)				
Legal effectiveness		**0.04***			
		(0.02)			
IPR sensitive * Legal effectiveness		0.00			
		(0.01)			
Corruption			-0.01		
			(0.01)		
IPR sensitive * Corruption			0.01		
			(0.01)		
Privatization				**0.005*****	**0.005*****
				(0.00)	**(0.00)**
IPR sensitive * Privatization				0.00	0.00
				(0.00)	(0.00)
Openness					-0.02
					(0.01)
IPR sensitive * Openness					**0.08*****
					(0.02)
No. obs.	6,707	6,707	6,354	6,707	6,707
Chi^2	47.8	54.1	84.1	141.5	120.0
Prob > Chi^2	0.00	0.00	0.00	0.00	0.00
Chi^2 d.f.	17	17	16	17	17
Pseudo R^2	0.36	0.34	0.32	0.38	0.39
Log Likelihood	-1,820	-1,890	-1,898	-1,752	-1,746

*** denotes significant at 1% level, ** at 5%, * at 10%. Standard errors are presented in parentheses.
Firm dummies have been included in all regressions.
'IPR sensitive' denotes a dummy variable for IPR sensitive sectors.
Note that **higher** values of Ginarte-Park index correspond to stronger IPR protection

Table 3. Probit results with IPR index

	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects
IPR index	-0.02**	-0.01	-0.02**	-0.01	-0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
IPR sensitive * IPR index	-0.02***	-0.02***	-0.02***	-0.02***	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
GDP per capita	0.02***	0.04***	0.05***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
IPR sensitive * GDP per capita	0.00	0.00	-0.01	0.00	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Population	0.03***	0.03***	0.03***	0.03***	0.02***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
IPR sensitive * Population	0.00	0.00	0.00	0.00	0.01***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Progress in reform	0.04***				
	(0.01)				
IPR sensitive * Progress in reform	-0.01				
	(0.01)				
Legal effectiveness		0.02**			
		(0.01)			
IPR sensitive * Legal effectiveness		-0.01			
		(0.01)			
Corruption			0.00		
			(0.00)		
IPR sensitive * Corruption			0.00		
			(0.00)		
Privatization				0.002***	0.002***
				(0.00)	(0.00)
IPR sensitive * Privatization				0.00	0.00
				(0.00)	(0.00)
Openness					0.00
					(0.00)
IPR sensitive * Openness					0.05***
					(0.02)
No. obs.	7,329	7,329	6,980	7,329	7,329
Chi^2	125.1	1646.2	5257.5	258.0	8189.9
Prob > Chi^2	0.00	0.00	0.00	0.00	0.00
Chi^2 d.f.	19	19	18	19	19
Pseudo R^2	0.43	0.42	0.41	0.44	0.44
Log Likelihood	-1629.9	-1650.2	-1645.6	-1612.2	-1606.7

*** denotes significant at 1% level, ** at 5%, * at 10%. Standard errors are presented in parentheses.

Firm dummies have been included in all regressions.

'IPR sensitive' denotes a dummy variable for IPR sensitive sectors.

Note that **lower** values of IPR index correspond to stronger IPR protection

Table 4. Probit results. Manufacturing vs. distribution projects.

	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects	Marginal effects
Firm size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
R&D intensity	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Advertising intensity	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Production diversification	-0.04***	-0.03***	-0.03***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ginarte-Park index	0.22***	0.13**	0.11*	0.21***	0.21***					
	(0.04)	(0.06)	(0.06)	(0.04)	(0.03)					
IPR index						-0.06	-0.11*	-0.15***	-0.04	-0.04
						(0.04)	(0.06)	(0.04)	(0.04)	(0.04)
GDP per capita	-0.10**	0.02	0.04*	-0.06**	-0.05	-0.07	0.00	-0.08*	-0.04	-0.05
	(0.04)	(0.03)	(0.02)	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.04)	(0.06)
Population	0.09***	0.09***	0.07***	0.08***	0.08***	0.08***	0.06**	0.02	0.07***	0.07***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Progress in reform	0.18***					0.11*				
	(0.05)					(0.01)				
Legal effectiveness		0.03					-0.03			
		(0.03)					(0.04)			
Corruption			0.01					0.05***		
			(0.01)					(0.01)		
Privatization				0.01***	0.01***				0.01**	0.01**
				(0.01)	(0.01)				(0.01)	(0.01)
Openness					0.01					-0.01
					(0.00)					(0.06)
No. obs.	494	494	488	494	494	432	432	426	432	432
Pseudo R^2	0.19	0.19	0.19	0.20	0.20	0.18	0.17	0.18	0.18	0.18

*** denotes significant at 1% level, ** at 5%, * at 10%. Standard errors are presented in parentheses.

Industry dummies have been included in all regressions.

Note that **higher** values of Ginarte-Park index and **lower** values of IPR index correspond to stronger IPR protection

APPENDIX I

Response bias

      The response rate in the survey was close to fifteen percent. It is likely 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, the list of major foreign investors in Poland compiled by the Polish State Investment Agency (PAIZ, 1995) was examined. Poland was chosen for this exercise since it was the most popular destination country in the sample. 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. Thus among the investing firms, the decision to respond to the survey was not systematically related to firm characteristics. Unfortunately, it was not possible to identify which among the firms that did not respond to the survey were not interested in undertaking investment in Eastern Europe and the former Soviet Union. There is 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, the data set can be treated as if the investing firms had been oversampled. This, however, does not affect the results presented in this study since all of regressions focus on firms that invested in at least one country in the region.

Table 1A. Results of OLS regressions

Ginarte-Park index	0.07*	0.03	0.03	0.07**	0.07**					
	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)					
IPR index						-0.05***	-0.04**	-0.06***	-0.04**	-0.04**
						(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
GDP per capita	-0.01	0.04*	0.05**	0.01	0.01	0.00	0.02	0.02	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Population	0.04***	0.04***	0.03**	0.03***	0.03***	0.03***	0.03***	0.02*	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Progress in reform	0.08**					0.03***				
	(0.03)					(0.02)				
Legal effectiveness		0.01					0.01			
		(0.02)					(0.01)			
Corruption			0.00					0.01		
			(0.01)					(0.01)		
Privatization				0.003***	0.003***				0.001**	0.001**
				(0.00)	(0.00)				(0.00)	(0.00)
Openness					0.00					0.00
					(0.02)					(0.02)
Constant	-0.39***	-0.40***	-0.44***	-0.41***	-0.42***	0.00	-0.04	0.00	-0.03	-0.02
	(0.09)	(0.12)	(0.12)	(0.07)	(0.10)	(0.10)	(0.12)	(0.13)	(0.11)	(0.13)
No. obs.	19	19	18	19	19	21	21	20	21	21
F-statistic	12.86	7.31	6.22	19.87	14.81	22.05	16.46	16.49	21.87	16.42
Prob > F	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R^2	0.79	0.68	0.66	0.85	0.85	0.85	0.80	0.81	0.85	0.85
Adjusted R^2	0.72	0.58	0.55	0.81	0.79	0.81	0.76	0.77	0.81	0.79

*** denotes significant at 1% level, ** at 5%, * at 10%. Standard errors are presented in parentheses.
Note that **higher** values of Ginarte-Park index and **lower** values of IPR index correspond to stronger IPR protection