IMPACT OF PATENT PROTECTION ON FOREIGN DIRECT INVESTMENT ACTIVITY

by

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Abstract

In this paper, we empirically examine the relationship between patent protection and Foreign Direct Investment (FDI). Using a sample of 47 countries, we examine patent protection and eight other economic variables as determinants of FDI before and after the introduction of the TRIPs Agreement in 1995. The results suggest a positive relationship between patent protection and FDI. Furthermore, we document the differences in the determinants of FDI between developed and less-developed countries. A better understanding of this relationship will assist firms and governments in formulating intellectual property policy to promote FDI and economic growth.

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1. Introduction

In this paper, we empirically examine the relationship between patents and Foreign Direct Investment (FDI), as a precursor of economic growth. We also explore how the factors affecting FDI differ between developed and less-developed nations. Furthermore, we attempt to quantify the impact of the Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement five years after its introduction.

It is well known that globalization continues to rise and national and regional markets are becoming more closely integrated through reductions in government and natural barriers to trade, and through increased investment and technology flows. In the new economy, creation of knowledge is essential for competitiveness and economic growth. One specific channel through which globalization can affect economies is Foreign Direct Investment (FDI), both a source of capital and a provider of knowledge about new production processes. In broad policy packages designed to maximize the benefits of expanded market access considered by governments, intellectual property rights are an important element, (Maskus, 1998). Introduction of the Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement in 1995, administered by the World Trade Organization (WTO), set minimum standards for many forms of intellectual property rights (IPRs), including patents. *The TRIPs Agreement has an important principle: intellectual property protection should contribute to technical innovation and the transfer of technology*, (Intellectual Property: Protection and Enforcement, 1995).

This paper is a contribution to the literature that seeks to quantify the effects on foreign capital inflows of a strong patent regime, as opposed to IPRs as a whole, in host countries. It contains a broad empirical analysis of the determinants of FDI using data from 47 countries at various levels of development and is an extension of two empirical papers by Seyoum (1996, 2006). We study the impact of eight economic variables, in addition to patent protection, on inward FDI using Ordinary Least Square (OLS) regressions for the years 1995 and 2000. The results suggest that the correlation between patents and FDI is much stronger in developed countries and is increasing after the TRIPs Agreement. Furthermore, we find that the independent variables attracting FDI in the developed countries are not the same as those in less-developed nations.

The motivation for this study is the on-going debate on the benefits of the TRIPs Agreement and its effect on technology transfer. Patents facilitate information transfer by disclosing the details of inventions to local firms and allows them to create similar products without violating the original patent. Patents can also slow technology diffusion by limiting the use of technologies through licensing arrangements. Hence the theoretical effects of patents are ambiguous. The harmonization of the minimum standards on the global level is designed to diminish the role of IPRs in determining the location of FDI, (Maskus, 1998). In theory, this concept seems reasonable, but the current economic conditions in the less-developed countries do not entirely support the notion of a strong IPRs regime.

Many theoretical papers focus on the idea of IPRs being implemented for the sole purpose of benefiting the developed countries, and this paper will attempt to apply empirics to this theory. Guo (2009), for example, states that the less-developed countries are slower on the development of economy and technology than the developed countries, therefore placing them on the same standard is unfair. The developed nations would not have reached the same level of technological advancement if they had to comply with the TRIPs Agreement while they were developing. This agreement requires the developing nations to give up their right to choose a suitable level of protection given their national conditions and forbids them to follow the track of the currently developed nations.

A large literature examines the various relationships between IPRs and economic growth (see, for example, Grossman and Helpman (1991); Lee and Mansfield (1996); Thompson and Rushing (1999)). The focus of these models is often on the impact on innovation, and studying the effect of patent protection alone (more important for R&D) is not as common. In general, the results in this literature suggest a positive relationship between IPRs and growth, but only in particular environments. Chaudhuri, Goldberg, and Jia (2003) for example, examined the Indian pharmaceutical industry and found a decrease in the welfare of developing countries due to increased patent protection. Lai and Qiu (2003) argue that Increased IPR protection in the South leads to a negative welfare effect in the South, a positive effect in the North, and a positive net effect overall. In terms of FDI, research suggests that foreign investment inflows create a knowledge spillover effect and increase the marginal productivity of the capital stock in

the host country, thereby promoting growth, (See Branstetter (2006); Wang and Blomstrom (1992)).

The remainder of the paper is organized as follows. Section 2 discusses knowledge spillover theory and the role of IPRs in fostering economic growth. Section 3 discusses the TRIPs Agreement and the different views on the benefits of the global minimum standards of IPRs. Section 4 presents the information on the determinants and the location choices for FDI. Section 5 presents the details on the model used in this study and the empirical motivation behind it. Section 6 provides the results and discussion of the empirical model. Section 7 concludes.

2. Intellectual Property Rights and Innovation

Consider an economy without intellectual property rights. Firms invest their resources in R&D to improve existing products or invent new ones and in the process generate knowledge that has no direct commercial value to them. This new knowledge creates a field of opportunities for entrepreneurs willing and able to take the risk in developing and commercializing the product; the firms create knowledge spillover. The implementation of IPRs, for the purpose of protecting the intellectual property of firms, can significantly reduce the knowledge spillover to the economy, which in turn reduces the innovation activity, (Acs and Sanders, 2008).

Given this theory of knowledge spillover, how can IPRs *increase* innovation activity?

2.1 Intellectual Property Rights

Increasing trade among the world economies due to globalization also includes the trade of ideas and knowledge. Some products contain higher proportion of invention and design in their values, and under certain regulations the creators are able to prevent others from using their inventions and designs. A payment is negotiated for the right of use – this is made possible by Intellectual Property Rights (IPRs), (Intellectual Property: Protection and Enforcement, 1995).

There are four main types of IPRs:

Copyright	A set of exclusive rights granted to the author or creator of an original work, including the right to copy, distribute and adapt the work. Copyright lasts for a certain time period after which the work is said to enter the public domain.
Trademarks	Prevent unauthorized use of a trademark: a distinctive sign or indicator used by an individual, business organization, or other legal entity to identify that the products or services to consumers with which the trademark appears originate from a unique source
Patents	A set of exclusive rights granted to an inventor or their assignee for a limited period of time in exchange for a public disclosure of an invention.
Trade Secrets	Prevent disclosure and unauthorized use; often include private proprietary information or physical material that allows a definite advantage to the owner; unlimited duration.

There is a growing belief in the importance of IPRs in stimulating innovation, despite the ambiguous results of research on the topic.

Gould and Gruben (1996) examined the relationship between IPRs and economic growth using a sample of 95 countries for the year 1960. Other variables included GDP

per capita, physical capital savings, and secondary school enrolment rates. After using instrumental variables to correct for possible measurement errors, they found a positive significant relationship – increased IPR protection leads to increased economic growth. It should be noted that IPR protection had a smaller effect on closed regimes.

A study by Schneider (2005) tested the impact of international trade, IPR protection, and FDI on innovation and economic growth. Using the Ginarte and Park (1997) index as a proxy for the strength of IPR protection and controlling for a number of domestic factors, Schneider (2005) found that in contrast to developed countries, increased IPR protection had a zero or even negative correlation with innovation in the developing country component of the sample. Opposed to findings by Gould and Gruben (1996), this result contradicts the belief that stronger intellectual property protection will actually spur growth in the economy by giving more incentives to innovate.

Despite the lack of strong evidence for a relationship between IPRs and economic growth, strong IPR regimes are on the rise. Developing countries with limited technical capabilities have strengthened their IPRs laws and enforcement without questioning the wisdom behind the decision. They prefer not to fall behind further in the global competition for capital and technology, which also helps explain the universal acceptance of the TRIPs Agreement, (Maskus, 1998).

2.2 Optimal Levels of Protection

As discussed above, it may not be true that there always exists a definite positive relationship between IPRs and innovation. Following empirical papers similar to Gould and Gruben (1996), Acs and Sanders (2008) show that there exists an optimal level of protection of intellectual property, beyond which the costs of protection become very costly and reduce economic growth.

The result by Acs and Sanders (2008) can be applied to the study by Jaffe and Lerner (2004). The authors suggest that the changes to the United States patent system in 1982 created waste and uncertainty rather than fostering innovation. They explain that making patents easier to obtain and enforce, thus increasing rent costs for firms, actually impeded the economic growth of the U.S.

It seems logical to state that different countries would have different levels of optimal protection depending of the economic environment and level of development. Given the various stages of development in all the countries, it is unlikely that the same rules for IPRs regulations can be applied across the board. If each country has a unique optimal level of protection, a strong regime can actually prevent or discourage the exploration of knowledge that spills over from R&D.

3. The TRIPs Agreement

The introduction of the TRIPs Agreement in 1995 by the WTO contributed significant changes to the regulatory system relating to international trade. The main focus of the

WTO law is to harmonize domestic laws and promote "positive" government interventions for correction of market failures and supply of public goods, (Cottier and Mavroidis, 2003). Deeper integration pushed forward by the WTO led to an increasing number of international minimum standards. In accordance with the TRIPs Agreement, worldwide minimum standards have been set out for the protection of intellectual property rights in domestic laws, a number of which have already been administered by the World Intellectual Property Organization. Given that many countries have different regulations regarding property rights and the fact that roughly 90% of patents are registered in developed countries, TRIPs provisions are likely to raise problems and create conflicts of interest, (Cottier and Mavroidis, 2003).

Despite the fact that the move towards globalization of TRIPs is becoming a source for conflict, many nations are jumping on the bandwagon of a strong intellectual property rights regime. One reason for this is the assumption that there exists a positive relationship between strong property rights protection and economic growth. Those debating for these rights often cite the work of Joseph Schumpeter whose research focused on innovation and technology being the driving forces in industrial development. The argument states that strong protection provides the following benefits: increased domestic research and development, increased flow of new products, enhanced value of patent rights, increased inward investment and technology transfer, and improvements in the local knowledge base, (Ostergard, 2003).

Quite often, less-developed countries do not have the means or capacity for research and development, which gives the developed countries an automatic advantage in innovative activities. Another concern is whether these new products are even appropriate given the situation in some less-developed countries. Various intellectual property rights forms are a source of monetary value for ideas and a basis for incentive to innovate, but once again, it is more applicable to developed countries. Underdeveloped countries are still in the process of acquiring the technology that is already available on the market, (Ostergard, 2003). Given the associated issues, countries should be cautious in accepting these laws, particularly if it may be harmful to their development.

It is argued by those who support the TRIPs that for those countries that adopt the new standards, the benefits will outweigh the proprietary costs, (Plahe, 2009). Current events are painting a different picture, with the Indian pharmaceutical industry being one of the primary examples among many others. One third of the world population lacks access to the most essential drugs, with the number rising to one half in Asia and Africa, (t'Hoen, 2002).

4. Foreign Direct Investment (FDI)

The knowledge spillover theory discussed earlier can also be extended across borders. The flow of goods is not the only way to transfer knowledge. Foreign direct investment (FDI) is an alternative method to foster innovation; production and research activities undertaken by multinational companies in the host country carry spillover

benefits. Research shows that there is the possibility of a learning-by-exporting effect where firms learn to improve their products and processes through contact with more advanced foreign competitors in the market, (Branstetter, 2006). Wang and Blomstrom (1992) believe that the imported skills and technology through FDI increase the marginal productivity of the capital stock in the host country and thereby promote growth. Some argue that the rate of growth of a less-developed country depends on the extent of adoption of new technologies that already exist in the developed countries, (Borensztein, Gregorio, and Lee, 1998).

More countries than ever are offering tax incentives and subsidies to attract foreign capital since the decrease in lending to the developing countries by the commercial banks in the 1980's. FDI accounts for more than 60% of private capital flows, (Carkovic and Levine, 2002).

An interesting question is will opening the border to foreign capital and creating an attractive economic environment (i.e. strong IPRs regime) lead the developing countries to economic prosperity?

4.1 Determinants of FDI

There are a number of market variables that have been proposed as determinants of FDI. The flow of FDI can be affected by variables such as markets, resources, competitiveness, macro and FDI policies, risk perception, taxation, trade and industry. Location-specific determinants are crucial to the country's inflow of FDI. The importance of the location-specific determinants is in turn affected by three aspects of

the investment: motive (resource, market or efficiency-seeking), type (services or manufacturing) and size of the investor, (Cho, 2003).

Research shows the importance of a highly educated workforce, sufficient wealth of the country, developed financial markets and trade openness in obtaining the growth effects of FDI, (see, for example, Borensztein, Gregorio, and Lee, (1998); Blomstrom, Lipsey, and Zejan, (1994); Alfaro, Areendam, Kalemli-Ozcan and Selin, (2003); Balasubramanyam, Salisu, and Sapsford, (1996)). This implies that FDI is relevant to economic growth, but only in particular environments – the environment often found in the developed countries.

The level of intellectual property protection is an important aspect of the economic environment, which means a possible determinant of FDI as well. A strong IPR regime makes the host country more attractive to foreign investors if their products and processes will be protected. Increasing regulation over intellectual property has become a signalling device used by governments in emerging economies to indicate a more business-friendly environment, (Maskus, 1998). Lee and Mansfield (1996) developed an index of perceived weakness of IPRs in destination countries on the part of U.S. firms. They regressed the volume of direct investments on this index, along with measures of market size, the past investment stock, the degree of industrialization, and a measure of openness. They find that weakness of IPRs has a significant negative impact on the location of American FDI.

4.2 Investment Location Choice and Patents

FDI is a long-term commitment, a business decision made by the multinational corporations only if the investment is expected to bring profits. Keeping the determinants listed above constant, research suggests that intellectual property protection plays a role in the choice of location of the investor. A firm deciding to invest abroad will pay attention to the different types of intellectual property protection depending on the product or service they are bringing into the country. Stronger trademarks are important in attracting imports of low-technology goods (i.e. consumer goods such as clothing), while not as much for goods that are difficult to imitate (i.e. basic metal manufacturers). Firms looking to invest in local R&D would pay more attention to patent protection laws in the host country, (Maskus, 1998). These findings suggest that emerging economies should consider varying the importance of IPRs in different industrial sectors to encourage FDI.

Focusing on patent protection and FDI, how does the relationship change if one investor location and multiple emerging economies (host countries) are considered? Pfister and Deffains (2005) modeled the location choices of French subsidiaries. Prior to sorting the economies by market size and their ability to imitate technologies, on average regressions showed an insignificant influence of patent protection on location choices. With the more detailed analysis, results showed that stronger patent protection reduces attractiveness to FDI in countries with a high GDP or a low R&D intensity and only in industries that are sensitive to patent protection.

Some studies model the relationship between patent protection and FDI inflows by also including a number of other possible market variables that are believed to be significant. Seyoum (2006) found that patent protection has a significant effect on investment flows, as do unemployment rate, market size, level of corruption and trade orientation of the host country. The study used a combined sample of 63 countries, therefore it is hard to determine whether the same effects are present across industries and countries at different levels of development.

There is also much criticism regarding the methodology of these papers and significance of the results. The main questions that arise are: How to measure the level of patent protection accurately? What is the importance of patents in the relationship alongside all of the possible economic indicators?, (Pfister and Deffains, 2005).

The analysis for this paper uses a combination of approaches from the two studies by Belay Seyoum (1996, 2006). In the 1996 study, Seyoum used a sample of 27 countries (developed, newly industrialized, and less-developed) to examine the empirical determinants of foreign investment (FDI) activity during the post 1975 period (1975-1990) and to establish the role of intellectual property rights in attracting FDI. The data on the level of intellectual property protection were obtained from a questionnaire, separated into patents, trademarks, trade secrets, and copyrights. The regression also included economic policy variables: market size, public investment as ratio of GDP, external debt to exports and exchange rate. In the 2006 paper, Seyoum expanded the sample to 63 countries, but this time did not split it into three levels of development.

The analysis looked only at the effects of patent protection and various market variables on FDI for periods 1990 and 1995. The independent variables consisted of the patent index by Ginarte and Park (1997), and seven market variables: market size, annual indirect exchange rate, level of corruption, unemployment rate, openness to trade, scientific and technological infrastructure and the GDP growth rate.

4.3 Empirical Studies of the Impact of FDI

Boyd and Smith (1992) predict that FDI in the presence of pre-existing trade, price, financial, and other distortions will hurt resource allocation and slow growth. They find that on the micro-level, FDI shows no significant effect on growth, while the macro-level analysis shows the opposite. Looking at a broader analysis, Romer (1993) argues that FDI can ease the transfer of technological and business know-how to poorer countries. According to this view, FDI may boost productivity of all firms, not just of those receiving the foreign capital. To further examine the effects different types of FDI have played in different sectors, Alfaro (2003) finds little support for FDI spillovers in the primary sector, a positive effect of FDI in manufacturing on growth, and ambiguous evidence from the service sector.

The macro-level studies generally show a positive role of FDI in generating economic growth, but they have often not fully controlled for simultaneity bias, country-specific effects and routinely use lagged dependent variables in growth regressions, (Carkovic and Levine, 2002).

5. Data and Methodology

For this study, the most relevant variables and results were used to construct a more refined updated model. A sample of roughly 60 countries was used, consisting of developed, newly industrialized and less-developed countries, to analyze the effects of patent protection and a number of economic variables on FDI for periods 1995 and 2000. Complete data was collected for 47 countries due to insufficiency of data supplied for inclusion in the study.

The major changes to the Seyoum works are the time periods, the patent index, and independent variables used in the analysis. The data sample included the years 1995 and 2000, therefore capturing the effects of the TRIPs Agreement introduced in 1995. The Agreements covers a number of broad issues including the clause that patent protection must be available for inventions for at least 20 years. (Intellectual Property: Protection and Enforcement, 1995) Seyoum (1996) found that the IPRs have less significance in determining FDI for the less-developed than for the developed countries. This study focuses on patents to determine if the result holds with a different index and time periods. The Park and Wagh (2003) patent index was used – an index identical in calculation to the Ginarte and Park (1997) index applied in the Seyoum (2006) research paper. The purpose of using the index instead of the questionnaire is to check for robustness of the Seyoum (1996) result: various economic indicators have a greater influence on FDI inflows than does the level of patent protection, but only in the less-developed countries. Using the results of the Seyoum (2006) study, some independent

economic variables were replaced. Instead of the scientific infrastructure, a measure of a country's physical infrastructure was used. A measure of the inflation rate was also added to the list of explanatory variables. The reasoning for each independent variable is stated below.

The OLS regression mode with robust errors is used to analyze the effects of patent protection on FDI for the two time periods (1995 and 2000). The dependent variable in the regression is the log of FDI. FDI is the annual inflow of total direct investment to a host country in US dollars. Log of FDI was used to render the distribution nearly normal and the error term heteroskedastic. Since the reaction of foreign investors to changes in levels of protection is not likely to be instantaneous, lagged values (t-1) of the independent variables were used in the study. The following is the primary regression used in this study:

$$\textbf{Log FDI}_{it} = \beta_1 + \beta_2(\text{GDP growth})_{it} + \beta_3(\text{Market Size})_{it} + \beta_4\,(\text{Unemployment})_{it} +$$
$$+ \beta_5\,(\text{Trade Openness})_{it} + \beta_6\,(\text{Exchange Rate})_{it} + \beta_7\,(\text{Physical Infrastructure})_{it} +$$
$$+ \beta_8\,(\text{Corruption})_{it} + \beta_9\,(\text{Inflation})_{it} + \beta_{10}\,(\text{Patent Protection})_{it} + \text{error}_{it}$$

i = country (Appendix 1 includes the list of countries)
t = time period; t = 1995, 2000

The key independent variable is the level of patent protection in a country. The Park and Wagh (2003) index for the periods 1995 and 2000 was used in the study as a measure of patent protection. The index measures the strength of patent protection across countries and over time, and scores a nation's patent system from 0 to 5. The

index contains five categories[1], each scored from 0 to 1, and the unweighted sum of scores yields the overall value for the nation. This index is the more recent version of the Ginarte and Park (1997) index popular with the academics and companies, (Park and Wagh, 2003).

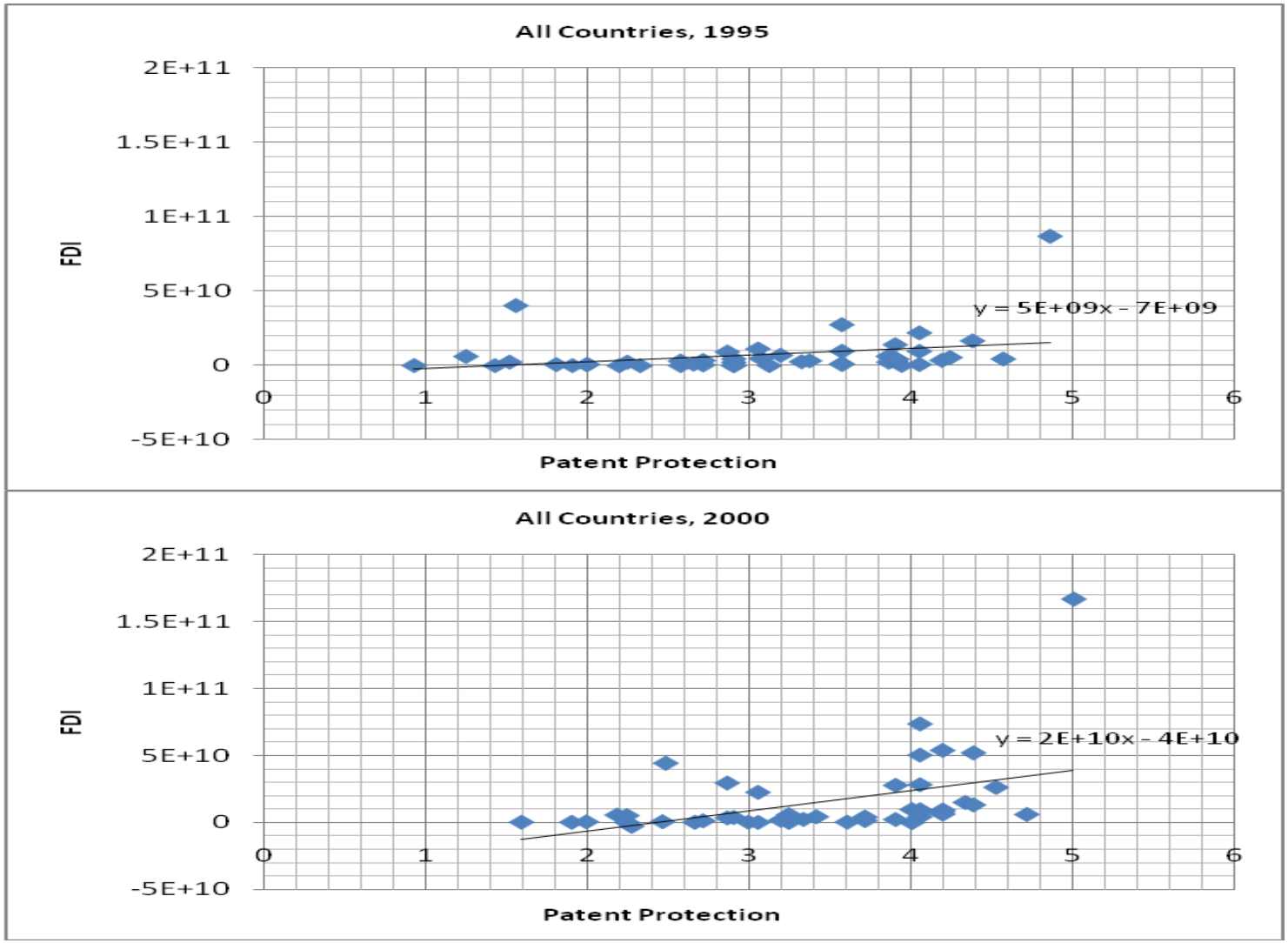
Figures 1 through 6 suggest the positive relationship between patent protection and FDI for the three data samples used in this study (all countries, developed countries and less-developed countries) for two periods (1995 and 2000). All samples show a shift of the trendline to the right from 1995 to 2000, suggesting a rise in the minimum level of patent protection in all countries. The graphs also show an increase in the slope of the trendline for the year 2000 compared to 1995, which means an increase in the correlation between the two variables. The relationship is much stronger for the developed than the less-developed countries.

The regression also includes a number of economic variables that are suggested to be FDI determinants in past research papers. The exchange rate and GDP growth rate were included even though the analysis by Seyoum (2006) showed no significance in the relationship; this decision was made for comparison purposes only.

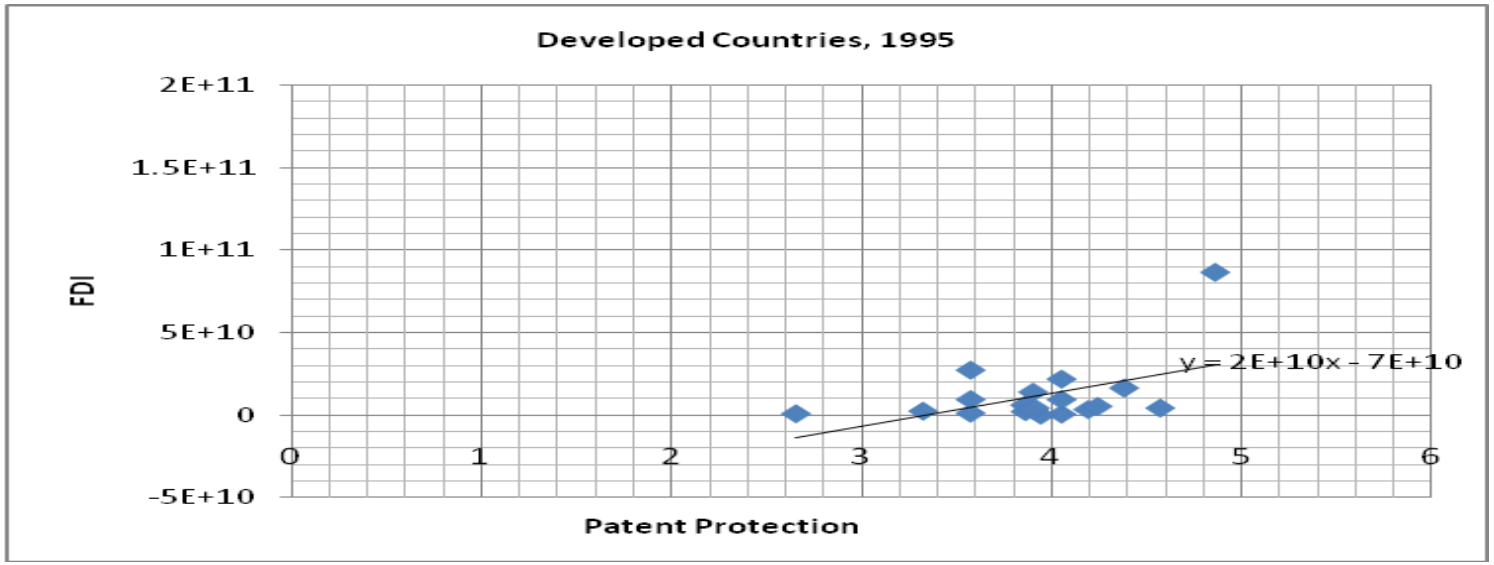
Foreign investment involves a set-up cost with increasing returns to scale which makes larger markets a more profitable opportunity than smaller markets. With regional trade agreements, a positive effect on FDI inflow is more likely to occur for a larger

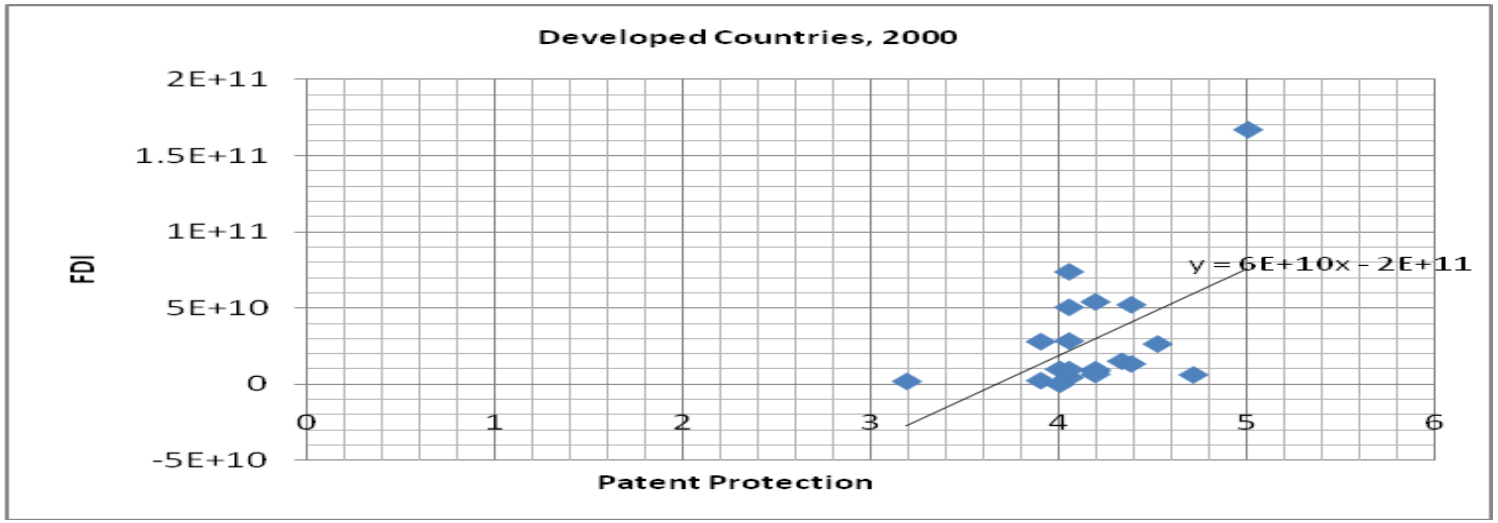
[1] Five categories in the Park and Wagh (2003) patent index: extent of coverage, membership in international patent agreements, provisions for loss of protection, enforcement mechanisms and duration of protection.

Figures 1 and 2

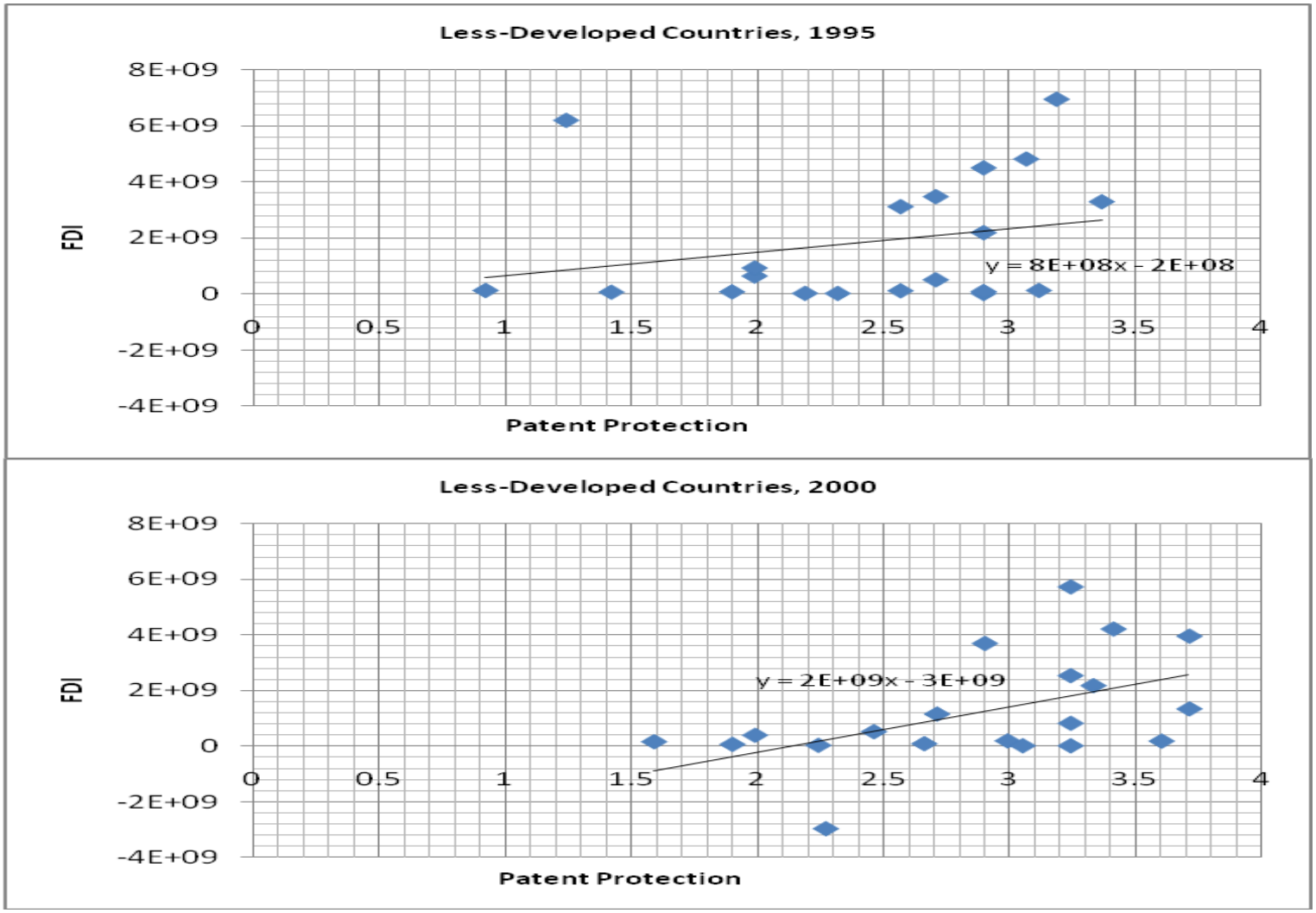


Figures 3 and 4





Figures 5 and 6



market size, (Jaumotte, 2004). Empirical evidence from Eastern and Central Europe shows the importance of market size as a determinant of FDI, (Benacek, Gronicki, Holland and Sass, 2000). The log population is used as a proxy to measure market size.

Although Seyoum (2006) found that the GDP growth rate is not a significant determinant of FDI inflows, Klein and Rosengren (1994) suggest that it is a determining factor for the developing countries. High growth ensures a steady demand for the output of the local FDI and the quality of growth matters. Policy makers may need to pay more attention to the environment that is driving the growth in order to attract FDI, (Frimpong and Fosu Oteng-Abayie, 2008). Seyoum (2006) did not separate the sample according to the levels of development, therefore GDP growth rate is included in the regression for comparison between the developed and the less-developed countries.

Trans-national corporations choose to minimize the risk associated with their investments and prefer a stable political climate and a reliable macroeconomic framework. A low inflation rate should have a positive relationship with FDI because high rates would threaten to erode the financial value of the assets and technologies invested in the host country, (Baimbridge and Whyman, 2006). The inflation rate is added to the Seyoum (2006) model.

The unemployment rate of the country may be positively correlated with FDI inflows. A high unemployment rate signals a large pool of available workforce, therefore making the location attractive to resource-seeking investors, (Dinga, 2009). National unemployment rates are included in the regression.

An economy's degree of openness, normally directed towards external markets, would be a good proxy for measuring correlation with direct investment. A country with greater degree of trade openness would also be more open to foreign capital, (Cardoso de Mendonca, Jorge and Braga Nonnemberg, 2004). This variable is measured by a country's trade/GDP ratio.

Countries can attract FDI in various ways. Depreciation of the exchange rate lowers the cost of domestic production and assets, thus making the location more attractive to foreign investors. Depreciation of real exchange rate also increases the relative wealth of foreign firms, (Bayoumi, Isard, Ito and Symanski, 1996). The annual indirect exchange rate with the U.S. dollar is used in the model.

Corruption is viewed as an additional cost of doing business or a tax on profits. It can be expected to decrease the expected profitability of investment projects, therefore investors take the level of corruption in a host country into account when making the decision to invest abroad, (Al-Sadig, 2009). An index of corruption provided by the Political Risk Services (1995, 2000) is used. The index measures countries from most to least corrupt on a scale of 1 to 6.

Instead of scientific and technological infrastructure, shown to be non-significant by Seyoum (2006), physical infrastructure can be a critical determinant of FDI. The availability of essential infrastructure, such as roads, ports and communication networks, should attract higher levels of FDI due to increased productivity, (Quazi,

2007). The number of telephone poles (per 100 people) is used as a proxy for a country's physical infrastructure.

Table 1 presents the summary statistics of the data used in the study. In comparison to 1995, patent protection for the year 2000 shows an increase in the average level of protection for all countries, although it is still higher for developed than less-developed countries. The summary also shows some unexpected results: the average level of corruption increased in all countries in 2000; the average level of unemployment is higher in 2000 for the less-developed countries.

A test of multicollinearity among independent variables was performed using the variance-inflation factor (VIF). If the independent variables are not orthogonal, collinearity will exist between at least two of the regressors. Multicollinearity often arises in analysis of the regression model, and can result in p-values that are meaningless in their explanatory powers. Methods to adjust for collinearity include removing the independent variable causing the problem or using a ridge regression and a principle-components regression. VIF values of 5 or 10 are suggested as cut offs for multicollinearity, (Craney and Surles, 2002). VIF values presented in Table 1 suggest no serious problems with multicollinearity among the independent variables.

Linear regressions are used to represent the economic relationship, therefore it is important to test that the relationship remains stable in two periods of time. The question is whether the subsets of coefficients in two regressions are equal or if there exists a structural break, (Chow, 1960). A Chow test was used to test for difference in

coefficients for patent protection for the periods 1995 and 2000. The test shows no structural breaks for all three samples. (See Appendix 3).

We examine the following three hypotheses.

H1: The level of patent protection is positively associated with investment inflows.

H2: Economic policy indicators have greater influence on Foreign Direct Investment inflows, but only in the case of the less-developed countries.

H3: After the TRIPs Agreement, the importance of patent protection in attracting Foreign Direct Investment grows more for the developed countries.

Table 1
Summary

All Countries	Mean		Std. Deviation		Min		Max		VIF	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
GDP Growth	4.18	4.07	3.20	2.71	-6.22	-7.90	10.90	25.84	1.41	1.65
log Population	17.03	17.08	1.53	2.71	13.54	13.54	20.91	20.96	2.26	2.65
Unemployment	9.96	10.52	6.52	10.12	2.20	2.40	35.00	50.00	1.55	2.51
Trade Openness	63.10	72.87	36.39	41.99	16.03	20.52	213.33	206.77	1.99	2.14
Exchange rate	0.94	0.43	2.19	0.46	0.00	0.00	14.29	1.51	1.43	1.35
Physical Infrastructure	26.52	31.08	23.00	23.98	0.22	0.35	68.09	72.88	5.28	5.36
Corruption	4.11	3.45	1.27	1.33	2.00	1.00	6.00	6.00	2.79	2.56
Inflation	14.18	8.48	19.08	17.04	-0.12	-0.94	88.11	96.09	1.67	1.31
Patent Protection	3.06	3.42	0.96	0.83	0.92	1.59	4.86	5.00	3.41	3.67
Log FDI	21.24	21.81	2.13	2.47	16.36	15.15	25.18	25.84	-	-

Developed Countries	Mean		Std. Deviation		Min		Max		VIF	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
GDP Growth	3.32	4.35	1.96	1.79	0.35	2.36	9.63	9.24	2.76	2.04
log Population	16.71	16.74	1.28	1.27	15.10	15.15	19.40	19.46	3.29	4.10
Unemployment	8.46	6.56	4.25	3.04	3.20	2.70	22.70	13.90	2.32	2.38
Trade Openness	64.66	79.35	31.97	41.01	16.92	20.52	140.73	182.73	3.98	2.81
Exchange rate	0.92	0.69	0.52	0.40	0.01	0.01	1.58	1.51	2.55	2.38
Physical Infrastructure	51.41	56.25	8.37	9.22	36.30	42.48	68.09	72.88	3.22	2.64
Corruption	5.15	4.40	0.93	1.19	3.00	2.00	6.00	6.00	4.25	2.72
Inflation	3.31	2.51	2.46	1.32	-0.12	-0.71	10.04	5.56	2.37	1.73
Patent Protection	3.92	4.17	0.46	0.36	2.65	3.19	4.86	5.00	1.71	1.75
Log FDI	22.32	23.44	1.37	1.23	19.15	21.18	25.18	25.84	-	-

Less-Developed Countries	Mean		Std. Deviation		Min		Max		VIF	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
GDP Growth	4.66	3.26	3.03	3.48	-2.85	-7.90	10.63	8.23	2.09	2.05
log Population	16.69	16.76	1.41	1.42	13.54	13.54	19.07	19.14	3.16	6.56
Unemployment	12.68	15.50	7.89	13.01	2.50	3.30	35.00	50.00	3.65	3.71
Trade Openness	67.59	72.98	43.17	45.16	19.72	22.40	213.33	206.77	2.64	4.39
Exchange rate	1.21	0.28	3.33	0.46	0.00	0.00	14.29	1.47	6.16	1.23
Physical Infrastructure	7.92	12.15	7.93	11.32	0.22	0.35	30.51	37.20	6.12	2.32
Corruption	3.35	2.75	0.88	0.97	2.00	1.00	5.00	4.00	3.10	2.98
Inflation	18.47	13.29	16.54	22.77	1.55	-0.94	62.05	96.09	3.63	2.35
Patent Protection	2.44	2.87	0.68	0.62	0.92	1.59	3.37	3.71	2.00	3.53
Log FDI	19.86	19.71	2.21	2.23	16.36	15.15	22.66	22.47	-	-

6. Results and Discussion

The regression equations for the two time periods (1995 and 2000) were estimated using OLS regressions. Table 2 presents the regressions results for all countries, developed countries, and less-developed countries. Figures 1-6 show the fitted

Table 2
Results of the regression analysis
Reported numbers are coefficients (standard errors in parentheses)
Dependent variable: log FDI

	All Countries		Developed Countries		Less-Developed Countries	
	1995	**2000**	**1995**	**2000**	**1995**	**2000**
Intercept	5.40 (4.38)	1.16 (3.71)	0.85 (5.44)	-1.13 (4.20)	16.15 (8.24)	9.62 (9.71)
GDP Growth	0.04 (0.10)	0.09 (0.06)	0.23 (0.17)	0.03 (0.12)	0.21 (0.17)	-0.08 (0.10)
log Population	0.70* (0.18)	0.92* (0.14)	0.35 (0.26)	0.87* (0.20)	0.30 (0.47)	0.54 (0.49)
Unemployment	-0.04 (0.05)	-0.07** (0.03)	0.08 (0.05)	0.09 (0.07)	0.05 (0.09)	-0.07** (0.03)
Trade Openness	0.01 (0.01)	0.01** (0.00)	0.01 (0.01)	0.02* (0.01)	-0.02 (0.01)	-0.01 (0.01)
Exchange Rate	-0.12 (0.11)	0.93** (0.37)	1.93* (0.59)	0.25 (0.54)	-0.79* (0.24)	0.95 (0.61)
Physical Infrastructure	0.03 (0.02)	0.03 (0.02)	0.09** (0.04)	0.04 (0.03)	0.34** (0.12)	0.13* (0.02)
Corruption	0.22 (0.28)	0.24 (0.21)	0.29 (0.39)	0.16 (0.20)	-0.91*** (0.44)	0.76 (0.52)
Inflation	0.02 (0.019)	0.01 (0.01)	0.12 (0.09)	0.04 (0.11)	0.08*** (0.04)	0.02 (0.02)
Patent Protection	0.63** (0.31)	0.68 (0.54)	1.37** (0.49)	1.07 (0.61)	-0.80 (0.78)	-0.41 (0.58)
R Squared	0.52	0.82	0.79	0.85	0.71	0.90
F Value	6.83*	40.32*	5.93*	9.24*	10.11*	51.70*

*** p < .10, ** p < .05, * p < .01

regression lines. Table 3 shows the correlation matrices for all the variables in the analysis for the developed and less-developed countries.

The tables show the combined results for all countries, as well as for the developed and less-developed countries to show the difference in significance of the independent variables. The sample labelled "All Countries" includes developed (D), newly industrialized (NI) and less-developed (LD) countries. The more in-depth analysis only looks at the developed and less-developed countries to examine **Hypothesis 2** (i.e. economic policy indicators have greater influence on FDI inflows, but only in the case of less-developed countries).

Overall, the modeled values for each time period are able to construct the predictor well, with the coefficient of determination of 52% and 82% for 1995 and 2000, respectively (for all countries). The percentages are even higher for the D and LD countries.

6.1 Significance of Variables

A key result from the regression analysis is the significance of patent protection in the model and the distinction between D and LD countries. For the combined sample, level of patent protection is significant in 1995. Patent protection is significant for periods 1995 for the D countries, while showing no significance for the LD countries for both periods. These findings show some support for the second hypothesis: when it comes to the LD countries, economic policy indicators, such as physical infrastructure,

the exchange rate and unemployment rate, have greater influence in attracting FDI than does patent protection.

It is important to note that patent protection was not significant for any of the development groups for the year 2000. This outcome could have happened for one or more of the following reasons: 1) for the less-developed countries, increased patent protection remains insignificant in its relationship with FDI, 2) the results for the either one or all of the subsamples are flawed, and 3) as suggested earlier, patent protection no longer plays a role in determining the location of FDI, as predicted by the WTO.

Looking at the combined sample of all countries, the significance of economic variables changes drastically from 1995 to 2000. In addition to market size, significant in 1995, unemployment, trade openness, exchange rate all have a strong influence on FDI in 2000. Patent protection is no longer significant in the year 2000. The result that the exchange rate has no significance supports the findings of Seyoum (2006) for the year 1995. The fact that it shows to be influential in 2000 supports previous studies that devaluation may be important in attracting FDI, (Bayoumi, Isard, Ito and Symanski, 1996).

The story changes when comparing the results for the D and LD countries. In 1995, both samples show two common variables that are significant in the model: the exchange rate and physical infrastructure. While patent protection is significant for the D countries, it is not for LD. In 2000, the significant variables for the D countries change to market size and trade openness, while for the LD countries they are unemployment

and physical infrastructure. It appears to be that when making the decision to invest in the D countries, firms consider the potential purchasing ability of the market as well as how open the economy is to trade; both variables are important for future operations and profitability of the firm. When it comes to the LD countries, importance seems to lie with the availability of labour willing to work for lower prices and the ease of transporting inputs and outputs of the production process, depending on the nature of the business. Both variables are quite important to the production inputs and the overall level of productivity of the company. The difference between the two samples could be due to the different nature of FDI flowing into the countries: market-seeking and resource-seeking. Therefore, the results can be explained by the possibility that market-seeking investors move operations to developed countries, while resource-seeking investors to less-developed countries. The nature of FDI is another variable that can be important to the model and requires further research.[2]

[2] Empirical studies recognize that the choice of location of FDI is strongly driven by the motivation for the FDI: natural resource-seeking, market-seeking, efficiency-seeking and asset-augmenting. Market-seeking investments are attracted to market size and growth, access to regional and global markets and consumer preferences, and can usually be witnessed between two industrial countries. Natural resource-seeking FDI, on the other hand, relies on low-cost unskilled labour, land and buildings rates, and the cost of raw materials. This type of investment is usually made by the developed nations in the less-developed nations. These findings support the results of this study and the difference between the two samples of data discussed above, (Dunning, 2004).

6.2 Coefficients

It is also important to note the results for coefficients in the regression. In both time periods, the regression coefficient for market size and patent protection for the combined sample is positive and significant. In 2000, the regression for all countries has a negative and significant coefficient for the unemployment rate, and positive and significant coefficients for trade openness, exchange rate, and market size. Once again, the effects differ when the data for the developed and less-developed countries is analyzed separately. In the case of the D countries, all the significant variables mentioned earlier have positive coefficients in the regression. For the LD countries, the coefficient for the exchange rate and level of corruption is negative and significant while the coefficients for physical infrastructure and the inflation rate are positive and significant in 1995. In 2000, coefficients for the unemployment rate and physical infrastructure are significant and have a negative and positive effect on FDI, respectively.

Given the difference in the regressions between the coefficients for the two samples, the cases are also dissimilar in terms of the significance of the independent variables. As discussed above, significance of variables changes from 1995 to 2000 for the D and LD countries, especially in terms of patent protection.

6.3 Crosscorrelations

We also report the correlation matrices for the independent variables for periods 1995 and 2000 in Table 3. The results suggest that patent protection can have a strong

influence on foreign direct investment. They also show that the correlation between the two variables increases from year 1995 to 2000. The introduction of the TRIPs Agreement can be partially responsible for this change. Once more, a substantial discrepancy can be seen between the D and LD countries. The patent protection matrix and the FDI matrix for the D countries have a correlation of 0.4184 (1995) and 0.5347 (2000), almost twice the result for the LD countries (0.2520 and 0.3563 respectively). The results for the D countries clearly show a stronger positive association of patent protection with the dependent variable. The matrices also show the varying degree of association between the other independent variables with FDI.

6.4 Final Remarks

Similar to Seyoum (2006), GDP growth rate seems to be insignificant in the model. The role of exchange rates in determining FDI inflows remains questionable. Table 2 shows that the significance of the variable changes depending on the year and the data sample, therefore the importance of devaluation in attracting FDI is still uncertain. The two new variables added to the Seyoum (2006) regression also show interesting results. Physical infrastructure appears to be very significant, especially for the LD countries. The inflation rate shows to have a negative significant relationship with FDI, but only for the LD countries for period 1995. This result supports the past works suggesting that a high inflation rate threatens to erode the financial value of the assets and technologies invested in the host country, (Baimbridge and Whyman, 2006). Similar to to Seyoum (2006), the level of corruption was significant to the investment

flows for period 1995, but once again only for the LD countries. In theory, corruption is seen as an additional cost to business and is expected to have a negative effect on FDI, but empirical research has not found this effect to exist. The reason behind the level of corruption not being consistently significant in the model, despite the common belief, could be explained by the fact that corruption is not necessarily an independent variable. It is a consequence of economic and non-economic variables and might need to be treated as an endogenous variable, (Al-Sadig, 2009).

Table 3.A
Correlation Matrix - 1995
Developed Countries

	GG	LP	UN	TO	ER	PI	CR	IN	PP	LF
GDP Growth (GG)	1.00	-0.47	0.16	0.48	-0.15	-0.48	0.01	0.29	-0.27	-0.17
log Population (LP)	-0.47	1.00	0.14	-0.60	0.25	0.08	-0.40	-0.22	0.33	0.39
Unemployment (UN)	0.16	0.14	1.00	0.07	0.41	-0.45	-0.67	0.23	-0.15	0.25
Trade Openness (TO)	0.48	-0.60	0.07	1.00	0.21	-0.19	0.26	-0.17	-0.13	0.09
Exchange rate (ER)	-0.15	0.25	0.41	0.21	1.00	-0.40	-0.40	0.08	-0.10	0.55
Physical Infrastructure (PI)	-0.48	0.08	-0.45	-0.19	-0.40	1.00	0.57	-0.39	0.31	0.18
Corruption (CR)	0.01	-0.40	-0.67	0.26	-0.40	0.57	1.00	-0.30	-0.06	-0.13
Inflation (IN)	0.29	-0.22	0.23	-0.17	0.08	-0.39	-0.30	1.00	-0.48	-0.17
Patent Protection (PP)	-0.27	0.33	-0.15	-0.13	-0.10	0.31	-0.06	-0.48	1.00	**0.42**
log FDI (LF)	-0.17	0.39	0.25	0.09	0.55	0.18	-0.13	-0.17	**0.42**	1.00

Less-Developed Countries

	GG	LP	UN	TO	ER	PI	CR	IN	PP	LF
GDP Growth (GG)	1.00	0.11	-0.52	0.01	-0.17	-0.26	-0.09	-0.20	-0.32	0.10
log Population (LP)	0.11	1.00	-0.42	-0.76	-0.12	-0.16	-0.37	-0.08	0.15	0.39
Unemployment (UN)	-0.52	-0.42	1.00	0.23	0.08	-0.02	0.38	0.02	0.14	-0.40
Trade Openness (TO)	0.01	-0.76	0.23	1.00	0.09	0.05	0.18	-0.02	-0.27	-0.47
Exchange rate (ER)	-0.17	-0.12	0.08	0.09	1.00	0.69	0.15	0.78	0.11	-0.08
Physical Infrastructure (PI)	-0.26	-0.16	-0.02	0.05	0.69	1.00	0.44	0.62	0.42	0.36
Corruption (CR)	-0.09	-0.37	0.38	0.18	0.15	0.44	1.00	0.32	0.05	0.07
Inflation (IN)	-0.20	-0.08	0.02	-0.02	0.78	0.62	0.32	1.00	0.16	0.17
Patent Protection (PP)	-0.32	0.15	0.14	-0.27	0.11	0.42	0.05	0.16	1.00	**0.25**
log FDI (LF)	0.10	0.39	-0.40	-0.47	-0.08	0.36	0.07	0.17	**0.25**	1.00

Table 3.B
Correlation Matrix - 2000
Developed Countries

	GG	LP	UN	TO	ER	PI	CR	IN	PP	LF
GDP Growth (GG)	1.00	-0.40	0.15	0.42	-0.01	-0.33	-0.41	0.32	-0.25	-0.19
log Population (LP)	-0.40	1.00	0.25	-0.65	0.35	0.06	-0.20	-0.26	0.42	0.59
Unemployment (UN)	0.15	0.25	1.00	-0.28	0.25	-0.52	-0.29	0.02	-0.36	-0.02
Trade Openness (TO)	0.42	-0.65	-0.28	1.00	0.13	-0.07	-0.02	0.35	-0.16	0.07
Exchange rate (ER)	-0.01	0.35	0.25	0.13	1.00	-0.10	-0.16	0.42	0.11	0.55
Physical Infrastructure (PI)	-0.33	0.06	-0.52	-0.07	-0.10	1.00	0.64	-0.12	0.24	0.30
Corruption (CR)	-0.41	-0.20	-0.29	-0.02	-0.16	0.64	1.00	0.00	-0.08	0.01
Inflation (IN)	0.32	-0.26	0.02	0.35	0.42	-0.12	0.00	1.00	-0.13	0.05
Patent Protection (PP)	-0.25	0.42	-0.36	-0.16	0.11	0.24	-0.08	-0.13	1.00	**0.53**
log FDI (LF)	-0.19	0.59	-0.02	0.07	0.55	0.30	0.01	0.05	**0.53**	1.00

Less-Developed Countries

	GG	LP	UN	TO	ER	PI	CR	IN	PP	LF
GDP Growth (GG)	1.00	0.10	-0.65	-0.07	0.03	0.20	0.41	-0.38	-0.09	0.38
log Population (LP)	0.10	1.00	-0.10	-0.81	-0.05	-0.13	-0.32	-0.10	0.20	0.27
Unemployment (UN)	-0.65	-0.10	1.00	-0.01	0.05	-0.19	-0.56	0.22	0.16	-0.62
Trade Openness (TO)	-0.07	-0.81	-0.01	1.00	-0.09	0.30	0.23	0.01	-0.07	-0.17
Exchange rate (ER)	0.03	-0.05	0.05	-0.09	1.00	0.15	0.05	-0.20	0.06	0.25
Physical Infrastructure (PI)	0.20	-0.13	-0.19	0.30	0.15	1.00	0.22	-0.12	0.50	0.66
Corruption (CR)	0.41	-0.32	-0.56	0.23	0.05	0.22	1.00	-0.21	0.06	0.45
Inflation (IN)	-0.38	-0.10	0.22	0.01	-0.20	-0.12	-0.21	1.00	0.36	-0.10
Patent Protection (PP)	-0.09	0.20	0.16	-0.07	0.06	0.50	0.06	0.36	1.00	**0.36**
log FDI (LF)	0.38	0.27	-0.62	-0.17	0.25	0.66	0.45	-0.10	**0.36**	1.00

7. Conclusions and Future Research

The purpose of the harmonized intellectual property protection standards was to allow countries to fully benefit in the global economy and spur economic growth in the less-developed areas. This paper contributes to the literature by presenting empirical evidence of the importance of the development level in the relationship between patent protection and FDI and how it changes with the introduction of the TRIPs Agreement in 1995.

The results suggest a positive relationship between patent protection and FDI which is greater for the developed countries than for the less-developed. The positive correlation increases after the TRIPs Agreement, showing support for the hypotheses that patent protection is positively associated with investment inflows and after the TRIPs Agreement the importance of patents in the relationship grows more for developed countries. More importantly, the study shows evidence for different economic indicators being essential in attracting FDI in developed and less-developed countries. From the independent variables that were significant in the regression, it can be suggested that developed countries attract market-seeking FDI, while less-developed countries attract resource-seeking FDI.

History does show that growth is also attainable in developing countries without the strong patent protection regime (i.e. Taiwan before 1994). One reason, also a limitation of this study, is that sophisticated technologies in these countries could be protected by trade secrets and not patents. A second reason could be that FDI occurring in these

countries is in industries where patent protection is of limited importance, (Seyoum, 1996).

While discussing the findings, it is worth mentioning other limitations of this study. It can be seen from the results that the level of development of a country may have an effect on the motive behind the FDI, therefore using the total FDI inflows as the dependent variable may have oversimplified the results. Future research should consider creating further subsamples according to the type of FDI (resource-seeking, market-seeking). The study can also be further extended for an additional five years because the TRIPs Agreement may require a ten year grace period for all the countries (especially the less-developed) to experience the benefits. The time period used in this study may not be long enough to make conclusive statements.

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Appendix 1: Country List

Countries Used in the Study

Developed			
Australia	France	Italy	Spain
Austria	Germany	Japan	Sweden
Belgium	Greece	Netherlands	Switzerland
Canada	Ireland	New Zealand	United Kingdom
Denmark	Israel	Norway	United States
Newly-Industrialized			
Brazil	India	South Africa	Turkey
China	Mexico	Thailand	
Less-Developed			
Argentina	Colombia	Indonesia	Peru
Bangladesh	Ecuador	Jordan	Poland
Botswana	Egypt	Kenya	Sri Lanka
Bulgaria	Guyana	Nicaragua	Venezuela
Chile	Hungary	Pakistan	Zimbabwe

Appendix 2: Data Sources

Most of the data for the sample comes from the World Bank database.

- Data for GDP growth rate, population, unemployment rates, trade/GDP ratio, exchange rates, and physical infrastructure were obtained from the World Bank for the periods 1995 and 2000.
- Data on corruption were obtained from the Political Risk Services for periods 1995 and 2000.
- The data for patents for 1995 and 2000 were obtained from the Park and Wagh (2003) index of patent protection.
- Data on FDI inflows were obtained from the World Bank for the periods 1996 and 2001.

Appendix 3: Chow Test Results

The original model

$$\textbf{Log FDI}_{it} = \beta_1 + \beta_2(\text{GDP growth})_{it} + \beta_3(\text{Market Size})_{it} + \beta_4\,(\text{Unemployment})_{it} +$$

$$+ \beta_5\,(\text{Trade Openness})_{it} + \beta_6\,(\text{Exchange Rate})_{it} + \beta_7\,(\text{Physical Infrastructure})_{it} +$$

$$+ \beta_8\,(\text{Corruption})_{it} + \beta_9\,(\text{Inflation})_{it} + \beta_{10}\,(\text{Patent Protection})_{it} + \text{error}_{it}$$

i = country (Appendix 1 includes the list of countries)
t = time period; t = 1995, 2000

Create new variables

Dummy variable (d): d = 0 if t=1995 and d = 1 if t=2000

Patent * dummy (patent_d): patent_d = 0 if t = 1995 and patent_d = patent if t = 2000

New regressions

Regression 1: t = 1995

$$\textbf{Log FDI}_{it} = \beta_1 + \beta_2(\text{GDP growth})_{it} + \beta_3(\text{Market Size})_{it} + \beta_4\,(\text{Unemployment})_{it} +$$

$$+ \beta_5\,(\text{Trade Openness})_{it} + \beta_6\,(\text{Exchange Rate})_{it} + \beta_7\,(\text{Physical Infrastructure})_{it} +$$

$$+ \beta_8\,(\text{Corruption})_{it} + \beta_9\,(\text{Inflation})_{it} + \beta_{10}\,(\text{Patent Protection})_{it} + \text{error}_{it}$$

Regression 2: t = 2000

$$\textbf{Log FDI}_{it} = \beta_1 + \beta_2(\text{GDP growth})_{it} + \beta_3(\text{Market Size})_{it} + \beta_4\,(\text{Unemployment})_{it} +$$

$$+ \beta_5\,(\text{Trade Openness})_{it} + \beta_6\,(\text{Exchange Rate})_{it} + \beta_7\,(\text{Physical Infrastructure})_{it} +$$

$$+ \beta_8\,(\text{Corruption})_{it} + \beta_9\,(\text{Inflation})_{it} + \beta_{10}\,(\text{Patent Protection})_{it} + \beta_{11}\,(\text{Patent\_d})_{it} +$$

$$+ \beta_{12}\,(\text{d})_{it} + \text{error}_{it}$$

Chow Test on Regression 2

H_0: $B_{11} = 0$, $B_{12} = 0$
H_1: not H_0

Reject H_0 if $P < 0.01$, 0.05 and 0.10 for 1%, 5% and 10% significance levels respectively

If $B_{11} \neq 0$, then the coefficient for Patent Protection will = $(\beta_{10} + \beta_{11})$
If $B_{12} \neq 0$, then the intercept will = $(\beta_1 + \beta_{12})$

Results of the Chow Test

Sample	**B_{11} (patent_d)**	**B_{12} (d)**	**Reject / Not Reject H_0**
All Countries	F(1, 80) = 0.53 Prob > F = 0.4682	F(1, 80) = 0.25 Prob > F = 0.6188	Not Reject H_0
Developed Countries	F(1, 27) = 0.04 Prob > F = 0.8399	F(1, 27) = 0.01 Prob > F = 0.9420	Not Reject H_0
Less-Developed Countries	F(1, 27) = 0.02 Prob > F = 0.8765	F(1, 27) = 0.00 Prob > F = 0.9449	Not Reject H_0

No evidence of a structural break in the model.