Stockholm School of Economics
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The effects of Intellectual Property Rights on trade and Foreign Direct Investments
-a study on an aggregate level

Abstract

A stylized view of the ongoing debate on protection of Intellectual Property Rights [IPRs] is that in developing countries stronger IPRs, in itself neither, leads to increased Foreign Direct Investments [FDIs], do not encourage technology transferring nor increase local innovations. Industrial countries however, have great confidence in IPRs ability to generate economic growth. The US Department of State has for instance argued that there is a direct relationship between a country's protection of intellectual property [IP] and its economic growth and development. This thesis employs an econometric cross country study on an aggregate level in an effort to examine IPRs effects on trade and FDI's. Further we also investigate if the strength of IPRs relations to trade and FDIs are linked to interaction effects with other explanatory variables. We can not find reliable evidence that would suggest that IPRs influences exports, imports nor FDIs in any specific way. Moreover our results show that IPRs relations to trade and FDIs can not be linked to specific interaction effects.

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1. Introduction

The Agreement on Trade-Related Aspects of Intellectual Property Rights [TRIPS] was submitted at the trade discussions at the Uruguay Round in 1994. From the talks in Uruguay emerged the World Trade Organization (WTO) and the WTO agreements which included TRIPS. The TRIPS agreement induces all Members of the WTO to provide principles of protection for an extensive series of Intellectual Property Rights (IPRs), which is protection for creative works such as writing (copyright), inventions (patents), processes (trade secrets) and identifiers (trademarks) [1].

Developing countries[2] have criticized the TRIPS treaty on several issues. The core issue is the relationship between IP legislations and economical development. Byström & Einarsson (2002) write that, a stylized view of the ongoing debate on protection of intellectual property rights is that in developing countries stronger IPRs, in itself neither, leads to increased Foreign Direct Investments [FDIs] (which is the movement of capital across national borders in a way that grants the investor control over the acquired asset[3]), encourage technology transferring nor increase local innovations. Industrial countries however, have great confidence in IPRs ability to generate economic growth. The US Department of State has argued that there is a direct relationship between a country's protection of intellectual property [IP] and its economic growth and development; and that the power of technology is capable of lifting all economies, but that those countries that neglect to protect IP will get behindhand.

Due to the fact that industrial countries and developing countries have different opinions about the effects of IPRs we will in this paper try to shed some light on the issue of IPRs. We will in this paper ask the question if IPRs actually improve markets everywhere. In an effort to do that we will examine IPRs effect on the trade and FDIs. This is an important question since it is of course in countries' interest to know whether a strengthening in IPRs will increase trade and/or FDIs, and what factors that influences IPRs relation to trade and IPRs.

[1] For further detailed explanations about IPRs, see section 4 in this paper. For more detailed information about TRIPS, see appendix A.
[2] Just as the Kommerskollegium [KK] (2004) refers to developing countries we will in this report use the term developing countries of those countries which by themselves choose that definition. For further details, see section 3 in this paper.
[3] When a company owns 10 percent or more of the stock of a company located in a foreign country it is a FDI. Thus, it is distinct from portfolio investment which may cross borders, but does not offer control over the asset.

The intentions of this study are to look at the relation between the strength of IPRs and the volume of exports, imports and FDIs, along with studying the effect other variables have on IPRs relation to trade and FDIs.

We will test the hypothesis that, on an aggregate level, a strengthening in IPR is associated with a positive effect on exports, imports and FDIs and that the strength of IPRs relations to exports, imports and FDIs are linked to interaction effects with other explanatory variables. Those variables are in the paper argued to be measures of GDP-, wage- and educational levels of country along with a dummy variable indicating if a country is a developing country or not.

In this paper we first survey the existing empirical research related to IPRs, FDIs, exports and imports. After that, in chapter 3, we present the data used in the study, followed, in chapter 4, by an explanation of the empirical method used in the study. At the end, we present the results, and finish by some concluding remarks.

2. Earlier Research

At first, IPRs were initiated in the world for the purpose of stimulating technological development and other creating efforts. However, there is an unavoidable trade-off in establishing IPRs. On the one hand, static efficiency[4] requires that there is wide access to technology and goods. At its best, marginal cost which might be quite low. On the other hand does dynamic efficiency[5] depend on the presence of incentives to invest in new information for which social value exceeds development costs. Evidently do lack of proper IPRs support the static ambition, but then society fails to provide necessary incentives to generate IP. The problem is very much an important one; without strong IP legislations we might end up in a situation where the incentives to invest in IP are very weak since all countries are trying to free ride on investments that are done in other countries[6].

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[4] Static efficiency exists at a point in time and focuses on how much output can be produced now from a given stock of resources and whether producers are charging a price to consumers that fairly reflects the cost of the factors of production used to produce a good or a service.

[5] Development of new technologies or processes (e.g., to enhance productivity, reduce the resource intensity or products, etc.).

[6] For more reading about the effects of Patents, Copyrights and Trademarks see Carlton and Perloff (2005).

IP legislations have been sources for international conflicts. Ganslandt (Ekholm, 2005, kap.7) writes that there are some fundamental reasons for those conflicts. First of all, the willingness to pay for new products and ideas vary between individuals and countries. As IP of various kinds are valued differently between countries, IPRs will vary in importance between countries. Moreover, Ganslandt says that, the choice between using resources for product development instead of producing more of existing products also depends on the income level. It is reasonable to believe that the willingness to pay for product- development and variations is larger when the income level is high. Therefore, it is expected that rich countries use relatively more resources for product development than poorer countries. Hence, it is not surprising that rich countries argue for stronger IPRs while poorer have a more negative approach towards IPRs.

That IPRs allow the innovators to obtain monopoly positions of varying levels can create problems of monopoly abuse. The KK (2004) declares that this is especially true in developing countries where competition regulation systems, which prevent monopoly abuses, are not as advanced as in developed countries. Hence, this could make poorer countries very exposed to inappropriate IP systems. If foreign firms take advantage of their dominating positions it could kill domestic production and prices of goods will increase. With this in mind, one understands that the benefits of TRIPS, in terms of profits, must be low in countries, presumably developing countries, where the scientific and technical infrastructures are at a low level. Not surprisingly, Ganslandt (Ekholm, 2005, kap.7) argues that, those countries that exclusively consume the end products, and hence not develop any products, are likely to premiere low prices before awarding innovators or firms for their investments. However, an increase in IPRs may still be beneficial for developing countries if it leads to increased domestic innovation, increased inflow of foreign products and more FDIs.

2.1 The relation between FDIs and IPRs

Certain sectors are more dependent of strong IP legislation than others. For example it is reasonable to believe that the chemical industry, where innovations are easy to copy, is very dependent of IPRs while high- tech industries (i.e. machinery and electrical equipment), where the ability to imitate is limited, tend to care less about these issues. Hence, the capacity to copy and a country's ability to imitate influences the relation between an increase in FDIs and stronger IPRs.

It is evident that strong IPRs alone neither offers necessary nor sufficient incentives for companies to invest in a certain country. Since, if that would have been the case, countries such as those in East Asia, which have been known to have weak IP protections, would not have received as much foreign investment inflow as they have in the past. Quite rightly, the CIPR (2003) confirms that *"recent reports from international institutions and bodies of investment flows almost entirely fail to mention IPRs as a factor"* and "*Similarly, a recent draft World Bank report on improving India's investment climate makes no mention at all of the role of IPRs.* "(p. 23).

Empirical studies on IPRs influence on inward FDIs give somewhat mixed results. Mansfield (1994) asks whether IPR protection is an important factor in firms' decision where to locate various facilities. For this Mansfield uses survey evidence for 100 large firms, in six industries, from the US. His evidence implicates that IPRs have little importance when deciding where to locate sales and distribution outlets, but they are a greater concern at higher stages of production. Mansfield found that IPRs are a crucial factor when deciding locations for R&D facilities, and that the chemical- and pharmaceutical industries are heavenly dependent on strong IPRs. For other industries however his findings suggests that IPRs had little importance.

Moreover Mansfield uses the survey of 100 US companies to study the volume of FDI into each of 14 countries[7]. Keeping in mind that Mansfield's study has faced severe criticism for his small sample size and his subjective measure of IPR protection, his results shows that, FDIs are lower in countries with perceived weak IP legislation, and FDIs, devoted to R&D and final production, are significantly lower in countries where IP protections are perceived as weak. His conclusion is that not only the volume of FDIs is affected by stronger IPRs but also the quality of FDIs.

Smarzynska (2004) studies whether the strengths of IPRs influence the composition of FDI flows for 24 transition economies[8]. In her study Smarzynska estimates a Probit model[9] of the

[7] Mansfield uses control variables and variables which measures the average percentage of companies that consideres IPRs in the specified country to be too low for them to transfer their newest technology to a wholly owned subsidiary or to invest in a joint venture with a local affiliate.
[8] Transition economies are countries of the former Soviet Union and its satellites that are moving from central planning to market orientation.

decision to invest in countries and in the decision to invest in production amenities in a foreign country. Her evidence indicates that weak IP legislations discourage FDIs in high-tech sectors, and also that the same relationship, with weak significance, occurred for low-tech industries.

As mentioned above, a country's ability to absorb and attract technology depends on several different factors. The size of a country plays a vital role. Maskus, Saggi and Puttitanun (2004) state that size and expected growth in a country serves as major reasons for FDIs to find its way there. In addition Maskus (2000) sadly declares that the worlds least developed countries fails to attract practically any FDIs because of terribly low skills, education and productivity levels. Moreover he states that, these countries have a tendency to be corrupt, have underdeveloped infrastructure and they are often relatively closed to trade. Of course, in the least developed countries, levels of IPR protection make little or no difference, since FDIs will not find its way there anyways.

Further, Maskus (2000) makes clear that there is a growing importance of IPRs the more horizontal[10] the FDI is. In addition he says "*In this sense, it is not surprising that countries moving up the FDI cycle find a growing economic interest in adopting stronger IPRs, an interest congruent with their own expanding abilities to produce new products and technologies.*" (p. 123). However, Maskus explains a contradiction to this observable fact; when information is imperfect and licensing is expensive the market faces an imperfection. This since the licensee wants to know what it is buying but the seller might not be willing to release enough information because of the risk that the buyer will take off with the information and copy it without paying for it. For this reason the seller might instead have to obtain a subsidiary to which the firm transfers its know ledged based assets. Hence, companies might be more willing to take on FDIs in nations with weak IPRs and contract enforcements. The analysis is that, as a country's IPRs grow to be stronger, companies will be inclined to choose less FDIs but instead more joint ventures and technology licensing.

Finally, while there are reasons to expect that IPRs should have an effect on FDI flows, the evidence linking IPRs to FDIs varies. Stronger IP legislations seem to encourage FDIs in

[9] For the explanation of a Probit model, go to website http://www.gseis.ucla.edu/courses/ed231c/notes3/probit1.html

[10] Horizontal Foreign Direct Investment is investment in the same industry abroad as a firm operates in at home.

certain industries, especially chemicals and pharmaceuticals. Not surprising, it appears as IPRs plays little role in industries where it is difficult to imitate products, notably high-tech industries, while in low-tech industries other factors than IPRs are more important for countries in their efforts to attract FDIs.

2.2 Variables affecting Trade

The model that best explains the size of trade is called the gravity model[11]. In a gravity model, the volume of trade between two countries is proportional to the product of the countries GDP and inversely proportional to the geographical distance between the two countries. Hence the trade volume between two large countries is larger than between two small countries. Also, the trade volume between two countries far from one another is less than the trade volume between two countries close to each other. It is common that other variables, which are assumed to influence trade, are included in the estimations. Flam (Ekholm, 2005. kap.1) lists a number of such explanatory variables for the extent of foreign trade between countries. The most important variables are:

- The area of countries; at similar distance, GDP and additional factors, countries with large areas are likely to trade less with each other. The logic is that, because of their size these countries tend to relatively trade more inside the country borders, and
- GDP per capita; richer countries ought to trade more with each other than poor countries since their consumers demand more varieties of goods and services.

Moreover, Flam catalogs other factors that (besides transport costs) affect costs of foreign trade. They are:

- Same language; similar language makes it easier for parties to understand each other,
- uncertainty about exchange courses; volatility in exchange courses creates uncertainty which is bad for trade,
- common currency; common currency seems to lead to increased trade,
- trade barriers; lower customs and free trade areas stimulates trade,
- common border; a common border is supposed to decrease transportation costs besides the importance of distance, and

[11] See for instance Krugman & Obstfeld (2005)

- common past; similarity in laws, public procedures and culture is supposed to make it easier to trade with each other.

These factors that are taken in the gravitation model typically explain 90 percent of foreign trade, with GDP and geographical distance by themselves explaining 70-80 percent. The strength of IPRs is typically not included, but is still likely to have an affect on both imports and exports.

2.3 The relation between trade and IPRs

A firm might be hesitant to export its products to a foreign country where IPR protection is weak. This since potential pirates could lower profitability. As a result, imports of such goods will be higher in countries where there are strong IPR regimes, as net demand for products from the foreign firm will be higher when possible pirates can not enter the market. This is of course good for a foreign IPR holder, but it might not be positive for domestic production since the market power of the IPR owner also sincerely increases, which may lead to reduced domestic- and foreign sales for domestic firms. The CIPR (2003) writes that, for a developing country, this could be a difficult adjustment. With stronger IPRs there might be access to more high technology imports, but the costs may be very large in terms of lost employment and output, or even retarded growth. Understandably this could have a long run substantial negative effect on the import and export market of a country, since, as Maskus et al. (2004) write that real Gross Domestic Product[12] is an excellent measure of the market size of a country, which clearly has a strong impact on all inward and outward commercial flow. In addition, Fink and Maskus (2005) write, in a co publication of the World Bank and Oxford University, that "*from a static general equilibrium point of view, tighter IPRs tend to be further detrimental to the destination country of the trade flows because the reallocation of production - that is, the shift of product lines from the destination country to the source country - worsens the terms of trade in favor of the source country*" (p. 22).

However, as already discussed one also has to keep in mind that stronger IPRs will increase incentives for innovators to develop new products, which in later stages can be sold both inside the country borders and abroad. This is likely to be the case in all countries. Fink and

[12] Real GDP is the real value of all final goods and services produced in the economy, measured in dollars adjusted for inflation

Maskus (2005) argues that from a dynamic point of view, strengthening of IPRs makes domestic innovation and development more attractive and therefore boosts trade flows. Moreover, it is discussed that strong IPRs, if managed in the right way, could improve dynamic competition between nations. The argument is that, innovation- producing countries have incentives to develop new technologies when IPRs are strong. These new technologies can then in the next generation be manufactured by follower countries. Hence, this mechanism gives rise to continued technological progress and economic growth, which from a dynamic point of view, is valuable for both leaders and followers.

Moreover, Fink and Braga (1999) write that a foreign firm may decide to decrease its sales in a foreign country or market where IPR protection is high, since the firm can reap benefits of its market power in a pirate free environment. Hence, these contrasting market expansion and market-power effects imply that the total effect of a strengthening of the IPR protection on trade is ambiguous. Given the theoretical uncertainty of the relationship between IPRs and trade, a number of studies have empirically examined the question.

With an augmented version of the Helpman-Krugman model[13] of monopolistic competition Maskus and Penubarti (1995) estimates the effects of patent protection on bilateral trade flows for 28 manufacturing sectors. They study trade from 22 OECD countries to 71 countries that were all at different levels of development[14]. The study shows that, there is a positive link between patent protection and bilateral manufacturing imports in both large and small developing countries. However, the impact is weaker in small developing countries. In the most patent sensitive industries Maskus and Penubarti finds, somewhat surprising, little evidence suggesting that stronger IPRs have a positive impact on trade.

Adding to the research are Fink and Braga (1999) who employ a standard gravity equation[15] of bilateral trade flows and estimate the effects of stronger IPRs on either total non-fuel or high-tech trade flows for a cross-section of 89 countries. They come to the conclusions that strong IP legislations have small but significantly positive influence on the likelihood that

[13] The Helpman-Krugman model shows how inter & intra industry trade can co-exist.
[14] Explanatory variables included importing country's Gross National Product/Capita and trade restrictions. Maskus and Penubarti also include the interaction between the IPR index and dummies indicating whether the importing country has a small or a large market. This to account for technological aptitude and market size effects.
[15] Including the GDP and populations of both trade partners, distance between trade partners and dummies for common border, common language and various Preferential Trading Arrengements (PTAs) as explanatory variables.

countries trade with each other and also that stronger IPRs affect bilateral trade flows (both non-fuel imports and exports) in a positive way. However, for high-tech trade their results show a somewhat opposite picture. Then they find that stronger IPRs are negatively related to the probability that two countries would trade with each other, and that IPRs are not significantly related with bilateral trade flows.

Conducting a similar gravity equation exercise, Smith (1999) analyzes the effects of IPRs on exports from the 50 US states (plus District of Columbia) to 96 countries. In her study, Smith divides her sample of importing countries into for groups depending on their ability to imitate, which is depending on their R&D spending and their strength of patent rights. An IPR measure[16] was then interacted with dummies for these four different groups. The results indicate a negative relationship between IPR protection and exports from the US to countries which had the lowest ability to imitate. However, for those countries that have the best ability to imitate, Smith finds a positive relationship between trade and IPRs. Smith's conclusions is that IPR protection in importing countries are important for US exporters, but only in countries that pose a threat of imitation.

Additional research, made by Maskus (2000) indicates that, "if *an average developing country were to strengthen its patent index by one unit, local sales of US affiliates would rise by $243 million, or about 2 percent of average annual sales."* (p.131). More he writes that his findings suggest that stronger IPRs in developing nations do not attract additional applications but do improve affiliate sales and rise asset stock.

Further, The KK (2004) refers to a study of foreign firms' activities in developing countries and says that weak property rights results in that investors choose to import instead of investing in indigenous production. Most important is that they write this is true for all sectors and not only those that are dependent on strong IPRs. The views and results of the analysis clearly go apart so further studies are definitely needed.

[16] Both the Ginarte and Park and the Rapp and Rozek (1990) indices were used. Both indices showed similar results.

3. The Data Used

The first step in order to measure the affect IPRs have on export, import and FDIs is of course to have a dataset of IPR protection. In the econometric analysis we use the Ginarte and Park index (2006)[17] to explain the levels of IPR protection in different countries. When the professors in economics, Walter Park and Juan Carlos Ginarte, measure the strength of IPRs around the world, they use a five point score built on the summation of five national components which are:

- Membership in international agreements,
- extent of coverage (food, pharmaceuticals, etc),
- duration of protection (standard is 20 years),
- provisions for loss of protection (compulsory license provisions, etc), and
- enforcement instruments (provisions for restrictions, pleadings etc).

The index grades the level of protection of 110 countries where United States receives the highest score with 5 at the year 2000 and countries with no patent laws, such as Mozambique and Papua New Guinea, receive a score of 0. Looking at Appendix C one can see that there were not that much change in IP legislation around the world before the year 1990.

Second we used export and import volumes from the WTO website[18]. As this paper deals with the effect on total exports and imports we combined the data from services and merchandize trade. For this reason the analysis in this paper can only go back to the year 1980 as we were only able to receive data of trade in services from no further back than that year.

We use the FDI statistics from the United Nations Conference on Trade and Development website[19]. One problem with the FDI data is that there are many missing values in that category, resulting in only 37 countries being analyzed, when studying IPRs effect on FDIs.

We collected the GDP data from the year 1980 and forward from the UN Statistic Division database[20]. All values, including export, imports, FDIs and GDP are in US dollar current

[17] I would like to thank Walter Park for sharing this index with me and Keith E Maskus for informing me of its existence.
[18] http://stat.wto.org/StatisticalProgram/WSDBStatProgramHome.aspx?Language=E
[19] http://www.unctad.org/Templates/Page.asp?intItemID=3198&lang=1

prices. Since they are in current prices they are deflated. The deflator index we use for deflating the series is also to be found at the UN statistic division website[21] and thereafter all values are converted[22] into 1990 prices.

One should keep in mind that it is common that national account statistics suffers from measurement difficulties. This is because of the problems with measuring illegal, informal and household based production. These difficulties are especially severe in developing countries where production "outside" of the economy is more common than in developed countries. Another problem with national accounts is that there are different coverage and accounting practices all around the world. It would be naive to believe that all numbers that are dealt with in this paper has been collected in a similar and accurate way. However, the organizations where we collected the data are all reliable and there are therefore reasons to believe the numbers are as accurate as it gets.

As discussed earlier, especially in the introduction and in section 2, there have been concerns in developing countries about how well IP legislation work, and also what the effects of an increase in IPRs are. Observations and opinions differ and more research is needed to obtain a true relationship. That developing countries trade less than richer countries is evident since the ability to buy and produce goods are less in poor countries. And again developing countries ability to attract FDIs is very much different from richer countries, because for example[23] their worse infrastructure and low wages. A developing country dummy is used for the econometric calculations in this study. There are problems with defining what a developed country is, but for the sake of the econometric analysis and our dummy variable in this paper we follow Andrew K Roose (2004) in his referral to developed countries[24]. Developing countries are all others.

One can look at low wage countries like China or India to understand that the level of wages in countries is an important factor for companies when they decide where to operate and

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[20] http://unstats.un.org/unsd/snaama/dnllist.asp
[21] http://unstats.un.org/unsd/snaama/dnllist.asp
[22] The formula used to calculate the deflator is: $\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$
[23] Also discussed in section 2.1
[24] Developed countries are Australia, Belgium, Canada, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zeeland, Norway, Portugal, Spain, Sweden, Switzerland, UK and USA.

invest. Thus, wage rates do have an impact on trade and FDIs. Quite rightly, do Maskus et al. (2004) use the effective (productivity – adjusted) wage as an explanatory variable when studying the effects of IPRs on FDIs. As there, according to earlier research (Maskus et al. 2004), might be a positive relationship between how well IPR legislations work and the skill level of the labor in a country, one could imagine there might be an interaction effect between IPRs and the average wage rate in a country. This, since skilled labor normally is better paid than unskilled. In this study we use cross-country data of the average wage in dollars per month from the year 1990. We choose the year 1990 since that was the year where the amount of missing values was at its lowest. The data was found in the appendix of Remco H. Oostendorps (2005) paper "The Standardized ILO October Inquiry 1983-2003".

Since different sorts of work demands different types of skills and hence, different types and degrees of education, one could argue that the educational levels across countries have an impact on FDIs and trade. Also important for this study is that skilled labor tend to be more educated than low skilled labor and hence, as with the wage level, one could presume there is an interaction effect between IPR legislations and the educational level in a country. Thus, cross country data of average years of education for the years 1985 or 1990 are used in the model. The data used is to be found at the World Bank's comprehensive database of education statistics, Edstats[25].

4. Econometric Specification

The elasticity[26] of exports, imports and FDIs to IPRs is estimated for the entire data set. To measure these elasticities, three regressions are done with the change in exports, imports and FDIs respectively as the dependent variable and with the change in IPRs as the explanatory variable. So the change in exports, imports and FDIs for the years 1980 to 2000 or for the years 1990 to 2000 are regressed on the change in IPR protection from the years 1980 to 2000 or the years 1990 to 2000 respectively, but also on some other variables: the difference in GDP from the years 1980 to 2000 or the years 1990 to 2000 respectively, average years of education at the years 1985 (used when the change in IPRs are measured for the years 1980 to 2000) and 1990 (used when the change in IPRs are measured for the years 1990 to 2000), average wage per month in dollars the year 1990, and a dummy indicating if the country is a

[25] http://www1.worldbank.org/education/edstats/

[26] Elasticity = (percentage change in Z) / (percentage change in Y) where (percentage change in Z) / (percentage change in Y) = (dZ / dY)*(Y/Z) and dZ/dY is the partial derivative of Z with respect to Y.

developing country or not. Possibly, these variables may affect the elasticity of the dependent variables and for that reason it is important to also control for these variables when measuring the effect IPRs has on the dependent variables. Hence the equations look like this.

$$\Delta \ln E_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev + \varepsilon_{ii} \quad (1)$$

$$\Delta \ln I_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev_i + \varepsilon_{ii} \quad (2)$$

$$\Delta \ln F_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev_i + \varepsilon_{ii} \quad (3)$$

where $\Delta \ln E_{i,}$ $\Delta \ln I_i$ and $\Delta \ln F_i$ is the relative change from the years 1980 to the year 2000 or from the years 1990 to 2000 in exports, imports and FDI´s respectively. The relative change in IPRs from the years 1980 and 2000 or the years 1990 to 2000 is $\Delta \ln P$. The relative change in GDP for the same years is of course $\Delta \ln GDP_{i,}$ Edu is the education variable in 1985 or 1990, Wage is the average wage level in 1990 and Dev is the developing dummy. Finally, ε is the error term.

As discussed in section 2, there are reasons why the effect of IPRs on trade and FDIs can vary with for instance the wage level. Hence, there are certain determinants of the relationship between IPRs and the dependent variables. In order to detect these determinants, the model also includes the interaction effects of the explanatory variables with the IPR variable. Hence, this reasoning gives the following equations.

$$\Delta \ln E_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev_i + \beta_5 \Delta \ln P_i * \Delta \ln GDP_i + \beta_6 \Delta \ln P_i * \ln Edu_i + \beta_7 \Delta \ln P_i * \ln Wage_i + \beta_8 \Delta \ln P_i * Dev_I + \varepsilon_{ii} \quad (4)$$

$$\Delta \ln I_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev_i + \beta_5 \Delta \ln P_i * \Delta \ln GDP_i + \beta_6 \Delta \ln P_i * \ln Edu_i + \beta_7 \Delta \ln P_i * \ln Wage_i + \beta_8 \Delta \ln P_i * Dev_I + \varepsilon_{ii} \quad (5)$$

$$\Delta \ln F_i = \alpha + \beta_0 \Delta \ln P_i + \beta_1 \Delta \ln GDP_i + \beta_2 \ln Edu_i + \beta_3 \ln Wage_i + \beta_4 Dev_i + \beta_5 \Delta \ln P_i * \Delta \ln GDP_i + \beta_6 \Delta \ln P_i * \ln Edu_i + \beta_7 \Delta \ln P_i * \ln Wage_i + \beta_8 \Delta \ln P_i * Dev_I + \varepsilon_{ii} \quad (6)$$

As one can see in the equations above we let the countries' characteristics directly have an influence over the dependent variables, but we also allow them to interact with the change in

IPR protection. The total effect of the IPR variable also depends on the interaction with the GDP-, education-, wage- and developing variables.

Developing countries have worse educational systems and lower wage levels than already developed countries. It could then be that the direct- and interaction effects that are expected with the education- or wage variable are in fact due to that most countries with high education levels, and/or high wages, are also developed. Hence, those three variables might be correlated with each other, and the model will then have a multicollinearity problem. Because of this we will not only run the regressions without the education and wage variable respectively but also without both of them. If we in the regression would have dealt with absolute numbers in the GDP variable we would most certainly have faced the same problem with that variable, since developing countries have lower GDP and also worse educational systems. However since the GDP variable in the above model measures relative change, it is unlikely that the correlations with that variable would be strong enough so that they give rise to multicollinearity problems.

It is worth saying a couple of words about some variables that we have left out of the model. We choose not to use GDP/Capita simply because earlier research, e.g. Maskus et al (2004), on IPRs shows that real GDP is the more accurate measure to use in studies such as this one. Using both of the measures would result in severe multicollinearity problems.

Regional cooperation is something that has an effect on exports, imports and FDIs. There might also be an indirect effect with the strength of IPRs in the sense that if the regional cooperation is good enough, the legislations of property rights might be respected in a higher sense or might even be unnecessary, since countries are afraid of losing important trade partners by breaking any unofficial agreements. The reason why regional cooperation is left out of the model as a variable is because it is very difficult to measure the effectiveness of regional collaboration. It is very difficult to distinguish the different regional collaborations from one another, even though they most certainly have been very much different both in size and efficiency. Another problem is that countries have left and entered different collaborations during the 20- and 10 year spans which the regressions deals with. Arranging the regional data in a suitable way for the type of models used in this paper is hence a very complex task, which is outside the scope of this paper.

Just as well as the strength of IPRs could influence the rise in trade and FDIs, trade and FDIs may well have an effect on the strength of IPRs. Hence we might have causality problems in the model. In an effort to obtain as robust results as possible we also run regressions using equations 1, 2 and 3, but we replace the change in IPRs from 1980 to 2000 and 1990 to 2000 with the logged absolute value of IPRs in 1980 and 1990 respectively. This is done since it is hard to argue that an increase in trade and FDIs between time t and t + s would influence the level of IPRs in time t.

Worth mentioning is the presence of parallel importing[27] in countries, since that can give rise to biased results when studying trade behavior. Whether parallel importing is legal in different countries or not will affect the export and import market of a country. Normally, parallel importing leads to lower prices in the import country which could result in losses for the exporting country. So the legal settlements of parallel importing will evidently affect the export and import markets, but it is a subject that should be analyzed in a different paper.

[27] A parallel import refers to a genuine (non-counterfeit) product positioned on the market in one country, which is later imported into another country without the authorization of the owner of the IPR assigned to the product in the second country.

5. Results

At first we start off with estimating equations 1, 2 and 3, which measures the direct effect an increase in IPRs, and the control variables, has on exports, imports and FDIs respectively. The estimations were done from the year 1980 to 2000 and from the year 1990 to 2000. The results are shown in the table 1 and 2 respectively.

Table 1: Different estimates of the direct effect on the change in exports, imports and FDIs from the years 1980 to 2000.

	ΔEXPORTS				**ΔIMPORTS**				**ΔFDIs**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
ΔIPR	0,15	0,16	0,16	0,17	0,25	0,30	0,24	0,24	1,01	1,16	1,52	1,48**
	(0,38)	(0,37)	(0,36)	(0,31)	(0,33)	(0,35)	(0,33)	(0,23)	(0,97)	(0,94)	(1,02)	(0,67)
ΔGDP	1,24*	1,25*	1,21*	1,36*	1,00*	1,03*	1,03*	1,14*	1,16	1,20	1,14	1,46
	(0,19)	(0,19)	(0,18)	(0,17)	(0,17)	(0,18)	(0,15)	(0,15)	(1,48)	(1,44)	(1,54)	(1,30)
DEV	-0,17	-0,09	-0,11	-0,05	-0,33*	-0,1	-0,37*	-0,06	-1,34	-0,85	-1,82**	-1,48*
	(0,23)	(0,14)	(0,23)	(0,09)	(0,12)	(0,12)	(0,11)	(0,08)	(0,81)	(0,86)	(0,82)	(0,49)
EDU	-0,11	-0,12			0,07	0,02			1,14	1,03		
	(0,12)	(0,12)			(0,08)	(0,09)			(0,97)	(0,91)		
WAGE	0,05		0,06		-0,18*		-0,17*		-0,29		-0,08	
	(0,10)		(0,10)		(0,06)		(0,05)		(0,41)		(0,43)	
In the regression:												
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	62	62	62	89	62	62	62	89	37	37	37	50
R^2	0,50	0,49	0,49	0,48	0,32	0,51	0,59	0,48	0,33	0,33	0,28	0,26

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1980 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are in the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Table 1 shows that on an aggregate level, it is difficult to establish any relationship between a change in IPRs and a change in exports, imports or FDIs. Only one IPR estimate is significant. In the 12th specification, where the average wage level in 1990 and average years of education in 1985 are left out of the model, the elasticity of the change in FDIs (from the years 1980 to 2000) to the change in IPRs (from the years 1980 to 2000) is 1,48 at the five

percent significance level. This implies that a ten percent change in IPRs will increase FDIs by 14.80 percent. However, when controlling for more variables (education and/or wage), there are no significant relationships between the change in IPRs and the change in FDIs. This could of course be due to multicollinearity issues, making it difficult to interpret the strength of the effect of each predictor. One reason for this divergence could be that there are more observations (50) in the 12th specification, making that regression more reliable.

Looking at appendix H, where only 37 countries are regressed, one sees that the estimate of the change in IPRs is not statistically significant. Hence, there is definitely the possibility that if we were to have a larger dataset, we would see different results and perhaps more significant estimates. In addition it is worth mentioning that all coefficients for the IPR variable show positive signs; hence, with more accurate data and more observations there is a slight possibility that the model would have delivered significant estimates in the IPR variable. This could especially be true when measuring IPRs effect on FDIs, since the IPR variable in specification 10 and 11 are not that far from being significant at the 10 percent level.

Because of the uncertainties regarding the 12 specifications, and for robustness reasons, it makes good sense to turn to the results from the regression handling the same equations (1, 2 and 3), but for the years 1990 to 2000. The results are shown below in table 2.

Table 2: Different estimates of the direct effect on the change in exports, imports and FDIs from the years 1990 to 2000.

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
ΔIPR	-0,11	-0,11	-0,16	0,12	0,16	0,24	-0,08	-0,01	0,39	0,00	0,49	0,28
	(0,33)	(0,32)	(0,33)	(0,22)	(0,59)	(0,59)	(0,63)	(0,19)	(0,88)	(0,89)	(0,81)	(0,70)
ΔGDP	1,01**	1,01*	0,73**	0,90*	0,66	0,73***	0,23	0,45*	1,43	0,87	1,64	1,83
	(0,43)	(0,39)	(0,40)	(0,24)	(0,43)	(0,40)	(0,44)	(0,36)	(1,70)	(1,75)	(1,27)	(1,15)
DEV	-0,18	-0,17	-0,01	0,03	-0,31*	-0,08	-0,06	0,29	0,71	-0,15	0,62	-0,43
	(0,28)	(0,17)	(0,33)	(0,09)	(0,20)	(0,13)	(0,28)	(0,11)	(0,79)	(0,69)	(0,67)	(0,35)
EDU	-0,29	-0,29**			0,43*	-0,49*			0,24	0,67		
	(0,19)	(0,15)			(0,17)	(0,13)			(0,69)	(0,60)		
WAGE	0		-0,05		-0,15		-0,21***		0,60***		0,65	
	(0,14)		(0,14)		(0,12)		(0,12)		(0,31)		(0,26)	
In the regression:												
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	60	60	60	89	60	60	60	89	37	37	37	52
R^2	0,18	0,18	0,09	0,11	0,40	0,36	0,24	0,08	0,37	0,15	0,24	0,10

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1990 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE variable are in the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Looking at table 2 does not make it easier to find any relationship between the elasticity of IPRs to exports, imports and FDIs. In fact, it makes it impossible. Now none of the IPR estimates are significant. Actually, they are all far from being significant. As one can see, some of the estimates also changed signs from table 1, going from positive to negative. Table 2 shows that there are no relationships, on an aggregate level, to be drawn from an increase in IPRs and the change in trade and FDIs. However, the inconsistency and the insignificance, in the estimates in table 2, could partly be due to the fact that for a specification to give significant results, the changes in IPRs have to vary a lot across countries. Hence, a large spread in the explanatory variable, in this case IPRs, is needed to trace a linear relationship.

As argued in the previous chapter, there might be a simultaneity problem when estimating the impact of IPRs on trade and FDIs. The problem is that, just as well as the strength of IPRs could influence the rise in trade and FDIs, trade and FDIs may well have an effect on the

strength of IPRs. That a country strengthens its IPR protection after it sees a rise in FDIs or a change in trade, perhaps after pressure from their trading partners, is a realistic thought. The results from the regression with the absolute value of IPRs in 1980 and 1990 (instead of the change in IPRs) in equations 1, 2 and 3 are presented in appendices K and L respectively. The tables do not present any evidence very dissimilar to tables 1 and 2 that would indicate that we have large causality problems in the model. Thus, we argue that the main causal direction is that the strength of IPRs influences the change in trade and FDIs.

On an aggregate level, it comes as no surprise that it is hard to establish any evidence that an increase in IPRs should positively affect trade and FDIs. Looking back at the earlier research[28] that has been done regarding the subject of IPRs, one gets the picture that different effects are possible and that there are no obvious predictions of IPRs relation to exports, imports and FDIs. It looks like a richer set of country characteristics than we can capture with a handful of variables observable to the econometrician determine what kind of effect IPRs have on trade and FDIs.

To possibly shed some light to what characteristics that might be, we now continue the analyses by estimating if there are any interaction effects with the IPR variable and the other explanatory variables on trade and FDIs. For that we use equations 4, 5 and 6. Since we here are only interested in the control variables interaction with the IPR variable, the direct effects of the control variables are not reported in tables 3 and 4[29].

[28] See section 2
[29] Complete versions of tables 3 and 4, with no variables excluded, can be found in Appendix I and J

Table 3: Different determinants of the interaction effect on the change in exports, imports and FDIs from the years 1980 to 2000.

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11**	**(12)**
ΔIPR	9,01***	0,67	9,46***	0,25	-1,44	0,65	-1,93	0,57	38,57	34,17	7.34	1,13
	(5,50)	(2,14)	(5,37)	(1,1)	(4,01)	(1,86)	(3,40)	(0,81)	(64,53)	(17,12)	(39,02)	(4,55)
ΔIPR*ΔGDP	0,10	-0,03	0,98	-0,22	-0,35	-0,58	-0,32	-0,33	-5,79	-4,05	-13,89	-6,08
	(1,70)	(2,28)	(1,57)	(1,84)	(1,64)	(1,83)	(1,57)	(1,38)	(15,50)	(10,72)	(19,49)	(5,94)
ΔIPR*DEV	-2,6	-0,28	-2,70***	0,03	0,87	0,07	1,00	-0,18	-7,51	-6,83	2,85	3,29
	(1,80)	(1,10)	(1,67)	(0,62)	(1,24)	(1,00)	(0,98)	(0,53)	(18,81)	(6,02)	(7,78)	(3,17)
ΔIPR*EDU	0,01	-0,17			0,08	-0,07			-15,29	-6,83		
	(1,00)	(0,89)			(0,77)	(0,90)			(10,31)	(6,87)		
ΔIPR*WAGE	-1,30***		-1,33**		0,18		0,26		-0,77		-0,18	
	(0,76)		(0,69)		(0,53)		(0,45)		(6,28)		(4,40)	
In the regression:												
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	62	62	62	89	62	62	62	89	37	37	37	50
R^2	0,54	0,49	0,54	0,46	0,60	0,51	0,61	0,48	0,46	0,46	0,32	0,30

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1980 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

As one can see in table 3, very few variables are statistically significant. Hence, it is difficult to find strong determinants of the change in IPRs elasticity of trade and FDIs. In addition, it is important to be aware of that the coefficients of the change in IPRs are difficult to interpret since the change in IPRs affects the change in exports, imports and FDIs through all of the interaction terms in the model.

Only three interaction variables in table 3 are significant. In specification 1, the interaction effect of the change in IPRs between the years 1980 to 2000 and the average wage level in 1990 is significant at the ten percent significance level. In specification 3 the interaction effect of the wage and IPR variable is again significant, this time at the five percent significance level. Further, the interaction effect of the developing countries dummy and the IPR variable is also significant (at the ten percent level). However, it would be a mistake to draw any

conclusions on the interaction effect of that dummy variable and the IPR variable. First of all the significance is very weak. Second, when looking at specification 1, 2 and 4, all where the change in exports is the dependent variable, one notices, apart from them all being insignificant, that the signs of the coefficient regarding that variable are not consistent (going from negative to positive).

Conversely, it is interesting to note that the two significant wage coefficients, where the change in exports is the dependent variable, are negative. The interpretation of this is that the higher the wage, the less of a positive effect does a strengthening of IPRs have on exports[30]. Presuming a strengthening of IPRs influence exports in a positive way, this is somewhat surprising since earlier research[31] (Maskus et al., 2004) have pointed out that there is a positive relationship between how well IP legislation works and the skill level[32] of workers. Further, looking at the interaction effect between education and the change in IPRs, one can not find any evidence of average years of education (which also is a measure of skill level in the labor force) interacting with the change in IPRs. Consequently, it would be wise to treat the result of the interaction effect between the wage level and the change in IPRs with a great deal of caution.

For the sake of robustness and hence be able to draw more accurate conclusions, we also, in table 4, display the results from the regressions using equations 4, 5 and 6 once again, but now for the years 1990 to 2000.

[30] This does not mean that in high wage countries, an increase in IPRs affect exports in a negative way; and it is not the objective of this study to analyze the effects of IPRs in countries where the wage level is high.
[31] See section 2
[32] Remember that skilled workers usually are better paid.

Table 4: Different determinants of the interaction effect on the change in exports, imports and FDIs from the years 1990 to 2000.

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
ΔIPR	0,32	0,06	0,69	-0,08	0,18	0,42	0,25	0,58	14,46	10,27	2,07	-1,97
	-3,51	-3,90	-1,19	-0,81	-2,89	-2,95	-1,19	-0,61	-13	-12,73	-3,87	-2,88
ΔIPR*GDP	-0,71	-1,29	-0,05	0,74	1,47	0,45	2,10	1,49	0,57	-6,83	-5,91	0,63
	-3,16	-3,26	-2,84	-1,48	-4,00	-3,69	-3,52	-1,98	-0,32	-15,84	-13,15	-7,97
ΔIPR*DEV	-0,47	-0,31	-0,76	-0,06	-0,33	-0,35	-0,57	-1,17	-4,23	-1,82	0,03	2,33
	-1,51	-1,62	-1,14	-0,75	-1,51	-1,41	(1.15)	-0,53	-5,42	-5,41	-2,52	-2,22
ΔIPR*EDU	0,17	-0,32			0,00	0,00			-6,53	-4,30		
	-1,83	-2,03			-1,6	-1,61			-6,26	-6,15		
ΔIPR*WAGE	0,09		0,21		0,25		0,40***		0,35		0,07	
	-0,20		-0,24		-0,20		-0,22		-0,64		-0,63	
In the regression:												
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	60	60	60	89	60	60	60	89	37	37	37	52
R^2	0,19	0,19	0,13	0,11	0,44	0,36	0,35	0,1	0,31	0,21	0,25	0,12

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1990 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Here only one variable is significant, and it is a weak significance. The interaction term between wage and the change in IPRs is significant at the 10 percent level in specification 7. As can be seen, the interaction term is positive not only in specification 7 but also in specification 5, although not significant. It is therefore tempting to draw some conclusions from the results. The interpretation would be that during the years 1990 to 2000, the higher the wage, the more of a positive effect does a strengthening of IPRs have on imports[33]. Presuming a strengthening of IPRs affect imports in a positive way[34]; these results, different from the surprising results obtained from table 3, are expected. This is expected since according to section 2 there is a positive relationship between how well IP legislation work and the skill level of labor. Moreover, the interaction term between education and the change in IPRs is insignificant for all specifications, making it even more difficult to interpret the

[33] This does not mean that in high wage countries, an increase in IPRs affect imports in a positive way; and it is not the objective of this study to analyze the effects of IPRs in countries where that wage level is high.
[34] No evidence of such has been proved in this study.

importance of wage. Again, because in this study both of those variables (education and wage), serve as a proxy for the skill level of the labor force in a country.

Comparing table 3 with table 4 one can see that in the latter, the interaction term between wage and the change in IPRs is far from significant when the change in exports is the dependent variable. This is different from table 3 where it is significant, whereas in table 4 one can also see that the coefficients have changed signs. This of course makes it even harder to analyze the results from table 4, or at least more difficult to find any relationship whatsoever. One reason that table 3 shows more significant results than table 4 could be that, as when looking at the direct effects, large spreads in the explanatory variables are needed to obtain a linear relationship.

As been discussed and can be seen, we have not found any relationship between the change in IPRs and the change in exports, imports or FDIs. To some extent, variance-inflating measurement error and limited country coverage can be blamed for yielding data which does not allow for statistical resolution. This is especially true when looking at the relationship with the change in FDIs. Only obtaining 37 observations for specifications 8-11 and around 50 for specification 12 are clearly too few.

Even if one has the complicating circumstances in mind, it seems like it is impossible to come to the conclusion that an increase in IPRs would affect export, imports and/or FDIs in a certain way. At least this is true at the aggregate level that this paper examines. There is more to be said about IPRs influence on bilateral trade and IPRs influence on FDI's direction and magnitude in specific countries. Moreover, when scaling it down to detailed sectors and industries around the world, IPRs, according to earlier research[35], seems to have an impact on trade and FDIs.

[35] See section 2

6. Final Discussion

With a growing world economy and more and more countries engaging in trade, the WTO plays a vital role in helping producers of goods and services, exporters, and importers to conduct their business[36]. In an effort to do just that, the WTO created the TRIPS agreement, and hence set up rules that decided on the extent of IPRs countries would be forced to adhere to. Ever since the TRIPS agreement was submitted in 1994 there have been ongoing debates about the effects of the TRIPS treaty, and consequently IPRs influence on trade and FDIs.

This study can not find any statistically valid relation between changes in IPRs and changes in exports, imports and FDIs, which would induce any improvement or worsening of markets. The analysis suggests that an increase in IPRs would also increase FDIs. Although, only one out of total 8 specifications measuring IPRs effect on FDIs shows significant proof of that fact making it impossible to draw any robust conclusions that IPRs affect FDIs in a positive way. Despite several different specifications measuring IPRs effect on trade, not one significant coefficient obtained suggests that an increase in IPRs would affect exports and imports either positively nor negatively.

In an attempt to find determinants that would explain what type of country characteristics that effects IPRs influence on trade and FDIs, interaction effects are analyzed in this paper. The results obtained do not reveal any significant interaction effects that are reliable. The results actually show that there is a negative interaction effect of the average wage level in 1990 and the change in IPRs between 1980 and 2000 on the change in exports between the years 1980 and 2000. However, when measuring the same interaction effects, but for the years 1990 to 2000, the results instead implicates a positive interaction effect (although not significant) on the change in exports for the years 1990 to 2000. This of course makes it impossible to draw any distinct conclusions on that interaction effect. Moreover, for the years 1990 to 2000 the analyses shows that the wage level in a country weakly affects IPRs influence on exports in a positive way. However the significance of that estimate is low and no certain evidence can be drawn.

It is very important to be aware of the fact that this study is done on an aggregate level. Of course an increase in IPRs will affect specific industries, sectors and countries in some way.

[36] http://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm

As touched upon in the section 2, research has established that the pharmaceutical industry is very dependent on strong IP legislation. The KK (2004) writes for example that stronger IP legislation in Brazil, Chile and Mexico during the 1990's resulted in increased investments in research and development in those countries. Further, the World Bank makes certain that the agricultural sector is in need of very strong IP legislation in order to spur for technological development (KK, 2004). Consequently, increases in IPRs are to affect countries bilateral trade if they are trading pharmaceutical- and/or agricultural goods. Evidently however, these effects are not large enough to have an affect on an aggregate level. At least not large enough so that it gives rise to linear relationships to trade and FDIs. This of course makes it more difficult for property holders to claim that an increase in IPRs will boost investments and better markets everywhere. The evidence in this study suggests that the issue is way more complex than that.

One problem studying cross country data, of the kind this study is, is the limited country coverage. This is of course worth remarking when interpreting the empirical results. Better country coverage, more accurate data, and longer time interval than 20 years could give rise to research that will be able the establish the significant estimates that this paper lacks of. Certainly, as the world economy grows and more countries open their borders for trade and investments there is of course the possibility that scholars might be able to find the relationships that is sought for in this paper. As the important issue it is, not only for property holders but also for very poor countries, it will be very interesting to follow future research on the subject.

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Appendix A. Details about TRIPS

The concept of IPRs varies somewhat depending on which organization or country one asks. Additionally, many countries are already regulated by higher norms of regional agreements than what is regulated by the TRIPS agreement. However the TRIPS agreement contains regulations of:

- Patents on products and procedures within all technique areas. The time of protection is at least 20 years,
- copyrights, time of protection is at least 50 years,
- trademarks, time of protection is at least 7 years, but with an unlimited amount of renewals,
- patterns (design), time of protection is at least 10 years,
- geographical indications, which is protection against misleading usage. The time of protection depends on the home country's time of protection,
- integrated computer circuits, time of protection is 10 years, and
- undisclosed information which is secrets of cooperations, and this theme has no time protection. (KK, (2004).

Appendix B. Countries and level of IPRs in descending order during different years.

Countries	IPR level year 1980	Countries	IPR level year 1990	Countries	IPR level year 2000
Netherl.	4,24	U.S.A.	4,52	U.S.A.	5
U.S.A.	4,19	Austria	4,24	Japan	4,86
Japan	3,94	Netherl.	4,24	Austria	4,71
France	3,9	Italy	4,05	Australia	4,52
Germany	3,86	Japan	3,94	Germany	4,52
Austria	3,81	Korea	3,94	Italy	4,52
Switzerl.	3,8	Denmark	3,9	Israel	4,38
Italy	3,71	France	3,9	Netherl.	4,38
Denmark	3,62	Sweden	3,9	Spain	4,38
Israel	3,57	Switzerl.	3,8	Sweden	4,38
S. Africa	3,57	Germany	3,71	Denmark	4,19
U.K.	3,57	Spain	3,62	Korea	4,19
Zambia	3,52	Israel	3,57	U.K.	4,19
Sweden	3,47	S. Africa	3,57	Canada	4,05
Algeria	3,38	U.K.	3,57	Finland	4,05
N. Zealand	3,32	Sudan	3,52	France	4,05
Norway	3,29	Zambia	3,52	Singapore	4,05
Spain	3,29	Algeria	3,38	S. Africa	4,05
Korea	3,28	Australia	3,32	Switzerl.	4,05
Australia	3,23	N. Zealand	3,32	Ireland	4
Haiti	3,19	Norway	3,29	N. Zealand	4
Nigeria	3,05	Malawi	3,24	Norway	3,9
Malawi	3,04	Haiti	3,19	Trin.& Tob.	3,86
Trin.& Tob.	3,01	Sri. Lanka	3,12	Ghana	3,71
Ireland	2,99	Nigeria	3,05	Hungary	3,71
Finland	2,95	Trin.& Tob.	3,01	El Salv.	3,67
Ghana	2,9	Ireland	2,99	Sri. Lanka	3,59
Tanzan.	2,9	Finland	2,95	Ecuador	3,57
Zimbabwe	2,9	Ghana	2,9	Malawi	3,57
Mauritius	2,89	Tanzan.	2,9	Algeria	3,53
Burundi	2,86	Zimbabwe	2,9	Panama	3,53
Jamaica	2,86	Mauritius	2,89	Czech Republic	3,52
Sudan	2,86	Benin	2,86	Gabon	3,52
Sri. Lanka	2,79	Burundi	2,86	Russia	3,52
Canada	2,76	Jamaica	2,86	Sudan	3,52
Chad	2,71	Rwanda	2,86	Ukraine	3,52
Philipp.	2,67	Canada	2,76	Zambia	3,52
Cameroon	2,57	Chad	2,71	Chile	3,4
Cent. Afr.	2,57	Philipp.	2,67	Nigeria	3,38
Gabon	2,57	Cameroon	2,57	Mauritius	3,37
Kenya	2,57	Cent. Afr.	2,57	Argentina	3,33
Malaysia	2,57	Gabon	2,57	Greece	3,33
Singapore	2,57	Kenya	2,57	Haiti	3,33
Uganda	2,57	Mali	2,57	Malaysia	3,27
Benin	2,52	Mauritan.	2,57	Vietnam	3,27
Nepal	2,52	Senegal	2,57	Bulgaria	3,24
Rwanda	2,52	Singapore	2,57	Colombia	3,24
Greece	2,46	Uganda	2,57	Cyprus	3,24
Syria	2,46	Nepal	2,52	Mali	3,24

Countries	IPR level year 1980	Countries	IPR level year 1990	Countries	IPR level year 2000
Chile	2,41	Syria	2,46	Mauritan.	3,24
Dom. Rep.	2,41	Chile	2,41	Niger	3,24
Panama	2,41	Dom. Rep.	2,41	Poland	3,24
Iran	2,38	Panama	2,41	Senegal	3,24
Morocco	2,38	Iran	2,38	Togo	3,24
Argentina	2,26	Morocco	2,38	Zimbabwe	3,24
Uruguay	2,26	Malaysia	2,37	Jamaica	3,22
Burk. Faso	2,24	Greece	2,32	Dom. Rep.	3,21
Cyprus	2,24	Argentina	2,26	Benin	3,19
Mauritan.	2,24	Uruguay	2,26	Brazil	3,19
Niger	2,24	Burk. Faso	2,24	Burundi	3,19
Senegal	2,24	Cyprus	2,24	Kenya	3,19
Togo	2,24	Niger	2,24	Nepal	3,19
El Salv.	2,19	Togo	2,24	Uruguay	3,07
Liberia	2,19	El Salv.	2,19	Chad	3,05
Swazil.	2,19	Liberia	2,19	Lithuania	3,05
Iceland	2,12	Swazil.	2,19	Rwanda	3
Saudi Ar.	2,05	Iceland	2,12	Jordan	2,99
Fiji	2,01	Saudi Ar.	2,05	Portugal	2,98
Banglad.	1,99	Fiji	2,01	Madagas.	2,94
Egypt	1,99	Banglad.	1,99	Syria	2,94
Bolivia	1,98	Egypt	1,99	Cameroon	2,9
Portugal	1,98	Bolivia	1,98	Cent. Afr.	2,9
Cost. Rica	1,94	Portugal	1,98	Tanzan.	2,9
Botswana	1,9	Botswana	1,9	Uganda	2,9
Mali	1,9	Tunisia	1,9	Liberia	2,86
Tunisia	1,9	Malta	1,89	Mexico	2,86
Malta	1,89	Jordan	1,86	Morocco	2,86
Jordan	1,86	Madagas.	1,86	Swazil.	2,86
Madagas.	1,86	Brazil	1,85	Turkey	2,86
Brazil	1,85	Thailand	1,85	Banglad.	2,8
Thailand	1,85	Paraguay	1,8	Paraguay	2,8
Paraguay	1,8	Turkey	1,8	Iceland	2,71
Turkey	1,8	Honduras	1,76	Peru	2,71
Honduras	1,76	Grenada	1,7	Romania	2,71
Grenada	1,7	Mexico	1,63	Philipp.	2,67
India	1,62	Ecuador	1,54	Burk. Faso	2,57
Ecuador	1,54	India	1,48	Honduras	2,57
Guyana	1,42	Cost. Rica	1,47	Iran	2,52
Mexico	1,4	Guyana	1,42	Grenada	2,51
Colombia	1,12	Colombia	1,12	China	2,48
Guatemala	1,08	Guatemala	1,08	Egypt	2,46
Peru	1,02	Peru	1,02	Bolivia	2,43
Nicaragua	0,92	Nicaragua	0,92	Cost. Rica	2,42
Indonesia	0,33	Indonesia	0,33	Malta	2,37
Angola	0	Angola	0	Fiji	2,34
Ethiopia	0	Ethiopia	0	Indonesia	2,27
Mozamb.	0	Mozamb.	0	Botswana	2,24
P.N.Guin.	0	P.N.Guin.	0	Thailand	2,24
Bulgaria	.	Bulgaria	.	Tunisia	2,24
China	.	China	.	India	2,18
Czech Republic	.	Czech Republic	.	Saudi Ar.	2,05
Hungary	.	Hungary	.	Guyana	1,9

Countries	IPR level year 1980	Countries	IPR level year 1990	Countries	IPR level year 2000
Lithuania	.	Lithuania	.	Angola	1,8
Poland	.	Poland	.	Nicaragua	1,59
Romania	.	Romania	.	Guatemala	1,56
Russia	.	Russia	.	Ethiopia	1
Ukraine	.	Ukraine	.	Mozamb.	0
Vietnam	.	Vietnam	.	P.N.Guin.	0

Appendix C. Differences in IPRs in descending order for different time intervals.

Countries	Δ in IPRs from 1980 to 1990	Countries	Δ in IPRs from 1990 to 2000	Countries	Δ in IPRs from 1980 to 2000
Mali	0,67	Colombia	2,12	Colombia	2,12
Korea	0,66	Ecuador	2,03	Ecuador	2,03
Sudan	0,66	Indonesia	1,94	Indonesia	1,94
Austria	0,43	Angola	1,8	Angola	1,8
Sweden	0,43	Peru	1,69	Peru	1,69
Benin	0,34	El Salv.	1,48	El Salv.	1,48
Italy	0,34	Singapore	1,48	Singapore	1,48
Rwanda	0,34	Brazil	1,34	Mexico	1,46
Mauritan.	0,33	Canada	1,29	Brazil	1,34
Senegal	0,33	Mexico	1,23	Mali	1,34
Spain	0,33	Australia	1,2	Australia	1,29
Sri. Lanka	0,33	Jordan	1,13	Canada	1,29
U.S.A.	0,33	Panama	1,12	Jordan	1,13
Denmark	0,28	Finland	1,1	Panama	1,12
Mexico	0,23	Madagas.	1,08	Finland	1,1
Malawi	0,2	Argentina	1,07	Spain	1,09
Australia	0,09	Turkey	1,06	Madagas.	1,08
Algeria	0	Ireland	1,01	Argentina	1,07
Angola	0	Greece	1,01	Turkey	1,06
Argentina	0	Cyprus	1	Ireland	1,01
Banglad.	0	Ethiopia	1	Cyprus	1
Bolivia	0	Niger	1	Ethiopia	1
Botswana	0	Paraguay	1	Mauritan.	1
Brazil	0	Portugal	1	Niger	1
Burk. Faso	0	Togo	1	Paraguay	1
Burundi	0	Chile	0,99	Portugal	1
Cameroon	0	Gabon	0,95	Senegal	1
Canada	0	Cost. Rica	0,95	Togo	1
Cent. Afr.	0	Japan	0,92	Chile	0,99
Chad	0	Malaysia	0,9	Gabon	0,95
Chile	0	Trin.& Tob.	0,85	Japan	0,92
Colombia	0	Banglad.	0,81	Korea	0,91
Cyprus	0	Ghana	0,81	Sweden	0,91
Dom. Rep.	0	Grenada	0,81	Austria	0,9
Ecuador	0	Honduras	0,81	Greece	0,87
Egypt	0	Israel	0,81	Trin.& Tob.	0,85
El Salv.	0	Uruguay	0,81	Banglad.	0,81
Ethiopia	0	Germany	0,81	Ghana	0,81
Fiji	0	Dom. Rep.	0,8	Grenada	0,81
Finland	0	Spain	0,76	Honduras	0,81
France	0	India	0,7	Israel	0,81
Gabon	0	N. Zealand	0,68	Italy	0,81
Ghana	0	Mali	0,67	U.S.A.	0,81
Grenada	0	Mauritan.	0,67	Uruguay	0,81
Guatemala	0	Senegal	0,67	Dom. Rep.	0,8
Guyana	0	Liberia	0,67	Sri. Lanka	0,8
Haiti	0	Nepal	0,67	Malaysia	0,7
Honduras	0	Nicaragua	0,67	N. Zealand	0,68

Countries	Δ in IPRs from 1980 to 1990	Countries	Δ in IPRs from 1990 to 2000	Countries	Δ in IPRs from 1980 to 2000
Iceland	0	Swazil.	0,67	Benin	0,67
Indonesia	0	Kenya	0,62	Liberia	0,67
Iran	0	U.K.	0,62	Nepal	0,67
Ireland	0	Norway	0,61	Nicaragua	0,67
Israel	0	Iceland	0,59	Swazil.	0,67
Jamaica	0	Sweden	0,48	Germany	0,66
Japan	0	U.S.A.	0,48	Sudan	0,66
Jordan	0	Guatemala	0,48	Kenya	0,62
Kenya	0	Guyana	0,48	U.K.	0,62
Liberia	0	Malta	0,48	Norway	0,61
Madagas.	0	Mauritius	0,48	Iceland	0,59
Malta	0	Morocco	0,48	Denmark	0,57
Mauritius	0	S. Africa	0,48	India	0,56
Morocco	0	Syria	0,48	Malawi	0,53
Mozamb.	0	Austria	0,47	Cost. Rica	0,48
Nepal	0	Italy	0,47	Guatemala	0,48
Netherl.	0	Sri. Lanka	0,47	Guyana	0,48
N. Zealand	0	Egypt	0,47	Malta	0,48
Nicaragua	0	Bolivia	0,45	Mauritius	0,48
Niger	0	Thailand	0,39	Morocco	0,48
Nigeria	0	Jamaica	0,36	Rwanda	0,48
Norway	0	Botswana	0,34	S. Africa	0,48
P.N.Guin.	0	Chad	0,34	Syria	0,48
Panama	0	Tunisia	0,34	Egypt	0,47
Paraguay	0	Zimbabwe	0,34	Bolivia	0,45
Peru	0	Benin	0,33	Thailand	0,39
Philipp.	0	Malawi	0,33	Jamaica	0,36
Portugal	0	Burk. Faso	0,33	Botswana	0,34
Saudi Ar.	0	Burundi	0,33	Chad	0,34
Singapore	0	Cameroon	0,33	Tunisia	0,34
S. Africa	0	Cent. Afr.	0,33	Zimbabwe	0,34
Swazil.	0	Fiji	0,33	Burk. Faso	0,33
Switzerl.	0	Nigeria	0,33	Burundi	0,33
Syria	0	Uganda	0,33	Cameroon	0,33
Tanzan.	0	Denmark	0,29	Cent. Afr.	0,33
Thailand	0	Korea	0,25	Fiji	0,33
Togo	0	Switzerl.	0,25	Nigeria	0,33
Trin.& Tob.	0	Algeria	0,15	Uganda	0,33
Tunisia	0	France	0,15	Switzerl.	0,25
Turkey	0	Rwanda	0,14	Algeria	0,15
Uganda	0	Haiti	0,14	France	0,15
U.K.	0	Iran	0,14	Haiti	0,14
Uruguay	0	Netherl.	0,14	Iran	0,14
Zambia	0	Sudan	0	Netherl.	0,14
Zimbabwe	0	Mozamb.	0	Mozamb.	0
Greece	-0,14	P.N.Guin.	0	P.N.Guin.	0
India	-0,14	Philipp.	0	Philipp.	0
Germany	-0,15	Saudi Ar.	0	Saudi Ar.	0
Malaysia	-0,2	Tanzan.	0	Tanzan.	0
Cost. Rica	-0,47	Zambia	0	Zambia	0
Bulgaria	.	Bulgaria	.	Bulgaria	.
China	.	China	.	China	.
Czech Republic	.	Czech Republic	.	Czech Republic	.

Countries	Δ in IPRs from 1980 to 1990	Countries	Δ in IPRs from 1990to 2000	Countries	Δ in IPRs from 1980 to 2000
Hungary	.	Hungary	.	Hungary	.
Lithuania	.	Lithuania	.	Lithuania	.
Poland	.	Poland	.	Poland	.
Romania	.	Romania	.	Romania	.
Russia	.	Russia	.	Russia	.
Ukraine	.	Ukraine	.	Ukraine	.
Vietnam	.	Vietnam	.	Vietnam	.

Appendix D. Countries in the regressions

Countries in the regressions when education and/or wage are in the model.

ΔEXPORTS 1980 - 00	ΔEXPORTS 1990 - 00	ΔIMPORTS1980 - 00	ΔIMPORTS 1990 - 00	ΔFDIs 1980 - 00	ΔFDIs 1990 - 00
Algeria	Algeria	Algeria	Algeria	Algeria	Algeria
Argentina	Argentina	Argentina	Argentina	Argentina	Argentina
Australia	Australia	Australia	Australia	Australia	Australia
Austria	Austria	Austria	Austria	Austria	Austria
Banglad.	Banglad.	Banglad.	Banglad.	Benin	Benin
Benin	Benin	Benin	Benin	Bolivia	Bolivia
Bolivia	Bolivia	Bolivia	Bolivia	Botswana	Botswana
Botswana	Botswana	Botswana	Botswana	Brazil	Brazil
Brazil	Brazil	Brazil	Brazil	Cameroon	Canada
Cameroon	Cameroon	Cameroon	Cameroon	Canada	Cent. Afr.
Canada	Canada	Canada	Canada	Cent. Afr.	Chile
Cent. Afr.	Cent. Afr.	Cent. Afr.	Cent. Afr.	Colombia	Colombia
Chile	Chile	Chile	Chile	Cost. Rica	Cost.Rica
Colombia	Colombia	Colombia	Colombia	Dom.Rep.	Denmark
Cost. Rica	Cost. Rica	Cost. Rica	Cost. Rica	Finland	Dom.Rep.
Cyprus	Cyprus	Cyprus	Cyprus	France	Finland
Denmark	Denmark	Denmark	Denmark	Germany	France
Dom.Rep.	Dom.Rep.	Dom.Rep.	Dom.Rep.	Guyana	Germany
Fiji	Fiji	Fiji	Fiji	Honduras	Guyana
Finland	Finland	Finland	Finland	Iceland	Honduras
France	France	France	France	Ireland	Iceland
Germany	Germany	Germany	Germany	Italy	Ireland
Ghana	Ghana	Ghana	Ghana	Japan	Italy
Guyana	Honduras	Guyana	Guyana	Mauritius	Japan
Honduras	Iceland	Honduras	Honduras	Mexico	Mauritius
Iceland	India	Iceland	Iceland	N.Zealand	Mexico
India	Iran	India	India	Netherl.	N.Zealand
Iran	Ireland	Iran	Iran	Norway	Netherl.
Ireland	Italy	Ireland	Ireland	Portugal	Norway
Italy	Japan	Italy	Italy	Rwanda	Portugal
Japan	Korea	Japan	Japan	Sweden	Rwanda
Korea	Malawi	Korea	Korea	Trin.&Tob.	Sweden
Malawi	Mali	Malawi	Malawi	Tunisia	Trin.&Tob.
Mali	Mauritius	Mali	Mali	U.K.	Tunisia
Mauritius	Mexico	Mauritius	Mauritius	U.S.A.	U.K.
Mexico	N.Zealand	Mexico	Mexico	Uruguay	U.S.A.
N.Zealand	Netherl.	N.Zealand	N.Zealand	Zambia	Zambia
Netherl.	Nicaragua	Netherl.	Netherl.		
Nicaragua	Niger	Nicaragua	Nicaragua		
Niger	Norway	Niger	Niger		
Norway	Philipp.	Norway	Norway		
Philipp.	Portugal	Philipp.	Philipp.		
Portugal	Rwanda	Portugal	Portugal		
Rwanda	S. Africa	Rwanda	Rwanda		
S. Africa	Senegal	S. Africa	S. Africa		
Senegal	Singapore	Senegal	Senegal		
Singapore	Sri. Lanka	Singapore	Singapore		
Sri. Lanka	Sudan	Sri. Lanka	Sri. Lanka		
Sudan	Swazil.	Sudan	Sudan		
Swazil.	Sweden	Swazil.	Swazil.		
Sweden	Syria	Sweden	Sweden		
Syria	Thailand	Syria	Syria		

ΔEXPORTS 1980 - 00	ΔEXPORTS 1990 - 00	ΔIMPORTS1980 - 00	ΔIMPORTS 1990 - 00	ΔFDIs 1980 - 00	ΔFDIs 1990 - 00
Thailand	Togo	Thailand	Thailand		
Togo	Trin.&Tob.	Togo	Togo		
Trin.&Tob.	Tunisia	Trin.&Tob.	Trin.&Tob.		
Tunisia	Turkey	Tunisia	Tunisia		
Turkey	U.K.	Turkey	Turkey		
U.K.	U.S.A.	U.K.	U.K.		
U.S.A.	Uruguay	U.S.A.	U.S.A.		
Uganda	Zambia	Uganda	Uganda		
Uruguay		Uruguay	Uruguay		
Zambia		Zambia	Zambia		

Top row indicates which dependent variable that was used in the regression.

Countries in the regressions when education and/or wage are not in the model.

ΔEXPORTS 1980 - 00	ΔEXPORTS 1990 - 00	ΔIMPORTS 1980 - 00	ΔIMPORTS 1990 - 00	ΔFDIs 1980 - 00	ΔFDIs 1990 - 00
Algeria	Algeria	Algeria	Algeria	Algeria	Algeria
Argentina	Argentina	Argentina	Argentina	Argentina	Argentina
Australia	Australia	Australia	Australia	Australia	Australia
Austria	Austria	Austria	Austria	Austria	Austria
Banglad.	Banglad.	Banglad.	Banglad.	Benin	Benin
Benin	Benin	Benin	Benin	Bolivia	Bolivia
Bolivia	Bolivia	Bolivia	Bolivia	Botswana	Botswana
Botswana	Botswana	Botswana	Botswana	Brazil	Brazil
Brazil	Brazil	Brazil	Brazil	Cameroon	Burk. Faso
Burk. Faso	Burk. Faso	Burk. Faso	Burk. Faso	Canada	Burundi
Cameroon	Burundi	Cameroon	Burundi	Cent. Afr.	Canada
Canada	Cameroon	Canada	Cameroon	Colombia	Cent. Afr.
Cent. Afr.	Canada	Cent. Afr.	Canada	Cost. Rica	Chile
Chad	Cent. Afr.	Chad	Cent. Afr.	Dom. Rep.	Colombia
Chile	Chad	Chile	Chad	Ecuador	Cost. Rica
Colombia	Chile	Colombia	Chile	El Salv.	Denmark
Cost. Rica	Colombia	Cost. Rica	Colombia	Finland	Dom. Rep.
Cyprus	Cost. Rica	Cyprus	Cost. Rica	France	Ecuador
Denmark	Cyprus	Denmark	Cyprus	Germany	El Salv.
Dom. Rep.	Denmark	Dom. Rep.	Denmark	Greece	Finland
Ecuador	Dom. Rep.	Ecuador	Dom. Rep.	Guatemala	France
Egypt	Ecuador	Egypt	Ecuador	Guyana	Germany
El Salv.	Egypt	El Salv.	Egypt	Haiti	Greece
Fiji	El Salv.	Fiji	El Salv.	Honduras	Guatemala
Finland	Fiji	Finland	Fiji	Iceland	Guyana
France	Finland	France	Finland	Ireland	Haiti
Gabon	France	Gabon	France	Italy	Honduras
Germany	Gabon	Germany	Gabon	Jamaica	Iceland
Ghana	Germany	Ghana	Germany	Japan	Ireland
Greece	Ghana	Greece	Ghana	Kenya	Italy
Grenada	Greece	Grenada	Greece	Mauritius	Jamaica
Guatemala	Grenada	Guatemala	Grenada	Mexico	Japan
Guyana	Guatemala	Guyana	Guatemala	Morocco	Kenya
Haiti	Haiti	Haiti	Haiti	N. Zealand	Mauritius
Honduras	Honduras	Honduras	Honduras	Netherl.	Mexico
Iceland	Iceland	Iceland	Iceland	Norway	Morocco
India	India	India	India	Panama	N. Zealand
Iran	Indonesia	Iran	Indonesia	Paraguay	Netherl.
Ireland	Iran	Ireland	Iran	Peru	Norway
Israel	Ireland	Israel	Ireland	Portugal	Panama
Italy	Israel	Italy	Israel	Rwanda	Paraguay
Jamaica	Italy	Jamaica	Italy	Spain	Peru

ΔEXPORTS 1980 - 00	ΔEXPORTS 1990 - 00	ΔIMPORTS 1980 - 00	ΔIMPORTS 1990 - 00	ΔFDIs 1980 - 00	ΔFDIs 1990 - 00
Japan	Jamaica	Japan	Jamaica	Sweden	Portugal
Jordan	Japan	Jordan	Japan	Trin.&Tob.	Rwanda
Kenya	Jordan	Kenya	Jordan	Tunisia	Spain
Korea	Kenya	Korea	Kenya	U.K.	Sweden
Madagas.	Korea	Madagas.	Korea	U.S.A.	Switzerl.
Malawi	Madagas.	Malawi	Madagas.	Uruguay	Trin.&Tob.
Malaysia	Malawi	Malaysia	Malawi	Zambia	Tunisia
Mali	Malaysia	Mali	Malaysia	Zimbabwe	U.K.
Malta	Mali	Malta	Mali		U.S.A.
Mauritius	Malta	Mauritius	Malta		Zambia
Mexico	Mauritius	Mexico	Mauritius		
Morocco	Mexico	Morocco	Mexico		
N. Zealand	Morocco	N. Zealand	Morocco		
Nepal	N. Zealand	Nepal	N. Zealand		
Netherl.	Nepal	Netherl.	Nepal		
Nicaragua	Netherl.	Nicaragua	Netherl.		
Niger	Nicaragua	Niger	Nicaragua		
Nigeria	Niger	Nigeria	Niger		
Norway	Nigeria	Norway	Nigeria		
Paraguay	Norway	Paraguay	Norway		
Peru	Paraguay	Peru	Paraguay		
Philipp.	Peru	Philipp.	Peru		
Portugal	Philipp.	Portugal	Philipp.		
Rwanda	Portugal	Rwanda	Portugal		
S. Africa	Rwanda	S. Africa	Rwanda		
Saudi Ar.	S. Africa	Saudi Ar.	S. Africa		
Senegal	Saudi Ar.	Senegal	Saudi Ar.		
Singapore	Senegal	Singapore	Senegal		
Spain	Singapore	Spain	Singapore		
Sri. Lanka	Spain	Sri. Lanka	Spain		
Sudan	Sri. Lanka	Sudan	Sri. Lanka		
Swazil.	Sudan	Swazil.	Sudan		
Sweden	Swazil.	Sweden	Swazil.		
Switzerl.	Sweden	Switzerl.	Sweden		
Syria	Switzerl.	Syria	Switzerl.		
Tanzan.	Syria	Tanzan.	Syria		
Thailand	Tanzan.	Thailand	Tanzan.		
Togo	Thailand	Togo	Thailand		
Trin.& Tob.	Togo	Trin.& Tob.	Togo		
Tunisia	Trin.& Tob.	Tunisia	Trin.& Tob.		
Turkey	Tunisia	Turkey	Tunisia		
U.K.	Turkey	U.K.	Turkey		
U.S.A.	U.K.	U.S.A.	U.K.		
Uganda	U.S.A.	Uganda	U.S.A.		
Uruguay	Uruguay	Uruguay	Uruguay		
Zambia	Zambia	Zambia	Zambia		
Zimbabwe	Zimbabwe	Zimbabwe	Zimbabwe		

Top row indicates which dependent variable that was used in the regression.

Appendix E. Descriptive Statistics of the Variables for the Years 1980 to 2000

Descriptive statistics of the variables (with EDU and/or WAGE in the regression)

Variable	N	Mean	Std. Dev.	Min	Max
ΔIPR	63	.2642857	.1724278	0	1.06
ΔGDP	66	.6168182	.4008804	-.91	1.85
EDU	66	1.489242	.6783494	-.49	2.45
WAGE	66	5.995152	1.215179	3.64	8.02
ΔEXPORTS	64	.6996875	.5716058	-.29	2.03
ΔIMPORTS	64	.5379687	.4761392	-.45	1.74
ΔFDIs	37	2.282162	1.72846	-1.77	6.12

Descriptive statistics of the variables (without EDU or WAGE in the regression)

Variable	Obs	Mean	Std. Dev.	Min	Max
ΔIPR	94	.2874468	.2545413	0	1.93
ΔGDP	105	.5820952	.378389	-.91	1.85
ΔEXPORTS	95	.5935789	.6433472	-.98	2.03
ΔIMPORTS	96	.5201042	.5171022	-.59	2.15
ΔFDIs	51	2.160784	1.719794	-1.77	6.12

Appendix F. Descriptive Statistics of the Variables for the Years 1990 to 2000

Descriptive statistics of the variables for the 1990 to 2000

Variable	N	Mean	Std. Dev.	Min	Max
ΔIPR	63	.2407936	.1787077	0	1.06
ΔGDP	66	.3606061	.1755421	.03	.98
EDU	66	1.588182	.6403843	-.4	2.46
WAGE	66	5.995152	1.215179	3.64	8.02
ΔEXPORTS	63	.4290476	.4492564	-.7	1.93
ΔIMPORTS	63	.575873	.5131957	-.3	1.89
ΔFDIs	38	1.757105	1.009907	-.25	4.35

Descriptive statistics of the variables (without EDU or WAGE in the regression)

Variable	Obs	Mean	Std. Dev.	Min	Max
ΔIPR	94	.2706383	.2592164	0	1.93
ΔGDP	108	.3063889	.2459635	-.87	.98
EDU	92	1.5875	.6120343	-.4	2.46
WAGE	75	5.8932	1.197276	3.64	8.02
ΔEXPORTS	99	.3868687	.4821056	-1.08	1.93
ΔIMPORTS	99	.5941414	.5498609	-.77	2.04
ΔFDIs	56	.4301786	.5448319	0	2.72

Appendix G. Variable Definitions and Data Sources

Deflator index: Used for deflating all series in current prices (dollars)
Source: http://unstats.un.org/unsd/snaama/dnllist.asp

Education: Cross country data of average years of education for the years 1985 and 1990.
Source: http://www1.worldbank.org/education/edstats/

Exports: Exports in current prices (dollars)
Source: http://stat.wto.org/StatisticalProgram/WSDBStatProgramHome.aspx?Language=E

FDIs: Data of foreign direct investments in current prices (dollars). The data had many missing values. For many countries there simply were no FDI statistics. In a few cases it was possible to take the mean of two nearby points where data was missing. However this method only resulted in a few empty cases being replaced with a value.
Source: http://www.unctad.org/Templates/Page.asp?intItemID=1923&lang=1

GDP: Gross Domestic Product in current prices (dollars).
Source: http://unstats.un.org/unsd/snaama/dnllist.asp

Ginarte and Park index: Index of IPR levels around the world. The index is ranging from 0 to 5.
Source: The index was sent to me on email by Professor Walter Park.

Imports: Imports in current prices (dollars)
Source: http://stat.wto.org/StatisticalProgram/WSDBStatProgramHome.aspx?Language=E

Wage: Cross country data on the average wage level at the year 1990. For many countries there simply were no wage statistics. The year 1990 was chosen because that year was the one with the least missing values. In a few cases it was possible to take the mean of two nearby points where data was missing. However this method only resulted in a few empty cases being replaced with a value.
Source: Oostendorp, R.H. (2005). "The Standardized ILO October Inquiry 1983-2003". Free University Amsterdam, Tinbergen Institute & Amsterdam Institute for International development.

Appendix H. Regressions for equations 1, 2 and 3 without education and wage (but with same countries as when those variables are in the regressions).

1980 to 2000

	ΔEXPORTS	ΔIMPORTS	ΔFDIs
ΔIPR	1,78	0,30	1,55
	(0,35)	(0,34)	(1,00)
ΔGDP	1,22*	1,04*	1,16
	(0,18)	(0,17)	(1,49)
DEV	0,01	-0,02	-1,65*
	(0,09	0,08	(0,57)
Observations	62	62	37
R^2	0,48	0,51	0,28

Estimations using ordinary least squares. Dependent variables are the change in exports, imports and FDIs from the years 1980 to 2000. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

1990 to 2000

	ΔEXPORTS	ΔIMPORTS	ΔFDIs
ΔIPR	-0,14	0,19	0,23
	(0,32)	(0,64)	(0,87)
ΔGDP	0,74***	0,26	1,40
	(0,38)	(0,45)	(1,27)
DEV	0,08	0,34*	-0,67
	(0,12)	(0,12)	(0,41)
Observations	60	60	37
R^2	0,08	0,14	0,12

Estimations using ordinary least squares. Dependent variables are the change in exports, imports and FDIs from the years 1990 to 2000. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Appendix I. The Full Estimation of Equations 4, 5 and 6 for the years 1980 to 2000

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
ΔIPR	9,01***	0,67	9,46***	0,51	-1,44	0,65	-1,93	0,48	38,57	34,17	7.34	5,40
	(5,5)	(2,14)	(5,37)	(1,33)	(4,01)	(1,86)	(3,40)	(1,06)	(64,53)	(17,12)	(39,02)	(8,35)
ΔGDP	1,00**	1,26**	1,02*	1,27**	1,09**	1,17**	1,10**	1,18**	1,85	1,57	3,77	3,36
	(0,42)	(0,53)	(0,38)	(0,51)	(0,51)	(0,52)	(0,49)	(0,49)	(3,04)	(2,52)	(4,35)	(3,70)
DEV	0,48	-0,01	0,54	0,07	-0,55	-0,02	-0,61*	-0,06	0,79	1,18	-3,12***	-2,30**
	(0,45)	(0,37)	(0,39)	(0,19)	(0,36)	(0,32)	(0,23)	(0,19)	(3,05)	(1,56)	(1,73)	(0,96)
EDU	-0,05	-0,06			0,04	0,05			4,60**	4,69*		
	(0,37)	(0.34)			(0,25)	(0,30)			(2,23)	(1,61)		
WAGE	0,23		0,24		-0,23		-0,24**		-0,13		-0,33	
	(0,17)		(0,16)		(0,12)		(0,11)		(0,58)		(0,84)	
ΔIPR*GDP	0,10	-0,03	0,98	-0,23	-0,35	-0,58	-0,32	-0,55	-5,79	-4,05	-13,89	-11,38
	(1,7)	(2,28)	(1,57)	(2,27)	(1,64)	(1,83)	(1,57)	(1,74)	(15,50)	(10,72)	(19,49)	(14,57)
ΔIPR*DEV	-2,6	-0,28	-2,70***	-0,23	0,87	0,07	1,00	0,14	-7,51	-6,83	2,85	2,55
	(1,8)	(1,10)	(1,67)	(0,68)	(1,24)	(1,00)	(0,98)	(0,68)	(18,81)	(6,02)	(7,78)	(3,04)
ΔIPR*EDU	0,01	-0,17			0,08	-0,07			-15,29	-6,83*		
	(1)	(0,89)			(0,77)	(0,90)			(10,31)	(6,87)		
ΔIPR*WAGE	-1,3***		-1,33**		0,18		0,26		-,77		-0,18	
	(0,76)		(0,69)		(0,53)		(0,45)		(6,28)		(4,40)	
EDU	x	X			x	X			x	X		
WAGE	x		X		x		X		x		X	
Observations	62	62	62	62	62	62	62	62	37	37	37	37
R^2	0,54	0,49	0,54	0,48	0,60	0,51	0,61	0,51	0,46	0,46	0,32	0,31

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1980 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Appendix J. The Full Estimation of Equations 4, 5 and 6 for the years 1990 to 2000

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
ΔIPR	0,32	0,06	0,69	0,79	0,18	0,42	0,25	0,67	14,46	10,27	2,07	1,53
	(3,51)	(3,90)	(1,19)	(0,96)	(2,89)	(2,95)	(1,19)	(0,92)	(13,00)	(12,73)	(3,87)	(3,88)
ΔGDP	1,14	1,30	0,75	0,97	0,24	0,61	-0,24	0,17	1,21	2,17	2,94	3,33
	(1,12)	(1,06)	(0,98)	(0,81)	(1,13)	(0,99)	(1,03)	(0,94)	(3,19)	(3,95)	(2,20)	(2,54)
DEV	-0,07	-0,11	0,13	0,22	-0,23	0	0,01	0,47**	2,06	0,54	0,64	-0,83
	(0,40)	(0,43)	(0,45)	(0,21)	(0,40)	(0,38)	(0,39)	(0,24)	(1,41)	(1,58)	(0,92)	(12,09)
EDU	-0,29	-0,36			-0,35	-0,48			1,71	1,62		
	(0,57)	(0,59)			(0,50)	(0,45)			(1,51)	(1,53)		
WAGE	-0,01		-0,05		-0,17		-0,23**		0,64		0,63**	
	(0,13)		(0,14)		(0,11)		(0,11)		(0,32)		(0,29)	
ΔIPR*GDP	-0,71	-1,29	-0,05	-1,05	1,47	0,45	2,10	0,33	0,57	-6,83	-5,91	-8,81
	(3,16)	(3,26)	(2,84)	(2,32)	(04,00)	(3,69)	(3,52)	(3,21)	(0,32)	(15,84)	(13,15)	(12,09)
ΔIPR*DEV	-0,47	-0,31	-0,76	-0,69	-0,33	-0,35	-0,57	-0,66	-4,23	-1,82	0,03	1,25
	(1,51)	(1,62)	(1,14)	(0,89)	(1,51)	(1,41)	(1.15)	(0,90)	(5,42)	(5,41)	(2,52)	(2,71)
ΔIPR*EDU	0,17	-0,32			0	0			-6,53	-4,30		
	(1,83)	(2,03)			(1,60)	(1,61)			(6,26)	(6,15)		()
ΔIPR*WAGE	0,09		0,21		0,25		0,40		0,35		0,07	
	(0,2)		(0,24)		(0,20)		(0,22)		(0,64)		(0,63)	()
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	60	60	60	60	60	60	60	60	37	37	37	37
R^2	0,19	0,19	0,13	0,09	0,44	0,36	0,35	0,14	0,31	0,21	0,25	0,15

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1990 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Appendix K. Estimation of Equations 1, 2 and 3, but with the absolute value of IPRs in the year 1980 (instead of the change) for the years 1980 to 2000

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
IPR	-0,25	0	0	-0.15	-0,29	0	0	-0,31**	-0,70	0	0	-0,68
	(0,23)	(0,30)	(0,28)	(0,19)	(0,18)	(0,38)	(0,28)	(0,14)	(1,13)	(0,79)	(0,96)	(0,77)
ΔGDP	1,25*	1,26*	1,22*	1,37*	1,01*	1,01*	1,02*	1,16*	1,10	1,21	1,17	1,40
	(0,19)	(0,18)	(0,17)	(0,17)	(0,17)	(0,18)	(0,16)	(0,15)	(1,60)	(1,47)	(1,60)	(1,42)
DEV	-0,22	-0,08	-0,15	-,10	-0,38*	0,02	-0,34**	-0,17	-1,37	-0,65	-1,34	-1,63*
	(0,22)	(0,18)	(0,26)	(0,11)	(0,11)	(0,19)	(0,14)	(0,09)	(0,88)	(0,88)	(1,14)	(0,62)
EDU	-0,11	-0,12			0,07	0,02			1,19	1,12		
	(0,12)	(0,11)			(0,07)	(0,08)			(0,95)	(0,92)		
WAGE	0,03		-0,08		-0,16*		-0,17*		-0,21		0,07	
	(0,10)		(0,11)		(0,06)		(0,06)		(0,33)		(0,59)	
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	62	62	62	89	62	62	62	89	37	37	37	50
R^2	0,51	0,49	0,49	0,47	0,60	0,52	0,62	0,37	0,33	0,32	0,26	0,24

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1980 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.

Appendix L. Estimation of Equations 1, 2 and 3, but with absolute value of IPRs in the year 1990 (instead of the change) for the years 1990 to 2000

	ΔEXPORTS				ΔIMPORTS				ΔFDIs			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
IPR	0,04	0,04	0,08	0,04	-0,14	-0,25	-0,09	-0,06	-0,62	0	-0,66	0,27
	(0,24)	(0,23)	(0,25)	(0,17)	(0,36)	(0,32)	(0,39)	(0,17)	(0,54)	(0,55)	(0,53)	(0,56)
ΔGDP	1,00*	1,00*	0,72***	0,91*	0,66***	0,72**	0,23	0,43*	1,31	0,87	1,51	2,06***
	(0,43)	(0,39)	(0,41)	(0,24)	(0,39)	(0,36)	(0,42)	(0,36)	(1,72)	(1,73)	(1,36)	(1,16)
DEV	-0,17	-0,16	0	-,02	-0,34	-0,16	-0,08	0,26**	0,70	-0,15	0,61	-0,28
	(0,28)	(0,19)	(0,34)	(0,12)	(0,21)	(0,16)	(0,29)	(0,13)	(0,80)	(0,71)	(0,67)	(0,42)
EDU	-0,29	-0,29			-0,43*	-0,48*			0,23	0,67		
	(0,19)	(0,15)			(0,17)	(0,13)			(0,59)	(0,57)		
WAGE	0		0,05		-0,14		-0,20		0,71		0,76	
	(0,15)		(0,14)		(0,13)		(0,13)		(0,29)		(0,28)	
EDU	X	X			X	X			X	X		
WAGE	X		X		X		X		X		X	
Observations	60	60	60	89	60	60	60	89	37	37	37	52
R^2	0,18	0,18	0,09	0,11	0,41	0,37	0,24	0,08	0,26	0,15	0,25	0,10

Estimations using ordinary least squares. Columns 1 through 12 represent different specifications. Dependent variables are the change in exports, imports and FDIs from the years 1990 to 2000. The two rows under "In the regression" headline indicate whether the variables EDU and WAGE are the regression or not. All variables are in natural logarithms. A more positive (negative) coefficient indicates a positive (negative) relation to exports, imports or/and FDIs. Robust standard errors in parenthesis. *, ** and *** denotes 1%, 5% and 10% significance respectively.