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IPR Protection Strength and the Market for Knowledge

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The world of today is called information society. This means, that information, knowledge and achievements of the intellect are gaining in importance in production over the more conventional factors of production like labour or capital. Who has the knowledge and the know-how, also has the advantage in competition.

Knowledge or intellectual products have, however, characteristics of a common good, which preclude its trade, and hinders specialisation in its production. Knowledge is common good inasmuch as there is no rivalry in its use, and also no natural excludability. Intellectual Property Rights (IPRs) are an artificial way to at least partial excludability which can – beside encouraging innovation – render intellectual products tradable.

In this paper I am going to focus on the trade related aspects of intellectual property rights from an institutional economics point of view. I intend to explore the relationship between tradability as determined by the strength of the actual IPR regime and the intensity of trade in intellectual properties across countries. I am exploring the theoretical basis for the relationship between international mobility of intellectual products and the country's IPR regime. Based on models and cross-country empirical data the strength of intellectual property rights does influence the magnitude of trade of intellectual products between countries. My hypothesis is, that when a country's IPR regime becomes stricter relatively to its trading partners, this facilitates the inflow of knowledge to the country. This is the technology transfer that can help developing countries to grow.

Keywords: intellectual property rights, patent, international trade, efficiency

1. Introduction

In the last decades it becomes increasingly clear, that those countries will be able to benefit from the new kind of international competition which can better adapt to the challenges of the knowledge-based economy. Knowledge is gaining in importance as an input to the production process. Therefore it is in the best interest of the countries and governments to facilitate knowledge production and try to manipulate its international spread in their own favour. This paper uses an institutionalist point of view to show how this can be done by an appropriately formulated intellectual property rights protection regime.

Intellectual property rights, or property rights more broadly, are institutions which are taken as given or exogenous by neoclassical economic models. In this paper, however, what is seen to influence important economic outcomes is the

design of this institution itself. Therefore I have to tackle the problem from a different point of view.

The New Institutional Economics seems a good choice. Institutions have always played an important role in the life of mankind, but their economic aspects have just recently started to be explicitly investigated. Starting with the influential works of R. H. Coase as far back as the 1930s, the new institutional economics a) views institutions as not being neutral, but influencing economics outcomes, b) rather than discarding the whole apparatus of the neoclassical economics, tries to link functioning of the institutions with the marginalist methodology and c) tries to use institutional variables as endogenous within the neoclassical framework. Thinking about property rights and their causes and effects has a long tradition in philosophy, dating back of course to the Greeks, to Aristotle. This line of thinking found its way to economic thinking only recently. In his 1960 paper, the Problem of Social Costs, Coase emphasises the economic importance of property rights. The famous Coase-theorem about how clearly established property rights enhance the efficiency of the market system in the presence of externalities is already a part of most every undergraduate microeconomic textbook. In the next decades numerous distinguished scholars such as Armen A. Alchian, Harold Demsetz, Douglas C. North, Oliver Williamson and Richard A. Posner – to name just a few – contributed to this new economics of property rights.

Property right in economics means "actual power to control or affect the use of an object, of some aspect thereof" (Makaay 1999, p. 247.). This controlling or affecting can typically mean 3 things: a) usage of the object (usus), b) appropriating the returns thereof (usus fructus) and c) the transferring of these rights partly or fully to another person (abusus). Clearcut property rights and their guaranteed enforcement are perquisites of a well-functioning, Pareto-optimal market economy. If any of these essential rights is restricted, either by a government authority or by the nature of the object of the property rights, efficiency can not be warranted.

The third of these rights is in connection with the freedom of contracts and trade. As Makaay writes (1999, p. 248., italics mine): "A person who controls the use of an object may find it *profitable* to allow another person to use it, or to exploit it with the help of another person. To this end, the owner enters into an agreement with the other person. The agreement defines the permissible uses for the other person, and thereby *confers* on him or her *some economic property rights*." The above quote implies, that both using our property ourselves or selling it to someone is driven by the profit-motive and leads to the efficient usage of the property. If there are any limitations to any of these parts of the property (that is, limiting the economic property right that can be conferred on someone, or limiting this conferring itself), efficiency cannot be ascertained.

We also have to be aware of the fact, that the property right system is not static, but dynamically changing. Since it is, in the institutionalist view, an endogenous variable, it is not merely a given factor that determines other variables,

but is itself dependent on other economic variables and processes. The emergence of new kinds of objects with new characteristics requires the emergence of appropriate property rights. The tailoring of property rights to the characteristics of the different objects can be a natural, evolutionary process, left to the market, but more often than not it is done by the government.

In the first section I identify special characteristics of intellectual products which the appropriate property rights system has to handle to be able to facilitate trading. In the second section I present predictions on the model-level and findings on the empirical level how the system of property rights influence trade. The third section compares the cross-country empirical results to the Hungarian situation. Throughout the whole paper I will concentrate not on the built and structure of the IPR protection system, but only on its strength.

2. Special characteristics of intellectual products and intellectual property rights

Intellectual products differ by their very nature from physical products in some important aspects. The most important of these for us now is their being common goods. This means, that there exists no rivalry in the usage or consumption of intellectual products. Once a certain piece of an intellectual product has been produced – written, invented etc. – it can be used even simultaneously in more production processes without any one specific usage precluding any other. Considering knowledge a common good in this sense supports the argument that knowledge should be freely available for anyone and everyone. It has been quickly recognised, however, that the producers of intellectual products will not be sufficiently interested in producing them if they can not appropriate the returns from their inventions due to their non-excludability characteristic as a common good. Based on this recognition, intellectual property protection by way of property rights appeared in England for example as early as the 14th century (David 1992).

The role of intellectual property rights is to artificially create shortage in the case of a product where scarcity is necessarily absent by virtue of the nature of the product (May 2005). This artificial scarcity serves as a basis for the (at least partial) excludability of intellectual products, and enables the (again at least partial) appropriation of the returns thereof. By creating excludability, intellectual products are rendered tradable, price can be set for their usage, which may result in profit for the producer of the intellectual product. This kind of partial excludability is indicated by the name quasi-common good.

The goal of the different instruments of intellectual property rights protection – patents, trademarks, copyright – is to make it rational to invest resources in the production of intellectual products, meaning the “promot[ion of] the Progress of Science and useful Arts “ by “securing for limited Times to Authors and Inventors

the exclusive Right to their respective Writings and Discoveries." (David 1992, quoting the constitution of the United States).

Many studies exist that show how the patent system can foster the *creation* of intellectual products, or knowledge, starting with the seminal works of Arrow (1962) and Nordhaus (1967). In this paper I am more interested in how the patent system, more broadly, the intellectual property rights system influences *trading* in knowledge.

Intellectual property protection aims not only at protecting the creators of new intellectual products – this was also not the main reason for which it was used in the 14th century England mentioned above – but at encouraging the spreading of new knowledge. Clear property rights allow of trading. Market prices which can be set due to excludability encourage not only efficient production, but also efficient allocation, which means that by the logic of the market mechanism the intellectual products will find their way to the most efficient users through trading.

Intellectual products have some important characteristics that can be identified as influencing their tradability[1]:

1. Appropriability, meaning the possibility that the inventor be the exclusive beneficiary of the profits from the invention.
2. Fungibility, meaning the possibility to simultaneously use the same unit of knowledge in more than one production processes.
3. Complexity, meaning the diversity of complementary pieces of knowledge required to generate a new piece of knowledge.
4. Cumulability, meaning complementarity between the already existing stock and the new flow of knowledge.
5. The stickiness of knowledge to human capital and routines (Antonelli 2004, p. 423.).

An intellectual property right regime has to be able to adequately handle all these characteristics in order to enable efficient trading on the intellectual products' market.

Trading in intellectual products involves transaction costs both on the supply and demand side. These costs cover the cost of finding the right trading partner, that is, the cost of inspecting the quality and expected usability of the ware to be traded, of the elimination of opportunistic tendencies and the risk of inappropriable derivative returns (Antonelli 2004, p. 423.).

[1] Tradability can be defined, following Antonelli (2004) as the degree to which a certain intellectual property without physical form can be bought and sold on the market.

3. Intellectual property protection and trading with intellectual products

Establishing a clear intellectual property rights (IPR) system makes trading with intellectual product possible. The possibility of trading in turn leads to specialisation, meaning that it is no more necessary for everyone to produce knowledge and innovate for themselves, but the production of these can be done by specialists having comparative advantage in their production. Knowledge can then be acquired from these specialists through the market. Research and development can be detached from production. Producers can have the necessary knowledge and technology from the researchers, and researchers do not have to bother with the commercial development of their ideas, like they had to in earlier centuries (Lamoreaux–Sokoloff 2001). The separation and cooperation of the two spheres are rendered possible by the market for intellectual products by way of intellectual property protection measures.

In this section I am talking about knowledge transfer in a very general sense. The model I introduce and the empirical test of its predictions are at the macro level. These do not say anything about the actual process, how knowledge is being transferred from one country to another. Neither is it important here, how individual firms find out, what knowledge and what innovations it is worth to acquire from outside the home country, or what determines the regional spreading of knowledge and innovations. Although these are all certainly important questions, I will concentrate here only on the aggregate, macro level.

There exists a number ways to transfer knowledge from one country to another. "International technology transfer refers to the process by which a firm in one country gains access to and employs technology developed in another country" (Falvey–Foster 2006, p. 23.). This has many ways and methods, that can and has been both theoretically and empirically explored. The possible ways include international trading in technology-intensive products, international flow of foreign direct investments, cross-country licensing, or even patenting in a different country.

International trading in intellectual products is one these market-conform way technologies can spread in the globalised world[2]. The same way it is important for a domestic market of intellectual products to clearly establish property rights, international trading in intellectual products is strongly influenced by the relation of the different national property rights regimes. As to how exactly national differences in the strength and design of the IPR system influence international trade in intellectual products, no generally accepted theoretical explanation has yet emerged in the literature.

[2] As opposed to certain non-market-conform ways like non-market transactions and spillovers (Falvey–Foster 2006)

4. Modelling the link between IPR regimes and technology transfer

There are at least two characteristics of a country's intellectual property rights regime, that can influence the inter-country flow of intellectual products, namely its design and its strength. The first model I will cite here shows how the design of the system influences trade (although differences in design can be translated into differences in terms of strength), and the second model will concentrate on the system's strength or strictness as an important determinant variable.

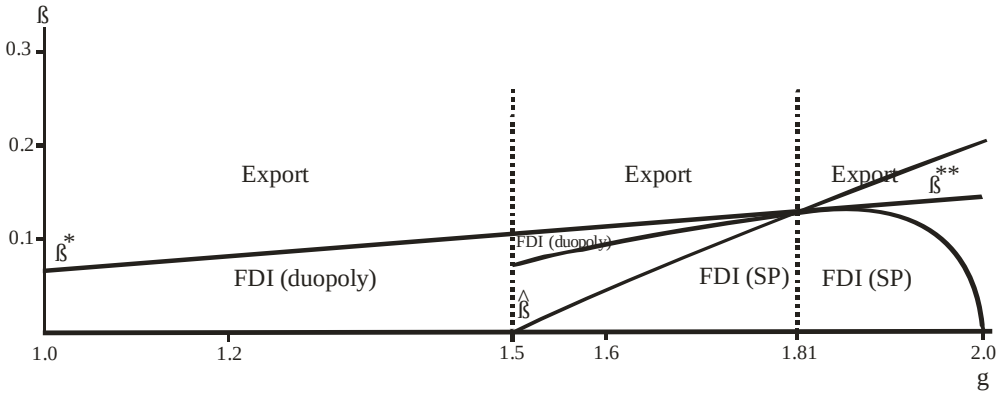
Building on the work of Dornbusch et al (1977), Taylor (1993, 1994) models at the macro level, how the strength of an IPR regime influences international trading in products and services and intellectual products. The model is a Ricardian trade model, where production and R&D is carried on in the different countries based on the relative factor costs. International trade then may or may not equalise factor costs in R&D depending on the institutional setting. Taylor finds, that there is „a link between asymmetries[3] in patent protection [between countries] and resulting trade distortions" (Taylor 1994, p. 363.). His model finds, that „Asymmetric protection of intellectual property rights: (1) distorts the pattern of trade in both goods and R&D, raises the relative wage rate of the country that imported R&D, and eliminates technology transfer between countries; (2) lowers the amount of labour allocated to R&D activities worldwide. […] (3) lowers R&D in the country that exported R&D, and raises R&D in the country that imported R&D." (Taylor 1994, p. 374.). It is important to observe, that the second statement is in connection with the encouraging role of IPR protection in the production of intellectual products (and its role in promoting economic growth, in turn), the first and the third makes a statement about the role it plays in influencing international trade in these. The first statement is especially remarkable as it establishes a link between the relative strength of IPR regimes and the trade in conventional goods and services. The model's third prediction basically means, that if a country's IPR regime discriminates against innovations made abroad, and the country is one that originally imported knowledge from outside, he will be less able to do so, and has to conduct R&D himself, even though he has comparative disadvantage.

What is more important in Naghavi's 2007 model is the explicit differentiation of the more developed North, capable of conducting R&D, and the less developed South, willing to acquire knowledge from the North directly or indirectly. Naghavi shows, that the looseness or strictness of the IPR regime in the South not only influences knowledge flow between North and South, but also determines for the North the more profitable way to enter the Southern market. In his model, trading with goods embodying new knowledge is an indirect way for the

[3] He defines the IPR regimes symetric if results of research and development conducted in another country enjoys the same degree of protection domestically, as those conducted domestically, and asymetric if the regime offers protection only for those intellectual products whose researches are conducted domestically Asymmetry therefore means a difference in the scope of the protection.

South to acquire new technologies through imitating or reverse engineering, while Northern firms' investing directly in the South makes copying the new technology easier. For the Northern firm, this two ways of entering the Southern market are complementary: by exporting it incurs tariff costs, but lowers competition as the technology itself is not readily available for copying in the South. In the FDI case transportation costs can be spared, but only at the cost of higher competition because of imitation. The model finds two bottom-line variables determining the export versus FDI question for the North: efficiency of the R&D project in the North indicated with g[4] and the level of technology spillovers in the South marked β,[5] which is an institutional variable to be set strategically by the South[6]. Figure 1 shows how these two variables determine the way Northern firm enter the Southern market, that is, the channel through which knowledge is being transferred from one country to another.

Figure 1. The Northern firm's decision about the way of going multinational



Source: Naghavi (2007, p. 69.)

β shows the strength of the IPR regime in the South. Higher values mean less strict protection. β^* shows the value at any g, at which it the North is indifferent between exporting to the South or investing directly abroad. If β is smaller than that (more strict IPR protection in the South), it is more profitable to invest directly, and spare tariff costs. If exporting is the outcome, the Northern firm becomes a monopoly in the South, in the FDI case, however, a duopoly arises. $\beta\hat{}$ is the threshold value, under which it is not profitable to the Northern firm to access the Southern market through FDI and β^{**} is that level of IPR protection, under which it

[4] Meaning basically how a unit of R&D cost incurred by the North reduces Northern production costs.
[5] Meaning in turn how a unit of Northern R&D cost reduces Southern production cost.
[6] The variable β itself is the product of the imitation costs b and the strictness of the Southern IPR protection regime ι. The model takes b as given, it is thus only scaling the effects of the actual institutional variable to be set.

is profitable for the Northern firm to invest directly, but it should spend as much on R&D that it becomes unprofitable for the Southern firm to compete, and a restrained monopoly situation arises. In sum, a low β value is supposed to induce more R&D in low-tech industries (crowding out exports, though) and stimulate high levels of R&D spending in hi-tech industries. Thus both in the case of less and more technology-intensive industries it is rational for the Southern government to pre-commit itself to a strict IPR regime, as it induces transfer of technology to the South (Naghavi 2007, p.71.)[7].

If the differences in national IPR regimes do have an impact on international technology diffusion, then their appropriate fine-tuning can become a new way of competition between countries and also a new possibility for levelling off. Endowment with or accessibility to knowledge might be less predetermined, constrained than endowment with natural resources, capital or labour. If it can be proven that the type (strength) of IPR systems as a new tool in the hand of a national government can influence international flow of capital and technology transfer, than using Ghosh's words we can speak of a „new mercantilism", of a new tool a government can use to compete more efficiently at the international level (Ghosh 2003, p. 85.).

5. Empirical studies of the link between IPR strength and transfer of technology

To test empirically, whether a link between the strength of IPR systems in a country and transfer of technology to that country could be established, two questions have to be answered: first, how to measure the strength of national IPR regimes, and second how to measure the magnitude of transfer of technology.

For the measurement of the strength of IPR regimes, Ginarte and Park developed a composite index in their 1997 paper[8]. Their index measures IPR strength along 5 dimensions, giving a number 0-1 to each, and then taking the sum of these to be the Ginarte-Park index, later referred to simply as Patent Right Index. The five dimensions are coverage (meaning what can and what can not be subject of protection), membership in international treaties (the Paris Convention, the Patent Cooperation Treaty and the International Convention for the Protection of New Varieties of Plants), enforcement (whether the legislation provides adequate

[7] Naghavi also shows, that stringent IPR protection does not only attract more FDI to the South and induce higher levels of R&D in the North, but also enhances Southern welfare more, than does a looser IPR regime.

[8] Beside this Ginarte-Park index, empirical studies use another, called Rapp-Rozek index to which due credit is given both in Ginarte–Park (1997) and Falvey–Foster (2006).

mechanism for the law to be enforced), and restrictions to exercising IPRs (eg. compulsory licensing), and duration of protection.[9]

For the measurement of the magnitude of transfer of technology many different indicators can be used. Falvey and Foster (2006) enumerate 4 basic channels through which technology can flow from one country to another, and that is through international trade, through foreign direct investment, through licensing agreements and through cross-national patenting.

In their original study Ginarte–Park (1997), the aim of the study was to examine, what determines the Ginarte-Park Index as a dependant variable. In Park and Lippoldt (2003) the authors conducted an empirical study to examine whether a statistical relationship can be established between the strength of IPR regimes as an independent variable and technology transfers, either in the form of foreign direct investment or in the form of technology-intensive merchandise import. They conducted a regression analysis where they use the above mentioned Ginarte-Park Index to measure the strength of the IPR system as an explaining variable. Beside that, their regression analysis has many control variables (like country-risk or per capita GDP), accounts for individual, country-specific effects like culture or quality of institutions (Park–Lippoldt 2003, p. 16). The countries involved are grouped into two groups of developed countries and least developed countries. Table 1 shows the percentage change (and the significance level in brackets) in inward and outward foreign direct investment (FDI), and exports and imports due to a one percentage change in the strength of IPR regimes (as measured by the Ginarte-Park index).

Table 1. Ginarte-Park Index elasticities

Effect of strengthening Patent Protection on…	**All countries**	**Developed countries**	**Least developed countries**
Inward FDI to GDP	0,49 (p=4,4%)	0,73 (p=1%)	2,76 (p=2%)
Outward FDI to GDP	1,69 (p=0,0%)	1,90 (p=0,0%)	6,11 (p=0,1%)
Exports to GDP	0,172 (p=16,6%)	insig.	insig.
Imports to GDP	0,315 (p=1,1%)	0,243 (p=14,4%)	insig.

Source: Park–Lippoldt (2003)

The effects of increasing the IPR index raised both inward and outward FDI for both country groups, and the effect was stronger for the least developed countries. The result thus is, that a rise in a country's IPR index will on average rise inward FDI and technology intensive merchandise imports to the country. The IPR index had only a moderate effect on aggregated import and export, and this effect was not even significant for the least developed countries. This leads the authors to the conclusion, that intellectual property rights protection affects exports and imports only in a very roundabout way, and on the other hand that trading and direct

[9] In a 2008 paper (Park–Lippoldt 2008), this patent right index is developed further, and an index for the strength of copyright protection and trademark right protection is included.

investments function as complementary in the case of technology transfer[10]. This latter conclusion is completely in accord with the results of Naghavi's model.

Strengthening the IPR systems can contribute to the flow of technology transfer towards the developing countries (Park–Lippoldt 2003, p. 8.), be it either through foreign direct investments or the import of technology-intensive commodities. The strength of intellectual property regime is however not the only determinant of knowledge diffusion. Some other influencing factors, the effects of which could even be studied at the model level might be the extent of the market, the quality of the labour force, the infrastructure, political stability etc.

Even if we take the strictness of IPR protection as a determinant of knowledge inflow into a country, it may not be the absolute, but the relative strictness of the protection that matters. In the next section I will use the Ginarte-Park index of countries to measure the differences in the strictness of IPR protection between trading partners, and see whether and how this influences knowledge inflow as understood by Park and Lippoldt (2003, 2008). I will use Hungary as a target country. Based on the above studies of Park and Lippoldt, my prediction is, that as Hungarian IPR protection gets stricter relative to that of its trading partners, this encourages knowledge inflow, while as it gets looser, it discourages knowledge inflow.

6. Patent Right Index and technology transfer in the case of Hungary

Neither the original 1997 study by Ginarte and Park, nor the 2003 study by Park and Lippoldt includes Hungary. Park in his 2008 paper (p. 2.), however gives the values of the Ginarte-Park index for Hungary. For the years 1960-1990 Hungary scores an average of 2,20. For the year 1995 the index is 4,04 remaining unchanged for 2000, and rising to 4,5 to the year 2005[11]. Having the scores of the patent right index for different years, and having the model of Park–Lippoldt (2008), we can see, whether the Hungarian data support my predictions. Park–Lippoldt (2008) has the methodology of what to measure and how to measure. They regress a) stock of inward FDI, b) technology-intensive merchandise imports and c) technology-intensive service imports to the Ginarte-Park Index of Patent Rights. In their paper, they use data from altogether 120 countries, which they divide into three groups: developed countries (25), developing countries (68, including Hungary) and least developed countries (27). What they find is, that 1% rise in the Ginarte-Park index is

[10] Falvey and Foster (2006) also enumerate (p. 25) many other ways how technology transfer can be measured with the corresponding methodological difficulties.

[11] The Patent Rights Index for Hungary is, however, different, being 3,71 in 2000 and 3,37 in 1995 (Park – Wagh 2002, p. 40.). Partial figures are: 0,71 for Coverage, 1,00 for Duration, 0,67 for Enforcement, 1,00 for Membership in International Treaties and 0,33 for Protection from Restrictions on Patent Rights.

accompanied by a 1,65% rise in inward FDI to developing countries (as opposed to 11,2 to developed and 1,66 to least developed countries). A 1% rise in the Patent Right Index goes together with 1,34% rise in merchandise imports to developing countries (compared to 9,86 to developed countries and 0,54 to least developed countries). Also, the coefficient for service imports to developing countries is 0,99 (9,99 to developed countries and 0,97 to least developed countries). They also give coefficients in a sectoral breakdown: they list those parts of merchandise imports and service imports which are the most likely to bring along with them the transfer of new technologies, and see how these are related to the strength of the IPR system[12]. In the case of the merchandise imports these are: pharmaceuticals, office and telecom equipments, organic and inorganic chemicals, electrical and electronic products, aircraft and spacecraft-related products and optics and precision equipment (Park–Lippoldt 2008, p. 37.). In the case of services imports they list communication services, computer and information services and royalties and license fees (Park–Lippoldt 2008, p. 43.). I also acquired data for Hungary in these categories.

Table 2 shows foreign direct investment, technology-intensive merchandise import and technology-intensive services import for the years 2000 and 2005 into Hungary. As a reference, I indicate in the first column the Ginarte-Park index for Hungary.

Table 2. Knowledge transfer to Hungary

Year	G-P Index for HU	Inward FDI	Technology-intensive merchandise import	Technology-intensive services import
2000	4,04	**22 869,9**	**16 101,3**	**461,0**
2005	4,50	**61 970,1**	**32 842,4**	**1 956,8**

Note: All boldface numbers are in million current USD
Source: MNB, KSH, UNCTAD

It is important to note here, that Hungary fits the original Park–Lippoldt prediction inasmuch as a rise in the IPR index from 4,04 to 4,50 is in fact accompanied by an increase in technology-intensive merchandise and services import to Hungary. My objective now is to see where these merchandise and services come from: do they come from countries where intellectual property rights are strongly or loosely protected? Do they come from countries that have a stronger or looser IPR regime, than Hungary? Is this inflow of merchandise or services sensible to changes in the absolute IPR protection strength or its relative state to the trading partner?

Having data of the above categories broken down to countries of origin it is now possible to see, whether any connection can be seen between change in Hungary's relative IPR strength to its trading partners and the change in stock of

[12] The model certainly also uses control variables.

inward FDI, technology-intensive merchandise imports and technology-intensive service imports, respectively. To see this I used data for only those countries, for which Park (2008) gives a Ginarte-Park index, which is, 120 countries. This means, that in the case of inward FDI, in 2000 88,1% and in 2005 90,3% of the whole inward FDI is covered. In the case of the technology-intensive merchandise imports, this means 99,46% and 98,64%, respectively, and in the case of the technology-intensive service imports, 98,57% and 97,56%, respectively. From the sample I excluded those items, where trade or FDI stock was 0 in at least one of the years, and also excluded outliers, where the change in either way was more than tenfold during the five-year interval. After these exclusions my data account for 86,7% of the inward FDI stock in 2000 and 76,68% in 2005, in the case of merchandise import these percentages are 99,45% and 98,58, respectively and for the services import they are 97,28% and 83,42%, respectively. I took into account further variables that could also have their effect, like the absolute value of the IPR index or GDP growth.

According to my prediction if Hungary employs a relatively stricter IPR protection regime as a trade partner country, technology-intensive merchandise and service import and FDI from that country should increase.

Statistics, however, do not show any discernable relationship between the change in relative IPR strength of a partner country and the change in the value of technology-intensive merchandises coming to Hungary from that particular country. All the variables together explain only a tiny percentage of the change in technology-intensive imports and FDI inflow.

This could on one hand be interpreted, that a change in the trading partners' relative IPR regime strengths can in and by itself not determine the magnitude of knowledge inflow, and is not even the most important factor determining it. It seems odd, however, that while an increase in the strength of IPR protection does attract more knowledge from outside, we cannot attract significantly more just by putting ourselves in a relatively better protected situation. On the other hand this could mean as well, that inflowing knowledge requires a certain level of IPR protection, and once it is reached, Knowledge can be imported regardless of the level of IPR protection in the exporting country.

Still the data show that the higher the partner countries score on the independent variable (relative IPR strength), the greater the upward spread of the dependent variable (knowledge inflow in the various above mentioned forms) can be. This could be meaning, that the change in the relative IPR strength does not, per se, determine technology transfer through these channels, but a greater positive change in Hungary's relative IPR strength is able to *allow for* higher technology transfer, while the smaller the positive change or the greater the negative change, the less it is able to do so. It is also possible, that the data are heteroskedastic, meaning that countries to the right has better chances of exhibiting higher growth in knowledge transfer than countries to the left, for some reason in connection with

their scoring higher on the independent variable, but this heteroskedasticity hypothesis can not be tested on this model.

This model should be extended and studied further. The main task to be done is identifying further variables that influence knowledge inflow to Hungary from the trade partners. My aim is to identify country groups that behave significantly differently than other countries, when it comes to transferring knowledge-intensive products and services to Hungary.

On the international level, there are continuous efforts being taken to facilitate the mobility of this quasi-common good. The institutional measures are trying to benefit everyone, including the seller and buyer country of the intellectual product, and also its creator.

One field of these efforts are The Trade-Related Aspects of Intellectual Property Rights (TRIPS) treaty proposed by the World Trade Organisation. This aims at the international harmonisation of national IPR regimes. The treaty was signed at the Uruguay round of GATT/WTO, and entered into force on the 1st January, 1995. This treaty prescribes minimal standards for national IPR legislation, specifying also some exceptions. Second, it also includes rules regarding the enforcement of the treaty. Third, it also designs a dispute resolution mechanism. It would however exceed the scope of this theoretical paper to examine the effects of the TRIPS agreement on the international market of intellectual products. This way, the trade-distorting effects of different national legislations can be circumvented.

A second field is the development of the institutional foundations of the trade in intellectual properties, including ways for example to reduce transaction costs.

7. Conclusion

Theoretical studies show, that the actual shape and built of a nation's intellectual property rights protection system can and does have effect on the international flow of intellectual products through the markets. Stronger IPR protection attracts more intellectual products into a country.

My objective was to test if there is a link between the strength of a country's IPR protection system *relative to the partner countries* and knowledge-intensive import from that particular country. If this is the case, different countries can shape their IPR regimes to profit more from the international flow of knowledge, while this can be a disadvantage for others.

In the case of Hungary, however, I found no such link of any significance, which could possibly mean, that if an IPR protection regime is strong enough in absolute terms, certain units of knowledge can be imported, otherwise not, regardless of how much the protection is stronger than this threshold value. The international efforts to standardise IPR systems indicate, that differences in relative strength still have some effect.

It is thus up to further studies to examine, *how exactly* varying relative strength of IPR systems influence technology transfer of the above mentioned kind, or other kinds, like the international flow of knowledge workers and human capital, and the resulting knowledge products as embodied in patents or copyrights.

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