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**Will It Fly? Influence of TRIPS implementation  
on innovations in post-Communist states.**

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*Abstract:* WTO is an increasingly influential international organization, which aims to liberalize global commercial activities and TRIPS is an important part of WTO agenda, which provides minimum standards for IPR regulation for all the members. Empirical evidence suggests that stronger IPR regimes contribute to increasing inward FDI, R&D investment and innovations. Starting out from these findings the present study aims to examine expected impacts of Russia's WTO membership on innovations. As Russia has joined WTO very recently, this paper relies on four case studies of countries with transitional economies, which have already joined WTO, where influence of stronger IPR on FDI, R&D and IP filings are analyzed. The findings show that stronger IPR positively influenced FDI and IP filings in most of the cases.

*Key words:* Russian Federation, Armenia, China, Poland, Lithuania, transitional economies, TRIPS, WTO, IPR, incentive theory, innovations

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## 1. List of acronyms

WTO – World Trade Organization

IPR – Intellectual Property Rights

TRIPS – Agreement on Trade-Related Aspects of Intellectual Property Rights

FDI – Foreign Direct Investment

R&D – Research and Development

MNE – Multi-National Enterprises

EIS – European Innovation Scoreboard

GATT – General Agreement of Tariffs and Trade

## 2. Introduction

Promotion of technological change, advance and innovation lies nowadays in planning policies of many countries. Importance of innovation promotion is widely recognized as one of the main engines of economic growth and development (Fagerbeg at. al., 2006, Bolay et.al., 2012). Intellectual property rights, which are the rights given to persons over the creations of their minds (including patents on industrial inventions, copyrights, trademarks, industrial designs, etc.) and usually give the creator an exclusive right over the use of his/her creation for a certain period of time (WTO, 2013) IPR are regarded to be an inseparable part of innovation system. A classic view on IPR suggests that strong IPR protection is a prerequisite for innovation growth because it provides incentives for R&D investment and secures returns for an investing party. Thus the problem of intellectual property protection and harmonization of IPR internationally a topical issue and is widely discussed in academic and political spheres.

TRIPS, an agreement on trade-related aspects of Intellectual Property Rights, introduced by WTO is one of the attempts to bring all the IPR regimes of organization's members together. An official aim of TRIPS is to introduce more order and predictability, to settle arousing disputes more systematically, narrow the gaps in the way intellectual property rights are protected around the world, and to bring them under common international rules (WTO, 2013). TRIPS requires all member countries to ensure legal protection of copyrights, trademarks, geographical indications, industrial designs and patents. It also provides a strict penalties framework against any kind of infringement of IPR. Newly entered developing countries and states with transitional economies are allowed to postpone a full TRIPS implementation for a period of five years. The notion of TRIPS has been widely debated and views on it and on tight IPR in general differ greatly. Some influential economists, including Stiglitz (2008) suggest that TRIPS is detrimental for poor nations as it only takes into the account interests of developed nations, neglecting developing states, and some (Consumers International, 2005) voice concerns that excessively tight IPR might limit access to generic drugs for the poor. Others, however, follow a classic incentive theory and say that IPR protection is favorable for international development and growth as it promotes indigenous innovations in developing countries and creates common grounds for fair competition and technology transfer through legitimized channels like licensing. Consequences of WTO accession in general and compliance to TRIPS in particular for developing countries are lacking thorough research and whether TRIPS promotes or hinders innovative development in developing countries is to a large extent unclear.

Russia, having an economy heavily relying on the exports of natural resources, has recently started to acknowledge the role innovations could play in the creation of a more conscious and stable growth. In addition Russian policies become more and more Western-oriented, a good evidence of which is its recent accession into WTO, and such notions as IPR protection, R&D expenditures and FDI gain more weight, especially in the framework of innovations. However, IPR infringement is still widespread and in the US Trade Representative's latest report the Russian Federation topped the list as one of the biggest infringing nations, second only to China (Green, 2012).

Russian accession in the WTO has not been a straightforward topic. Russian media was full of opposing views, dividing journalists and academics into two camps. Some experts were making dull predictions, stating that the WTO membership would lead to unbearable competition and Russian industry is not ready for such a shock and can not yet be competitive on a global market (Katasonov, 2013; Tsagolov, 2013). Others, however, emphasized positive sides of WTO accession, especially its potential positive impact on innovations (Mankov, 2013) – this view is also shared by the state, as it can be seen from the statements of the government officials (Chubajs, 2012) .

This paper is going to examine consequences of the Russian accession to the WTO in the framework of innovations. Using the case studies of three former Eastern Bloc countries and China as a country which shares multiple characteristics with Russia this paper will elaborate on the hypothesis: “Russia's accession to the WTO will foster innovations because of the increased intellectual property rights protection which fostered FDI, R&D and boosted the number of patent applications”. This hypothesis is derived partially from official statements of government officials and is based on IPR incentive theory and interrelation of FDI and IPR protection theory. The present paper aims to fill in some gaps in the related research as earlier contributions do not observe influence of TRIPS and its correlation with innovations in the former Soviet countries which have entered WTO, they rather focus on discussions of TRIPS pros and cons theoretically or touch upon trade-related consequences of WTO accession.

Accession of the Russian Federation in the WTO is a big event in the international arena, which might change the international power balance, markets and trade considerably. However, surprisingly, not much research has been done to predict or at least theorize on what the consequences for Russia will be. There is an abundance of different viewpoints in the media, expressed by Russian politicians and economists, but what is really lacking is a concise and logical study, which would present some theories of what will happen, supported by empirical evidence. In

addition, there is little research of what actually happened in Post-Soviet countries, which have recently joined WTO and how it influenced their economies, let alone such narrow topics as innovations.

Implementation of TRIPS and stronger IPRs in developing countries is a controversial subject and is surrounded by heated debates. The consequences of increased intellectual property protection in poorer countries are not clear and many scholars, like Deardoff (1992), are quite negative towards the outcomes. The present study aims to contribute to the research on this topic and look at the problem from the point of former Communist states with transitional economies, which have recently joined WTO.

### 3. Theoretical framework

#### 3.1 Definitions and measurements of innovations

The term ‘innovation’ is used in numerous senses. It can refer to the inventive process by which new things, ideas, and practices are created; it can mean the new thing, idea, or practice itself; or it can describe the “process whereby an existing innovation becomes a part of an adopter’s cognitive state and behavioral repertoire” (Zaltman, Duncan & Holbek, 1973, pp. 7–8). Even though such notions as innovation and invention often go hand in hand, an important distinction should be made between those two. Invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out into practice (Fagerberg et. al., 2006:145).

There are many ways to measure innovation, but the most commonly used in academic research are firstly the analysis of R&D data; secondly analysis of data on patent applications, grants and citations; and thirdly observation of bibliometric data (that is data on scientific publication and citation) (Fagerberg et.al., 2006:46). All these indicators have their pluses and minuses. R&D indicator reflects relation of R&D expenditure to total sales and is referred to as R&D intensity. It is very commonly used to measure innovation because data on R&D on firm level is normally longitudinal and is available for many years. However, its also has drawbacks, for instance, R&D figures are not comprehensive and miss out on innovation-related investments in design, trial, market testing and fixed assets: It has been estimated that only 25 percent of innovation expenditures relate directly to R&D activities (Brouwer, Kleiknecht, 1997, cited in van der Panne, 2007).

Bibliometric analysis is the analysis of the composition and dynamics of scientific publication and

citation. It revolves around the Science Citation Index and the Institute for Scientific Information database and is mostly use to analyze the dynamics of science and academic research rather than innovations. Patent applications data is very often longitudinal, available for long periods of time, contains detailed information about new technologies and effectively captures inventive activity. This indicator is useful in many instances and has numerous advantages. These are: patents are granted for inventive technologies with commercial promise thus potentially reflect actual innovations; the patent system is an old institution, providing a long history - it is the only innovation indicator extending back over centuries, and this means that it is possible to use patents to explore quantitative issues over very long periods; and the data is freely available (Fagerberg).

However, this indicator also contains some disadvantages. To start with, even though patents reflect potentially commercial inventions, they are still an indicator of invention rather than innovation itself: they mark the emergence of a new technical principle, not a commercial innovation and there are numerous patents, which refer to inventions that are intrinsically of little technological or economic significance (Fagerberg et.al., 2006:43). In addition, even though the majority of inventions are patented, there is a certain amount of inventions, which are not registered in patent organizations and some types of inventions are not patentable at all. Also, within a patent data there is a certain distinction between patent applications data and patents granted data. Patent applications are more commonly used: however, patents granted show more of a quality of invention and its commercial potential.

In this paper patent applications indicator will be used as the study is longitudinal and focuses on the volume of innovation and incentives to innovate brought about by IPR changes. Trademark and industrial designs applications will also be analyzed in order to see the patterns in inventions in various fields and their connection with specific IPR laws. R&D investment here is not used as a measurement of innovation as for the present paper it is not suitable in this role due to the fact that it reflects input rather than results of innovation activity. It is rather viewed as one of the factors, which foster innovation and is analyzed individually.

### 3.2 IPR theories

Intellectual property rights notion refers to a right that is had by a person or by a company to have exclusive rights to use its own plans, ideas, or other intangible assets without the worry of competition, at least for a specific period of time and these rights can include copyrights, patents, trademarks, and trade secrets (Business Dictionary, 2013). The use of property-like rights to induce innovations of various kinds is perhaps the oldest institutional arrangement that is particular to

innovation as a social phenomenon (Fagerberg et.al., 2006:220). Connection between tighter IPR, often in terms of stronger patent protection, is a widely debated topic and is modeled in many theories.

A classic theory of economic incentives is based on an assumption that the stronger IPR protection is the more incentives firms have to invest in R&D and promote innovations and inventions. Patent system is a good way for a company to maintain control of the technology while a production and sales capability is established (Mazzoleni, Nelson, 1998). A granted patent is an instrument, which lets inventor will get sufficient returns from the money invested into R&D, though at a social cost of restricted use. The view is that a temporary monopoly created by granted patents is justified by incentives and returns it creates. As Arrow (1962) claimed, if the patent system is absent, to reach high levels of R&D it is pivotal that the government or some other institution not concerned with profits should finance research and invention as private firms will tend to underinvest in R&D due to low expected returns. In this line of thinking, patent protection can be justified as one of several alternative means, such as contracts, prizes, subsidies, and research consortia, to deal with this market failure (Fagerberg et.al., 2006: 243). The present paper is to a large extent based on incentives theory as it expects the innovations in studied countries to grow as a consequence of stronger IPR regimes.

Another widely recognized virtue of the patent system is that it induces diffusion of technology through a disclosure of technological details of the invention. Even though patent rules do not let other researchers use this exact patent for free, the disclosure of information encourages development of alternative solutions, inventions “around” a given patent, etc. When patent system is missing, there is a risk that an inventing company chooses to keep a corporate secret and the knowledge does not spread. Disclosure of information is also important in situations when the inventor cannot exploit all possible uses of the invention himself and the publication of a patent can attract attention of other parties who can make use of the invention (Mazzoleni, Nelson, 1998)

Some scholars raise concerns about the drawbacks of the patent system. On the other hand, there is a theory that protection of information and inventions might lead to duplication of the same R&D in different corporations, which is irrational in terms of resource allocation (Fagerberg et. al., 2006: 25). In addition, when such invention race occurs, the first finishers enjoy profits, and those who were not fast enough lose. Thus a precise system, which would institutionalize appropriability of inventions is very important in order to balance R&D expenditures and volumes, foster innovations and avoid over- and underinvestment in technological research.



On the other hand, some scholars criticize the incentive theory for being inconsistent as there is a lack of empirical evidence proving it. This view is supported by the work of Mansfield (1986) who found very small or missing effects of patent protection on innovation in most studied industries, like office equipment, rubber, motor vehicles, etc., - some substantial effect was only found in pharmaceutical and chemical industries. Another social study by Levin et. al. (1987) also underlines several main disadvantages of a patent system, stating that in reality patents do not work as good as on paper and there are numerous limitations, such as little protection of patent rights due to stringent legal requirements for proof that they are being infringed, or limited opportunities of technology diffusion on competitive terms. The study also presents some evidence that patent system does not matter for innovations except in semiconductor and chemical industries. Certain scholars even criticize patent system and strong IPRs for being actually harmful for innovations: Gallini (2002) claims that the theoretical literature shows that when research is sequential and builds upon previous discoveries, stronger patents may discourage subsequent research on valuable, but potentially infringing, follow-on inventions (Merges and Nelson, 1990; Scotchmer, 1991 cited in Gallini, 2002).

Stiglitz (2008) also claims that society's innovation system is heterogeneous and there are other ways of financing and producing research—for instance, through universities and government-supported research labs, which he claims to be more significant, than most of patent-covered inventions. He also discusses other ways of getting returns from R&D investments, for instance, through trade secrets or through a natural advantage of the first entrant. There is also a view that strict IPR system does not take into account people's incentives to invent and conduct research: for many researchers monetary reward is just a small part of the motivation.

A good example of other sources of motivation than monetary profits is development of open-source software, which emphasizes the free distribution of software in source code form. In an open source community using of instruments of copyright or patent to protect one's intellectual assets is considered improper and detrimental to software development (De Laat, 2005). The logic of this society is that if the code is available for many people, its reliability and quality increases greatly as there is a huge number of developers taking part in a process of program creation. Open-source community is a good example of motivation other than monetary: instead they are motivated by intellectual stimulus and the improvement of skills, joy of working in a team and the felt need for the software (De Laat, 2005). Thus, incentive theory does not fully take into account that money is not imperative for people to create and invent: joy of creation and personal interest can be powerful stimulants too.

One more source of the incentive theory criticism is implementation of strong IPRs in developing countries, which is often viewed to be harmful. Barton (2003, cited in Forero-Pineda, 2006) for example wrote that the risk that IPR slow the movement of technological capability to developing nations suggests that harmonization efforts might consider one IPR system for developed countries and another one for developing nations. Thus applicability of incentive theory to developing countries is highly disputable. Edith Penrose (1952) stated it as follows: “No amount of talk about the “economic unity of the world” can hide the fact that some countries with little export trade in industrial goods and few, if any, inventions for sale have nothing to gain from granting patents on inventions worked and patented abroad except the avoidance of unpleasant foreign retaliation in other directions”.

### 3.3 R&D

R&D spending refers to the amount of money companies or the state spend on research and development activities and is a good indicator of the role of innovation in the state/ firm. R&D is regarded to be one of the main drivers of innovation (Fagerberg) – however, it is not always a good indicator of innovations because many innovations occur without specific centralized R&D spending – for instance, in case of individual inventors. In theory R&D is should be positively influenced by tighter IPR due to higher expected returns from the investment, brought by stronger protection (Park, 2005).

### 3.4 FDI

FDI in broad terms is an investment made by a company or an entity into another company or entity abroad. The investing company may make its overseas investment in a number of ways - either by setting up a subsidiary or associate company in the foreign country, by acquiring shares of an overseas company, or through a merger or joint venture (Investopedia, 2013). It is important to note that FDI is not confined to flows of capital, but can include various production factors, such as technological knowledge, managerial and marketing skills, etc.

One of the theories on FDI and intellectual property protection states that stronger IPR should bring more FDI as MNEs, which are normally the main investors, are more willing to invest in countries with tighter IPR protection to avoid theft of technologies. The connection between IPR framework and inward FDI is not yet clear. On the one hand, low IPR protection gives space for imitation, even

though illegal, and technology transfers through copying of foreign technology. However, it happened on expense of being a favorable investment target. High IPR protection, on the other hand, can foster legal ways of technology transfers and spillovers through FDI, licenses, etc. The concern about the IPR regime also depends on the purpose of an investment project, being the highest in the case of R&D facilities and the lowest for projects focusing exclusively on sales and distribution (see Mansfield, 1994, cited in Javorcik 2004).

If directions of connection between FDI and IPR are not yet clear and quite ambiguous, positive connection between FDI and innovation is almost not doubted. For example, Fu (2008) in his research about China found that FDI has a significant positive impact on the overall regional innovation capacity. However, a similar study of FDI and innovations in Estonia, conducted on a basis of Community Innovation Surveys and analyzed three time-periods and although foreign companies were found to be more innovative in several respects, many of the results did not hold after various other factors had been controlled for and the author did not find any significant connection between FDI and growth of innovations (Masso et.al., 2010). In general, the theory states that FDI drives innovation due to technology transfer and knowledge spillovers, which occur when MNEs set their branches abroad. It is especially true when FDI receiver is on a lower technological development position than the investor.

This paper is going to look at FDI in terms of capital as it is mostly interested in global trends. In addition, even though some scholars, like Javorcik (2004) in similar studies of FDI patterns break down FDI into FDI by industry, this paper does it only in one country-case. It is so due to specificity of the chosen countries: the data on post-Soviet republics is limited and it is impossible to make longitudinal assessments. In this study FDI is analyzed as a potential driver of innovations.

The hypothesis, which is tested in this thesis, is basically based on a combination of theories discussed above. The first theory is an incentive theory, and according to this theory the expectation is that stronger IPR will influence trademark, industrial design and patent applications positively. This paper also analyzes effects of the stronger IPR on R&D and FDI as potential drivers of innovation, and the expectation is that R&D and FDI will increase after TRIPS implementation due to the theories discussed above. Thus the hypothesis is as follows: “Accession into WTO in terms of TRIPS implementation should positively influence innovations in terms of IP filings and such drivers of innovations as FDI and R&D.”

## 4. Research question and aims of the study

### 4.1 Aims of the study

The issue of WTO and TRIPS economic consequences for newly entered post Soviet countries is a largely under researched and highly interesting. A study of the implications of WTO membership for some of the post-communist states would be useful as it could give some hints on what to expect from WTO accession in cases of countries who have not yet entered or are have recently entered WTO. This paper will attempt to test the hypothesis formulated above by looking at three different cases of former Eastern bloc countries and China, which recently joined WTO, and on their example try to derive lessons and formulate possible what will happen to Russia as the analysis of Russian indicators is not yet possible because not enough time has passed to analyze the patterns.

Although developed countries actively implement IPR protecting policies, such as TRIPS, IPR infringement is still widespread, especially among developing countries and countries with transitional economies. The case of Russia is especially interesting in this sense, as in the US Trade Representative's latest report, the Russian Federation topped the list as one of the biggest infringing nations, second only to China (Green, 2012). The issue becomes even more vital in light of Russian accession to WTO: how will Russian IPR framework change in light of this event? As Russia joined WTO less than half a year ago, on the 22 of August 2012, this theme is not thoroughly researched, even though there are numerous papers, which contain predictions for Russian policy changes in light of accession to WTO.

The aim of this thesis is to explore how stronger IPR in new WTO members influenced innovations in broad terms. To do so this paper analyzes specific changes in IPR frameworks, which were directly influenced by TRIPS, and examines such indicators as R&D and FDI, as they are the drivers of innovation; and the number of IP filings as a direct indicator of invention. We analyze not only patent applications number as an indicator of innovation, but go further in our analysis and also look at innovation drivers as positive changes in those drivers might be beneficial for innovations in the long run.

The paper attempts to assess some experiences with WTO accession and especially TRIPS implementation in developing countries' innovation framework through descriptive statistics. The countries' under study experience with WTO and strengthened IPRs is still quite short-term which to

a large extent excludes possibilities for a long-term thorough quantitative evaluation of the effects. At the same time it is important to point out that in some cases potential impacts of IPRs are confounded with other changes, such as liberalization of trade regime and certain changes in foreign and domestic policies. The paper therefore focuses on qualitative assessment of the countries' experiences, evaluates IPR implementation, effectiveness of the new IPR frameworks in providing added incentives for the R&D, FDI and patent applications numbers. This study has no ambition to give a thorough and full prediction of what will happen in Russia after joining the WTO. However, this research is an attempt to provide some basis for the widespread argument that WTO membership has a potential to foster innovations and support it with actual evidence. In addition, this study can also be viewed as a suggestion for further research in the fields of WTO, TRIPS and innovations interrelation.

Thus the research question of this paper is as follows: Will membership in WTO in terms of TRIPS foster innovations development in Russian Federation because of increased IPR?

Additional questions and issues under study are:

What changes have occurred in national IPR regimes and what laws have been taken after WTO accession?

Did increased IPR protection in new WTO members (Armenia, Lithuania, Poland and China) lead to increases in FDI, R&D and the number of patent applications?

## 4.2 Implications

Evaluation of the consequences of WTO accession for poorer and less developed countries is an important task. It becomes especially vital in light of popular arguments that WTO in general and TRIPS in particular are more concerned with profits for developed countries and developing states encounter numerous problems when join the organization, especially in terms of IPR. Thus his study aimed to show that stronger IPR is not necessary evil and does not always negatively influence poorer country's economy. Results of this study might be used for assessment of the consequences of WTO accession for developing countries in general and for countries with transitional economies in particular, as many of them are not yet members, like Azerbaijan or Belarus. In general analysis of consequences is important in terms of special policy guidelines formulation and helps derive lessons

for adoption of stronger IPRs in ways that increase their positive impacts on innovations and growth and limit their negative effects.

## 5. Historical background

### 5.1 IPR history

The history of intellectual property rights is long and complex. Industrial revolution led to the emergence and popularization of industrial R&D, which diminished importance of individual inventor. The making of inventions started to require vast resources, which in many cases could only be provided by big industrial corporations. As technological development was accelerating and becoming more important and R&D has become a pricey and lengthy process, protection of inventions was put on agenda. The situation was also complicated by the fact that all nations were on different stages of industrial, scientific and economic development and their IP regimes were to a large extent erratic and untuned. Thus an international harmonization of IP systems was needed and in 1967 a convention establishing the World Intellectual Property Organization (WIPO, 2012) was promulgated by fifty-one governments, which has become an important step in the process of development of common IPR system (Fagerberg, et.al., 2006). TRIPS agreement, taken in 1994 in the framework of WTO, goes even further in harmonizing IPR regimes in member countries and is currently widely discussed by economists and development specialists.

Some claim that it is a very suitable instrument for fine-tuning different IPR systems, but others argue that it favors developed countries neglecting interests of developing nations. For instance, Stiglitz (2008) stated that the main gap between developing and developed countries is knowledge and limiting spread of this knowledge is hindering development of backward countries very much. He especially criticizes the effects of TRIPS on access to life-saving medicines; TRIPS attempted (successfully) to restrict access to generic medicines, putting these drugs out of the financial reach of most in the developing countries.

### 5.2 IPR legislation in Russia

As for the history of IPR legislation transformations in Russia, during the Communist rule recognition of individual rights was low in general, let alone rights on intellectual property. In the industrial sector certificates were given to the industrial inventors. However, these certificates did not

grant any specific rights on the invention: the 1931 regulations abolished the private ownership of intellectual property rights (Green, 2011): the inventor had no right to commercially use his/her invention. Instead he received a nominal compensation and all the rights on the invention went over to the state. The copyright system, on the other hand, established strict political control in the field of creation, dissemination and protection of literary and artistic works in the interest of the socialist community (UN Publications, 2001).

After the collapse of the Soviet Union a newly formed Russian Federation adopted its first democratic constitution in 1993. Between 1994 and 2004, Russia's government enacted a set of laws that would regulate usage and protection of trademarks, copyrights, patents, and even trade secrets (Federal Law 98-FZ of 2004, WIPO). In 2006 Russia has enacted Part IV of the Russian Civil Code, which transformed Russian IPR framework and specified inventors' rights protection and penalties for infringement procedures. The Code can be viewed as an effort of Russia to finally win accession into the WTO and the new legislation framework appeared to satisfy the U.S., which, up until that point, had vigorously opposed Russia's admission into the WTO (Green, 2011). Finally, after 18 years of negotiations, Russian Federation was admitted to WTO in August 2012.

However, WTO membership is not going to become a magical solution for IPR protection problems. The main problem in Russian intellectual property framework has always been not the lack of laws, but the lack of their enforcement, lack of prosecution of the violators, lack of control over spreading pirated goods. Russian Federation still needs to develop domestic laws regarding intellectual property protection of famous foreign trademarks, geographical indications and plant varieties, which are a part of TRIPS agreement. The state also needs to improve criminal procedures and sanctions against copyright violations and ensure effective enforcement of IPR through broader criminal procedures, including stronger penalties for infringement, compensation for the revenue garnered through infringement, civil judicial procedures and remedies, etc. (METI, 2013).

## 6. Related literature

The literature on the effects of IPR on various socio-economic indicators is abundant and covers such topics as IPR and the volume of exports, studied by Ferrantino (1993), who examined how the number of signed Intellectual Property treaties influenced exports in the US; IPR and knowledge spillovers, studied by Samaniego (2013), who based his research on a theory that knowledge spillovers are more likely in countries with weaker IPR regimes; IPR, human rights and their interrelations and intersections, studied by Murumba (2012), and many others. In general IPR system

is an important characteristic which influences numerous aspects of economy and people's lives.

The interrelation of IPR and R&D spending is studied in numerous papers, but the actual relationship is not clear. Samaniego (2013) for example examined state-led R&D investment and found that tight IPR lead to increases in R&D spending; Chuang (2011) focused his studies on business R&D and examined the influence of intellectual property rights (IPRs) protection on the overseas R&D activities of multinational enterprises (MNEs) in emerging economies and found that stronger IPR protection results in more R&D activities. However, Campbell et.al (2012) gives an example of an industry where process R&D is not deterred by a lack of IPR.

As for interrelation IPR and inventions in terms of patent applications, there is much literature based on classic incentive theory, which states that tight IPR create incentives to invent as inventors are granted financial benefits from their inventions. At the same time there are numerous empirical findings on the topic. For instance, a study by Geuna and Rossi (2011) is concerned with academic patenting and its correlation with IPR and finds that there is a certain positive correlation between two indicators. A study of a panel dataset of 70 countries by Kyoung et.al. (2012) also finds that strong patent protection contributes to economic growth and innovations mostly in developed countries whereas developing countries benefit more from specifically adjusted IP regimes: patent protection enhances innovation and economic growth only in countries where the capacity to conduct innovative research already exists.

Many scholars also actively research effects of IPR framework on FDI. Even though there is no clear agreement about the character of the variables' interdependence, most of the scholars seem to be supporting the view that stronger IPR actually lead to higher FDI. For instance, an influential study by Branstetter et.al. (2007) found a clear relationship between strengthening IPR regimes in developing countries and MNE's FDI increases. Javorcik (2004) examined effects of the IPR on the composition of FDI flows in transitional economies and finds that weak protection deters foreign investors in technology-intensive sectors that rely heavily on intellectual property rights. On the other hand, Maskus and Eby-Konan (1994) find no effect of IPR changes on FDI when studying Egyptian economy.

As for the specific case of Russian accession to the WTO, academic literature on this topic is almost non-existent due to the recent character of the event. Most of the existing articles are concerned with the problems of trade, trade barriers and exports and impacts of the WTO accession on the agriculture, like in a paper by Leifert (2011). Most of the authors writing about Russian Federation



and the WTO focus on the long road of Russia towards the accession to WTO instead of the consequences of Russia's membership, such as Broadman's (2004) paper which elaborates on numerous reforms which Russia has implemented in order to fit into the WTO legal framework, including reforms to increase market competition, increase FDI flows, etc. Shadikhodjaev's (2010), Sabelnikov's (1996) and Aslund's paper (2003) are also concerned with the steps which Russia took to bring its domestic legislation in line with WTO standards and agreements. Some scholars focus on obstacles to Russia's WTO accession, such as Katz and Ocheltree paper on poor IPR protection in Russian Federation (2006).

Thus the topic of innovations in Russian Federation is underrepresented in academic literature but is widely discussed in Russian media. For instance, an leading Russian politician, the head of the Russian Nanotechnology Corporation, stated that accession to the WTO will lead to the increase of the production volume in nano technological innovation sector up to 7.8% (RiaNovosti, 2011). Another Russian politician, speaker of the Russian State Duma, Boris Gryzlov stated that Russian accession to the WTO accession can give Russia's economy an impulse and reduce the discrimination Russia is facing on an international market (webpolitician.ru, 2011) and Lichachev, the member of Russian leading party, stated that joining the WTO will show the rest of the world that Russia is a reliable and internationally acknowledged partner which will lead to higher international cooperation and inflow of investments (webpolitician.ru, 2011).

On the other hand, the topic of IPR infringement and protection in Russia is covered in many papers, which is logical with Russia being the second largest IPR violator in the world. Such sources as BASCAP report 2012 on promotion and protection of IPR in Russian Federation or a resolution from the US National IPR Coordination Center (2009) lists Russia as one of the main offenders of IPR, especially when it comes to content piracy. Despite noting some progress, the United States Trade Representative continued to place Russia on its 2011 Priority Watch List due to ongoing concerns, particularly with respect to privacy over the Internet and enforcement generally. Some authors have discussed IPR in the framework of prospects of investments in Russia, including various aspects of Russian legal framework for patent and trademark protection, such as Feiler and Garese (2007) in their book on investing in Eastern European countries.

When discussing IPR infringement, Russia is often compared to China, as they share many socio-economic characteristics. For instance, Green's (2012) article elaborates on implications of Russia joining WTO and compares it to China, and Lane's (2012) paper is dedicated to the reforms in the IPR framework which occurred in Russia in light of WTO accession and examine whether Chinese

failure to secure IPR will be replicated in the case of Russia. China also seems to be the country examined the most in relation to WTO accession: there are papers numerous papers on how WTO influenced FDI inflows in China, like articles by Walmsey et. al. (2006), who found that investment and capital stocks increase substantially as a result of China's WTO membership; or by Hong (2008), which purpose is to investigate the location determinants of foreign direct investment (FDI) and examine the impact of WTO accession.

Consequences of the WTO accession in terms of innovation for other states examined in this paper, Armenia, Lithuania and Poland are almost not covered by academic papers in English and are mostly limited to short overviews instead of in-depth analyses. An example of this is a short introduction by Kiskis (2006), where he briefly outlines the main expected consequences of Lithuanian WTO accession. There are more articles in Russian, which, however, also lack coherency and empirical evidence and are more of an explanatory character, such as an article by Uspenskaya-Rantsane (2006) dedicated to the FDI flows to Lithuania since the collapse of the USSR. Papers by Gundersen and Lindner (2002) and CSIS organization (2006) discuss IPR changes in Poland with its adoption of TRIPS in detail – however, the study from 2002 it to a large extend outdated already and neither of them devote adequate attention to innovations.

## 7. Research methodology

### 7.1 Research design

This paper is going to use a deductive research approach, thus the study will go through five main stages (Saunders et al, 2007). First, it is deducing a hypothesis, which is “Accession into WTO in terms of TRIPS implementation should positively influence innovations in terms of IP filings and such drivers of innovations as FDI and R&D.” The hypothesis was deduced from several IP-related theories discussed in a theoretical framework section. Second stage is to express the hypothesis in operational terms, indicating exactly how the concepts or variables are to be measured. The following variables were chosen: number of patent, trademark and industrial design applications as indicators of actual innovations, the amount of FDI and R&D as drivers of innovation, and the number of important IP laws and regulations adopted after the accession to WTO, indicating changes in IPR protection framework in new member countries. In addition, the paper scrutinizes specific changes in the legislation, which were adopted in order to comply with TRIPS. Laws which are examined are

chosen on the basis of TRIPS requirements: member states are obliged to provide and ensure copyrights and related rights protection, including protection of industrial designs, geographical indications, patents, trademarks and new plant varieties. Thus this paper focuses on the laws and amendments to laws concerning the above-mentioned IP types. For the case of Poland two additional indicators are analyzed: FDI by industry and business enterprise R&D by industry. This is done to study the interrelations of the indicators closer and check whether FDI and R&D increased specifically in technology- and knowledge-intensive industries.

Stage three includes testing of the hypothesis, which will be done through an examination of four cases of countries, which possess some similar characteristics with Russia. I chose two such as post-Soviet countries (Lithuania and Armenia), a country which belonged to the Eastern bloc and was very much influenced by the USSR (Poland), and China, which is often compared to Russia in various respects, for instance in terms of widespread IPR infringement, the size, and similar Communist past. In a stage four I will examine the outcomes of the inquiry and see if the hypothesis is valid and if the results comply with the chosen theories. Finally, based on the results of the study I will attempt to derive some lessons for Russia and make some general predictions about its future in terms of innovations after WTO accession.

The research is of explanatory character as the aim is to study a situation or a problem in order to explain the relationships between variables (Saunders et al, 2007). I am studying an actual situation: accession of a country with transitional economy to WTO in order to find out and explain the relationships between IPR protection and increase of innovations. This research is a multiple case study as the present paper involves an empirical investigation of a particular contemporary phenomenon within its real life context, thus it is important to use multiple sources of evidence (Saunders et al, 2007). The reason for using multiple cases also stems from the need to examine whether the findings of the first case occur in other cases and, as a consequence, increase ability to generalize and claim that if your findings are true in these multiple cases studied they will be more likely true for all similar cases. For this reason Yin (2003 cited in Saunders et al, 2007) argues that multiple case studies may be preferable to a single case study and that, where one chooses to use a single case study, he/her will need to have a strong justification for this choice.

## 7.2 Data collection

This paper is going to analyze two types of compiled secondary data: quantitative indicators from

public data bases (WIPO and OECD databases) and qualitative documentary data in form of academic papers, reports, interviews, journal articles and other written materials with previous research of the topic of interest, thus quantitative and qualitative data will be combined. However, even though part of the data is quantitative, I will qualitize it, that is convert it into narrative that can be analyzed qualitatively (Saunders et al, 2007). In addition, I am after the representation of data and trends, which can be observed over time, and the aim is to see if there has been any change and development in long period perspective, which makes this research longitudinal. The time frame of the study is approximately 15 years, including several years before WTO accession (if possible) and up until present – this period should be enough to see the patterns if they are there.

First type of the data I am going to use is archival data, as archival research strategy allows research questions, which focus upon the past and changes over time. I am going to use indicators from public databases, such as WIPO, OECD (OECD.stat) and World Bank (World Development Indicators) databases. Four quantitative indicators will be used: volume of inward FDI received by the studied country, R&D expenditure in percentage of GDP made by this country and number of patent, trademark and industrial designs applications. The fourth indicator is created on a basis of the data on the National IP legislation found in WIPO database, which traces all IP-related laws and regulations applied in a given country. This indicator shows the number of IP-related laws and acts taken each year in a given state. Its aim is to trace the steps in IPR transformation under the WTO membership, reflect the intensity of IPR-related activities per year and to some extent reveal the state's interest and concern in IPR protection.

The choice of indicators is caused by the studied topic: the aim is to observe the changes in innovations in a broader perspective, thus I take IP filings as a direct indicator of innovation and invention, and FDI with R&D as potential drivers of innovation, which can improve innovation performance in the long run.

Second type of data I am going to use is the previous research on the given countries. Some aspects of changes and development which occurred in the countries under study can hardly be grasped through bold numbers, thus an inquiry in more detailed research of each of the countries will be useful for this research. The amount of academic papers about the chosen countries is unfortunately limited. However, there are much more papers in Russian than in English thus here I have an advantage being a native speaker. Even though papers on the topic of consequences of WTO accession, TRIPS agreement implementation and IPR in general for all the chosen states except China are not abundant, the amount is enough to get the information and the insight which is needed

to observe the change over time.

I chose to use secondary data for many reasons. First of all, for the present research large data sets are needed which can only be collected and processed by large organizations. This study is of a longitudinal character, which requires datasets from different years for a long period of time, and secondary data is the only possibility for this kind of research. It also has an advantage of permanence, meaning that unlike data I would collect myself, secondary data source I am using is permanent and available in form that may be checked easily by others (Denscombe, 1998 cited in *Sunders et al*, 2007). However, the fact that I am using secondary data also implies some limitations. Some indicators, which are needed for specific countries for specific years, are lacking or not included in the publicly available datasets.

The choice of the country cases in a study of this character, where the results are meant to be generalized and applied for a similar case to predict the consequences of a certain event. I chose to take two post-Soviet countries (Lithuania and Armenia), one former Eastern bloc country (Poland) and China. All of these countries have joined the WTO relatively recently and have some common grounds with Russia. With former Soviet states it is quite clear: they used to be a part of the Soviet Union, which makes their socio-economic setting and stages of development very close. Poland, even though part of the Eastern bloc, made a faster transition towards more Western-oriented and Western-friendly economy, which makes it an interesting case to look at. Finally, China has several common characteristics with Russia, such as abundant land and labor, communist past, transitional character of economy, high rates of IPR infringement, etc. In general, all of these countries are transitional economies as they are, or have recently gone through, the transition from centrally-planned economy to market-led economy.

## 8. Data analysis: country cases.

This section examines four cases of countries, which have recently joined the WTO: Lithuania, Poland, Armenia and China. First I analyze changes in legislation, then FDI and R&D and finally look at the transformations in innovation volume. In the course of analysis I found that IPR protection has actually increased at least de-jure in all the examined countries, including laws on copyrights, patent and trademarks protection, which were taken as a consequence of WTO accession. In addition, TRIPS implementation seems to have had a positive influence on all studied indicators,

except R&D, where no specific changes have been traced.

## 8.1 Lithuania

WTO membership negotiations for Lithuania started in 1994, in 1995 Lithuania became a WTO observer, which means it could follow discussions on matters of direct interest (WTO, 2013). It became a member of WTO in 2001. Membership in WTO in Lithuania encouraged legal reforms, including positive developments in IPR protection, helped recovery from the Russian economic crisis of 1998-1999 and made Lithuania more reliable and attractive as a business partner and a place for investments. Now I am going to look at these assertions more closely and assess whether WTO accession really was so beneficial and brought these changes. To start with, I will analyze actual changes in IPR framework.

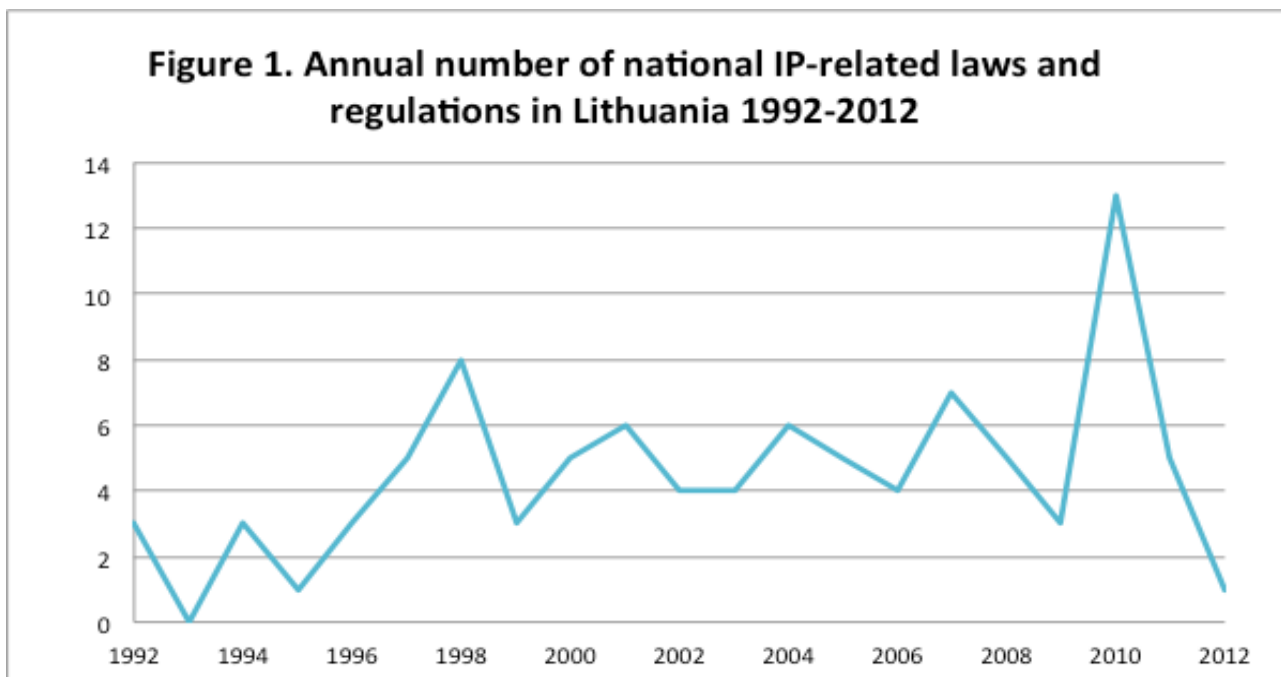
Starting from the year 1994, when Lithuania has applied for WTO membership, there has been a considerable increase in attention towards IPR laws: in 1994 it has adopted such important international IPR conventions as Paris and Berne Conventions. An explanation for this peak of IP-related activity is probably that Lithuania was a newly formed country and lacked detailed legislation in general.

In 2001 Lithuania implemented TRIPS agreement. As a former Soviet state in the process of transformation from a centrally-planned into a market, free-enterprise economy, which is undertaking structural reform of its intellectual property system and facing special problems in the preparation and implementation of intellectual property laws and regulations, Lithuania got period of delay of four years (WTO, 2013).

One of the steps of Lithuania towards harmonization of its IPR framework with WTO requirements was establishment of the Strategy for the Protection of Copyright and Related Rights in 2000. The main goal of the Strategy was to develop further the system for the implementation and protection of copyright and related rights, having regard to the needs and international obligations of Lithuania, and co-ordinate activities of public administration institutions in this field, as well as actions of law enforcement institutions and associations of holders of copyright and related rights. (Jucevicius, Kriaucioniene, 2006)

As Lithuania got some postponement for TRIPS implementation, the main laws in IP area were not

adopted strictly in 2001 or before: instead, the process of IP harmonization expanded to 2006-2010. The law on legal protection of trademarks was adopted in 2000 and amended in 2006. Amendment further specified legal definition of trademarks and well-known trademarks and identified application procedures. The law on patents was improved with an important amendment in 2007. This amendment clarified what patentable invention is and what are the criteria and specified guidelines for patent applications. More importantly, it included enforcement procedures and penalties for infringement and patent rights violations. Industrial designs protection was first protected by the law in 2002 and was amended in 2008. The aim of the amendment was to further harmonize Lithuanian IP legislation with TRIPS and it provided some further details on industrial design application and examination procedures.

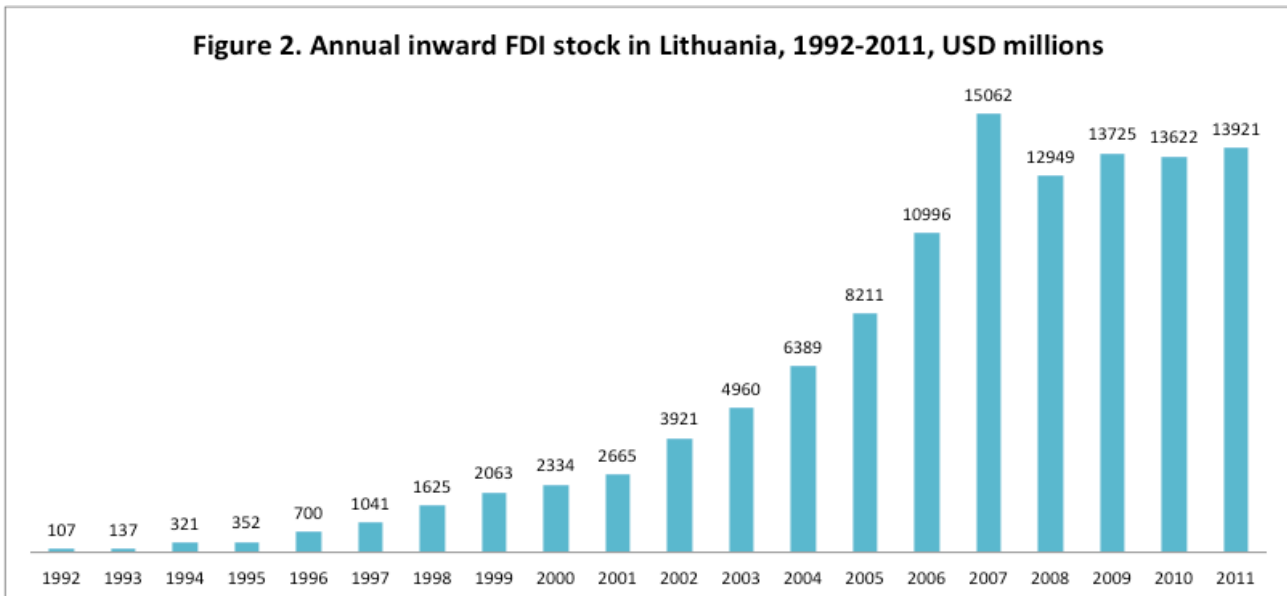


Source: WIPO statistics, 2012

Thus Lithuanian IPR system has improved significantly after TRIPS implementation. Lithuanian achievements are especially impressive because its whole IPR system had to be built virtually from zero.

However, despite the wide range of measures undertaken in this direction, IP protection situation in the country is still imperfect. 66 % of respondents to the Opinion Survey, carried out by Kiskis in 2007 expressed opinion that there is insufficient information and state support for IPR protection in business. In addition, some spheres of intellectual property remain unprotected, such as internet-specific intellectual property. Some also criticize Lithuanian IP regime for the lack of practical enforcement of the laws and low prosecution of IPR violations.

In spite of these imperfections, overall picture has improved greatly, which is expected to have a positive influence on FDI, examined further.

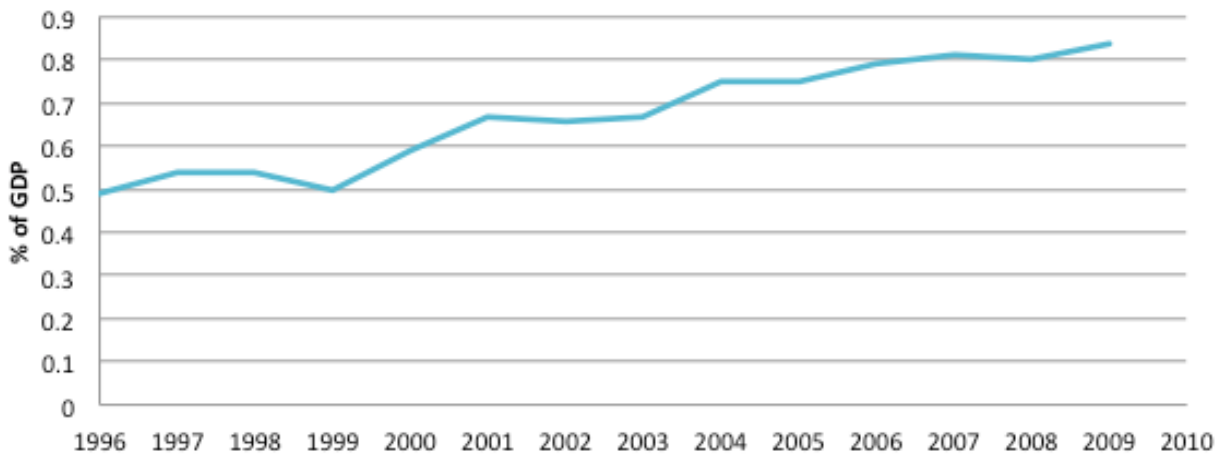


Source: UNSTAD statistics, 2011

After 2001 the volume of FDI has increased and its annual growth accelerated considerably. If before 2001 yearly increase of FDI was not exceeding 300 million every year – and this figure was the same for around five years – after 2001 yearly increase of FDI has instantly become 1500 million per year and increasing. Even though it went down during the global economic crisis in 2007-2008, positive influence of the WTO accession is quite visible from this statistics. There is also a peak of inward FDI in 2006, which might have been a consequence of the legal enforcement of trademarks, which was adopted in the same year, and regulated protection of well-known foreign trademarks. A positive influence of other adopted IP laws is hard to trace as the time of their adoption coincides with global economic crisis of 2008, which negatively affected FDI.



**Figure 3. Annual R&D expenditure in Lithuania, % of GDP, 1996-2010**



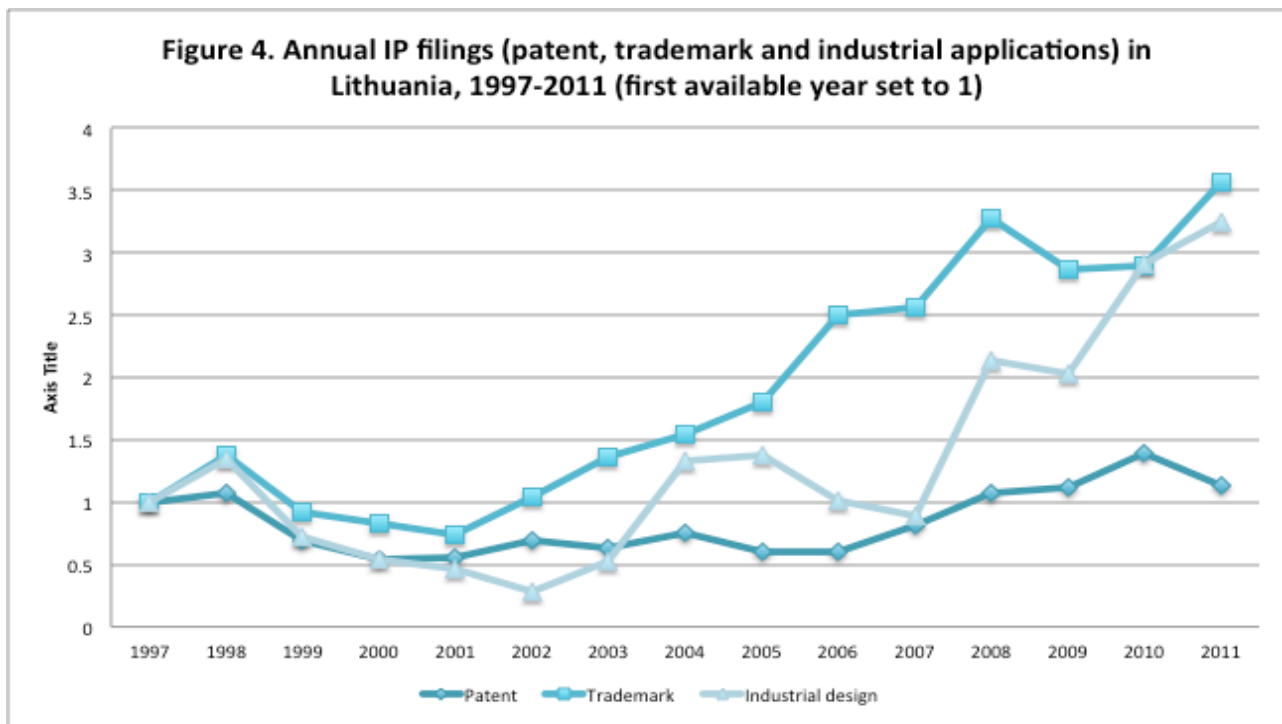
Source: The World Bank Development Indicators, 2012

R&D figures are also expected to go up in connection with numerous IP protection laws and amendments taken in Lithuania after 2005.

R&D expenditure has been steadily growing with some plateaus (2001-2003) and increases (1999-2001). However, even by 2010 it is still very small in comparison with EU average which today composes 2 percent of GDP (Jucevicius, Kriaucioniene, 2006) In general, there is no evidence that a slight increase in R&D expenditure over time is correlated with IPR laws and TRIPS implementation. It is peculiar however that the main increase in R&D activity occurred in 1999 when many important IP laws were nonexistent. This to a large extent supports the argument of Campbell (2012) who claimed that strong IPRs are not necessary for R&D activity.

Finally, it is important to observe how all the above factors influenced innovations. As for FDI increases, the statistics corresponds to the theory: it has been growing since WTO accession and some dynamics of FDI growth can be related to changes in IP legislation. However, there is no direct evidence that R&D expenditures have been somehow influenced by WTO and higher IPR protection.

Note: for trademark and industrial design only filings by applicants from Lithuania (resident + abroad applications) are counted. Gross Domestic Product is measured in billion US dollars in constant 2005 prices



Source: WIPO statistical database, 2012

Trademark applications started to increase right after the WTO accession, in 2001, which can be connected with increased trade and more opportunities for business. In addition, a law on trademark protection was adopted in October 2000, thus an increase starting in 2001 might have been triggered by this regulation. In addition, a sharp increase of trademark applications in 2007 could have also been influenced by the 2006 amendment, which clarified application process for the inventors.

The number of patent application was stably low until 2006 and starting from 2007 the number of patents has been growing. Here a correlation with 2007 amendment to the patent law can be traced. The number of industrial design applications has also been growing fast since the industrial design protection law in 2002. Interestingly enough, the number of IP filings of all kinds in Lithuania kept rising during the recession when in the rest of the world it was falling due to economic crisis, which means a country has a strong innovating potential (Jucevicius, 2006) and probably there are many individual innovators, who are not that sensitive to economic shocks.

In general a review of the Lithuanian IPR legislation changes shows that the regulation of IP enforcement in Lithuania is modern and complies with international norms and standards. Case law

in the administrative and civil judiciary also suggests fairly effective enforcement systems, where most of the problematic issues have been sorted out in the 2001- 2005 period (Kiskis, 2007). In general, the changes, which occurred in Lithuanian IPR legislation, have been quite big and TRIPS has obviously played an important role in these transformations.

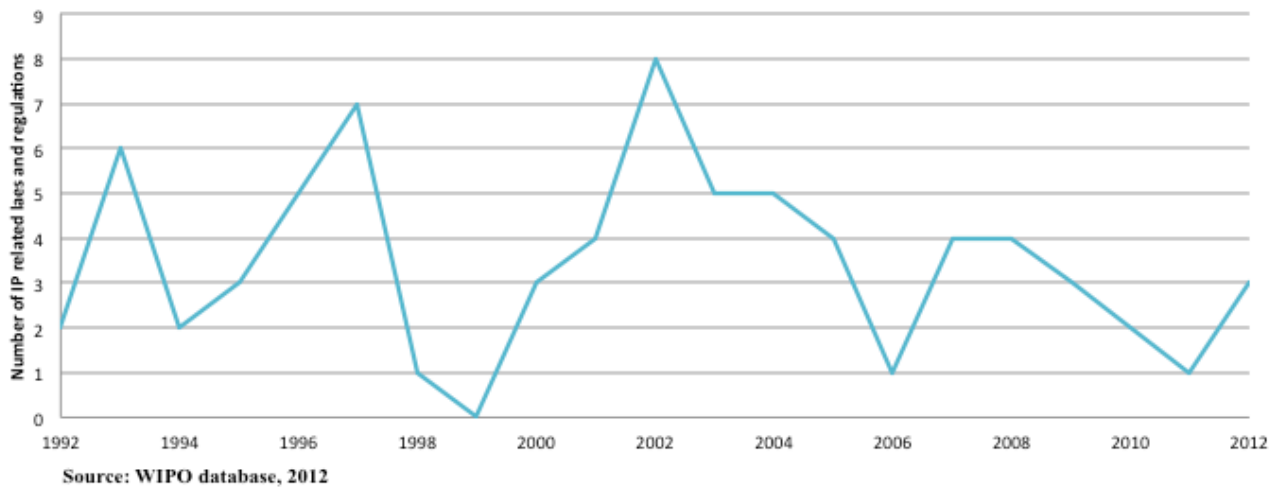
To conclude, from our data it is visible that TRIPS implementation has brought about considerable changes in IPR framework in Lithuania. These changes have also to some extent positively influenced FDI volumes and have especially affected numbers of trademark, patent and industrial design applications, which corresponds to the theories and hypothesis I used. However, if R&D spending has been anyhow influenced by stronger IPR is still under question.

## 8. 2 Poland

Poland has become a member of WTO in 1995, entered NATO in 1999 and joined the EU in 2004, which shows that nowadays it is to a large extent Western-oriented. Today it is a rapidly developing economy, sixth largest in the EU, and is considered to have the strongest economy of all eastern European nations, with an annual economic growth rate of over 6.0% (Ram, 2007).

An especially sharp increase in IPR related laws and regulations occurred from 1994 and 1999. The increase, which started in 1994 and accelerated in 1995, most likely has a relation to WTO as Poland has applied for the membership in a year 1995 and was striving towards harmonization of its IPR framework with TRIPS requirements, which involved numerous changes and improvements in legislation. Poland signed TRIPS agreement in 1995, which came into force in 2000 after a postponement of four years. This led to multiple changes in its IPR framework: the activities which were required to bring Poland's Copyright Act in compliance with the TRIPS Agreement included a number of amendments to other provisions of the copyright law, like the Act of 9 June 2000 to revise the Act on Copyright and Neighbouring Rights, which came in force on the 22<sup>nd</sup> of July 2000 (Gundersen, Linden, 2002). This amendment led to higher protection of the computer programs, audio files, videograms, television programs and artistic performances; and provided a specified punishment framework in terms of imprisonment duration for various IP violations.

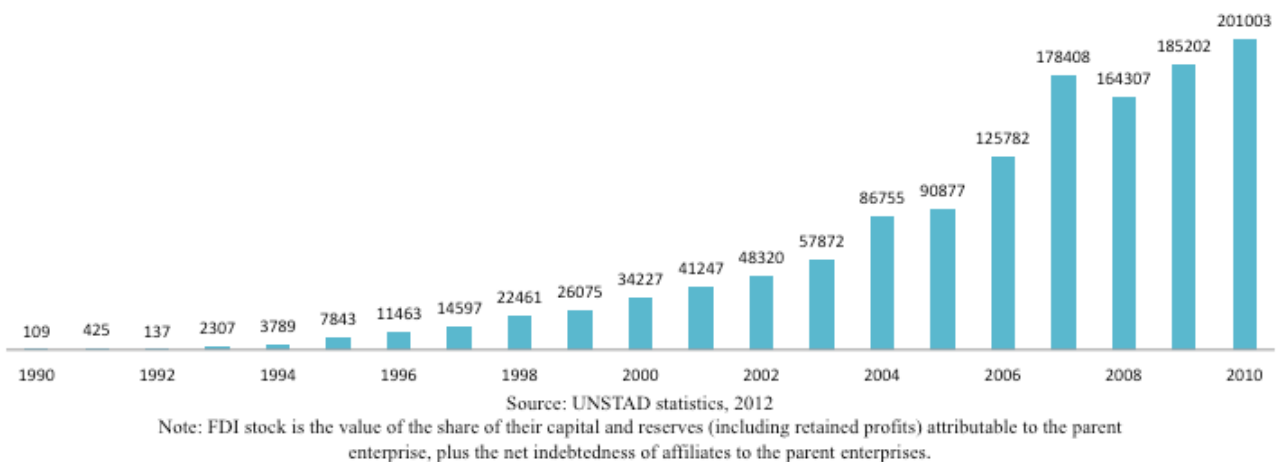
**Figure 5. Annual number of national IP-related laws and regulations in Poland 1992-2012**



Source: WIPO database, 2012

Some additional laws were taken later on, like a law on a legal protection of plant varieties, adopted in 2007, which protects breeders' rights on a genotype or a combination of genotypes of a plant they bred. The law on Industrial Property protection was adopted in 2000 and regulated relationships in the field of inventions, utility models, industrial design, trademarks, integrated circuits, etc. (WIPO, 2013). It was amended in 2004, and the amendment regulated patent application and examination procedures, specifies inventor's rights on the invention and definitions of invention, enforces these rights' protection, etc.

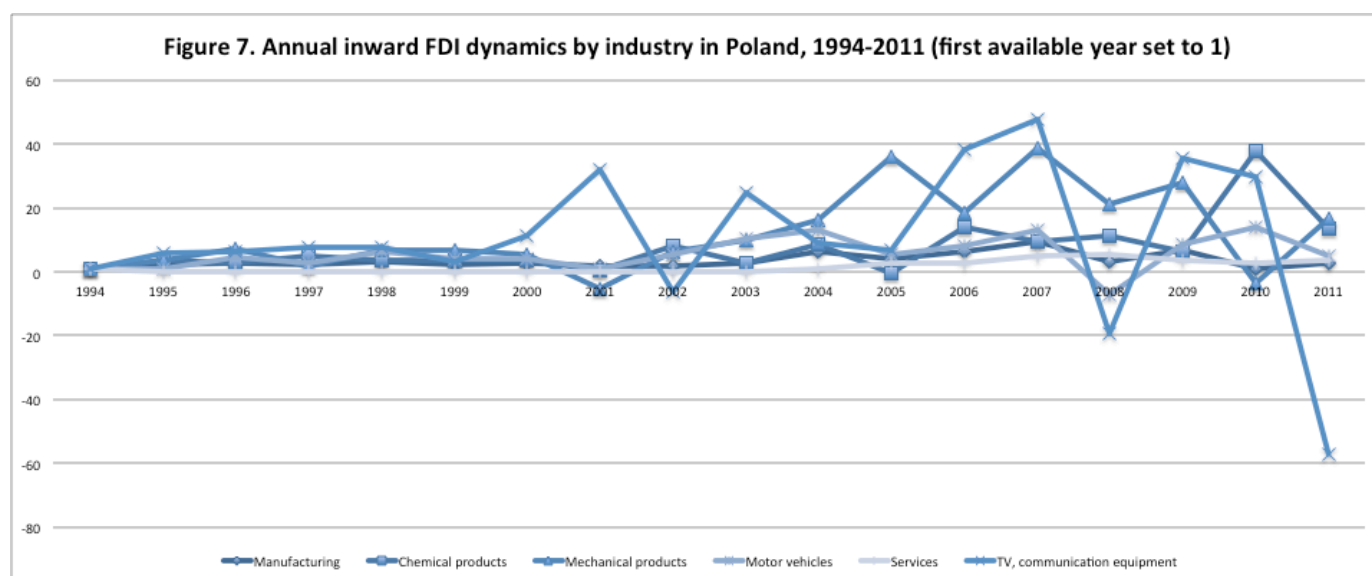
**Figure 6. FDI (US Dollars at current prices and exchange rates in millions)**



With accession to WTO Poland has not only transformed its IPR regime, but also has liberalized and re-orientated its trade flows towards more developed countries. This gave rise to high-technology imports from the West, as well as encouraged one of the biggest FDI inflows in the region (Saland, 2011). Thus it is important to note that increases in FDI were caused not only by increase of IPR protection, but also by a plethora of other factors.

FDI growth in Poland has been very steady since approximately 1994, with a leap from 2003 to 2004, which could be foreign capital starting to flow into the country in larger amounts as a response to expected EU accession, with a sharp increase starting from 2005. Even if WTO accession has positively influenced FDI inflows, it is not very visible on the graph. Probably foreign investment has been increasing, as Poland was becoming more and more opened and West-oriented, and WTO just slightly fostered this process.

The following chart shows FDI inflows by industry:



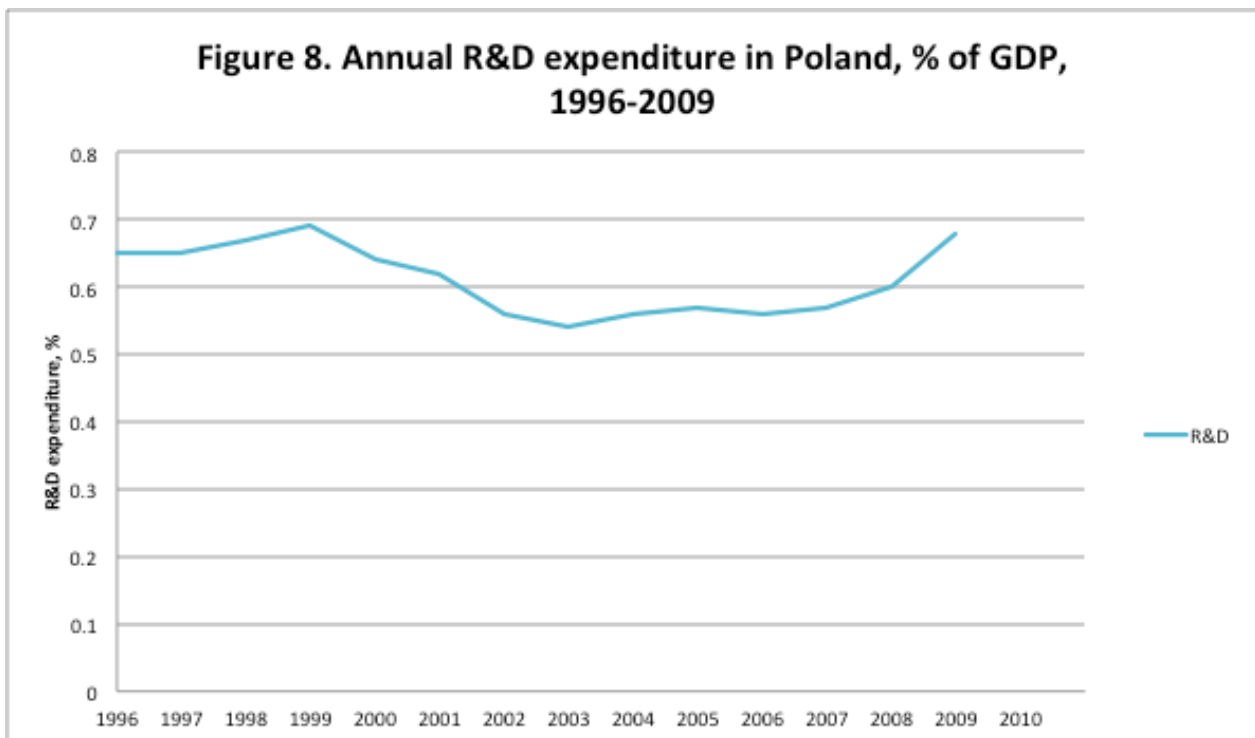
Source: OECD.stat, 2013

The choice of industries is simple: manufacturing in general and mechanical products, chemical products, communications equipment in particular are regarded to be highly human capital intensive and have a high potential for innovations. These branches and motor vehicle branch tend to be the most R&D intensive in developed countries (Jakubiak, 2002), thus they are of a particular interest the present study.

FDI volumes were to a large extent stagnating during the 1990s with negligent increases in motor

vehicles branch: this can be explained by low quality of IPR framework at the beginning of the 1990s on the one hand and by Russian crisis of 1998: the economic crisis in Russian Federation caused panic and fear that crisis will hit Poland too and investors immediately withdrew 1 billion dollars of short-term FDI from Polish assets (Prihodko, 1998). Drops in FDI in several branches like mechanical products, motor vehicles and manufacturing in general in 2007-2009 can also be explained by global economic recession and economic crisis in EU in particular. However, there have been spectacular increases of FDI in some industries in early 2000s: TV and communications branch FDI started growing fast in a year 2000 and numerous industrial branches such as motor vehicles, mechanical products and to a lesser extent chemical products in 2001. Acceleration of investment in Polish industry, which occurred around 2000 can be connected with a law on Industrial Property, adopted in 2000, which was discussed above and was a part of TRIPS adoption. A sharp increase in FDI in telecommunications is most likely connected with copyright law accepted in 2000, which specifically ensured protection of teleprograms.

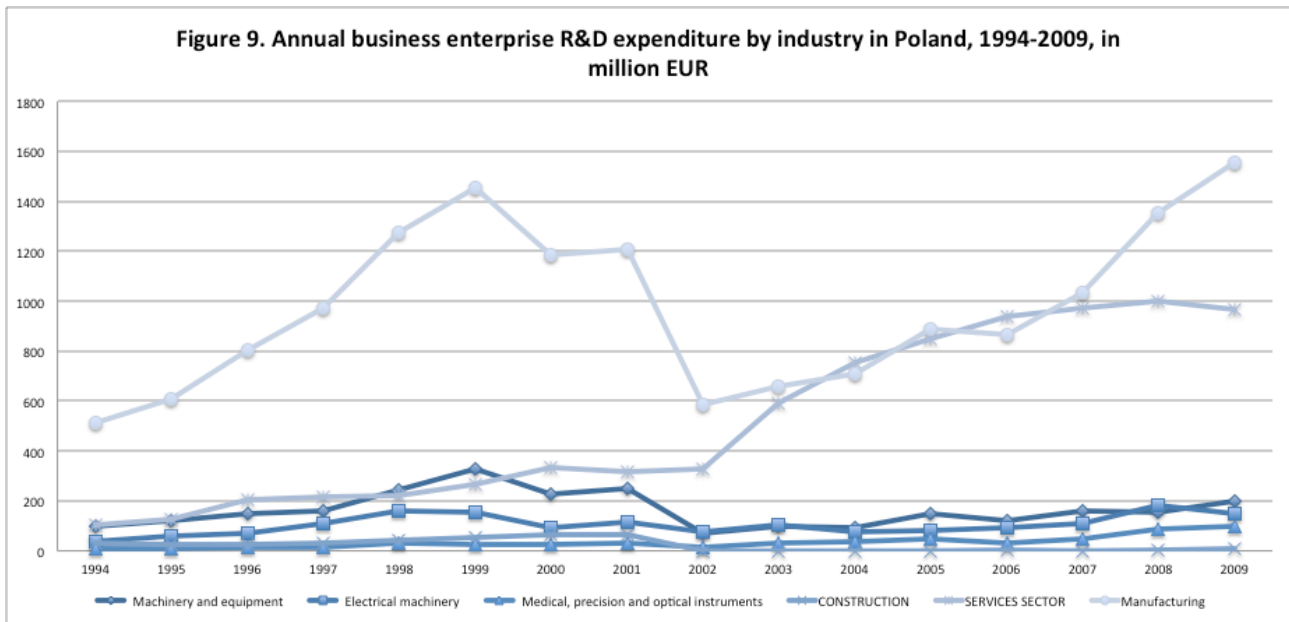
Increase of FDI volumes in industrial knowledge-intensive industries has some connection with IPR framework improvements. If we assume that foreign investment determines state's access to new technologies and capital, which fosters transfer and creation of innovation, R&D expenditure figures in industrial subdivisions is expected to grow.



Source: OECD.stat, 2013

R&D spending in Poland are very low in comparison with Europe's average (2%) and even with other Eastern European states, like Slovenia (1.86 in 2009) and Estonia (1.62 in 2009). Since 1999, a

year of Russian economic crisis, R&D expenditure has been steadily going down with a recovery starting around 2003 and a sharper upswing starting from around 2007, when Poland entered Schengen, thus an increase this year might have to some extent been driven by increased competition brought about by entering then Schengen zone. However, influence of WTO or TRIPS cannot be traced yet.

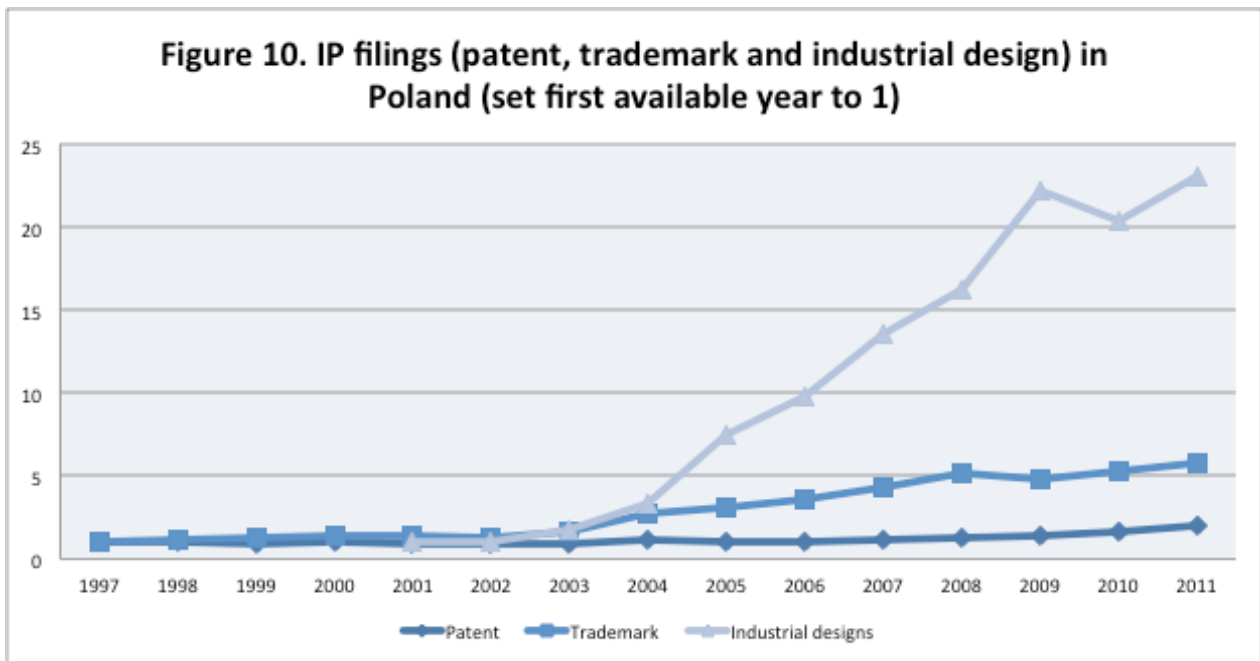


Source: OECD.stat, 2012

In order to see whether R&D investments were focused on technology- and knowledge-intensive industries, which foster technological patents and inventions the most, or service sector, which emphasizes process and service innovations it is important to look at the distribution of R&D investment by industry in business sector and changes connected with this indicator. Business enterprise R&D investment distribution is also important to look at because FDI made by foreign MNEs go to business sector of the receiving country, thus the indicator I am observing might have been influenced by positive changes in FDI focused on R&D.

R&D expenditures on manufacturing sector have been growing fast from 1994, with a downturn in 1999, which was probably connected with economic problems in Russia discussed above. However, from 2002 growth continues, which means that R&D expenditures in technology-intensive sectors are growing continuously. According to Jakubiak's study (2002) in 1999 R&D intensity was especially visible in branches which are regarded to be knowledge and capital intensive and closely linked to technological inventions such as electrical machinery (2.95%), motor vehicles (1.82%), pharmaceuticals (2.95%), which is still the case: even though R&D expenditure remains quite low, there is some growth in electrical machinery and medical instruments. Service sector has started to gain importance in 2002 as Poland started a transformation towards modern service-driven model of

economy and today manufacturing and service sector are the most rapidly developing sectors in Polish economy.



Source: WIPO database, 2012

Growth in the number of patent applications increased very slightly only in 2010, which is understandable, taking into the account late acceptance of the patent protection law. The most notable increase in patent applications occurred in 2008-2009, years when most European countries saw a drop in application numbers, and worldwide applications fell 3.1% (Article One, 2011) and the number of applications continues to rise. Industrial design applications started to go up in 2004, which is most likely connected with the 2004 amendment to the industrial property law, which specified and to some extent simplified application procedures and enforced legal punishment for infringement. Thus though some scholars, notably Blazyca (2001) stated that Poland was incapable of indigenous innovation back in 2001, now situation seems to be improving.

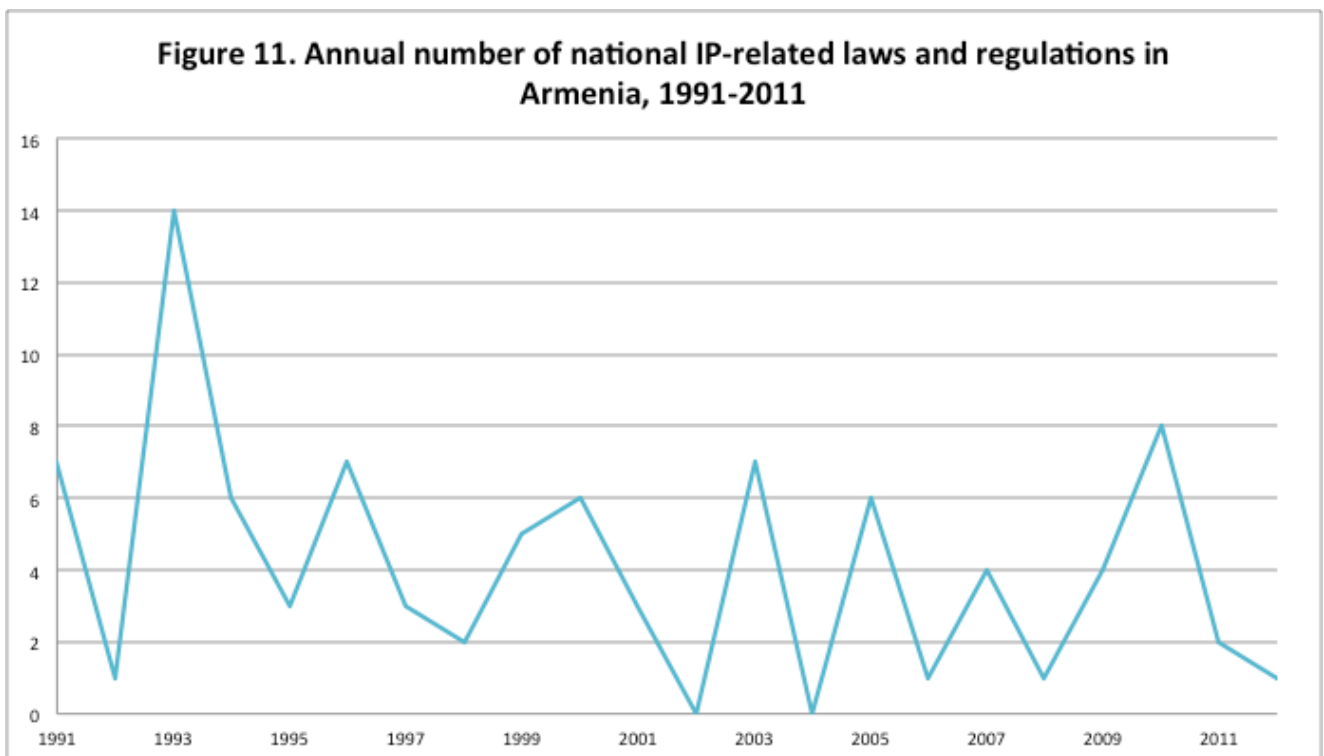
To conclude, IPR framework in Poland has considerably changed after implementation of TRIPS: new laws were taken and old ones amended, as the hypothesis predicted, led to higher FDI, especially in technology-intensive sectors. As for R&D, even though its numbers are low in comparison with the region average, there are some positive changes in technology- and knowledge-intensive industries like electrical machinery and pharmaceuticals. IP filings also show positive links with specific laws implemented within the TRIPS framework.



### 8.3 Armenia

Armenia applied for GATT (former WTO) membership status in 1993 and joined WTO only in 2003. Former Soviet central planning economy has not transformed into market economy as fast as it happened in previously discussed countries, which negatively influenced its economic growth. As it was discussed before, USSR lacked any consistent IPR framework, thus just like any other post-Soviet republic a newly formed Armenia was left with no IPR enforcing laws.

WTO accession has smoothed the challenges with intellectual property rights protection as it gave Armenia incentives to upgrade its IP laws and needed guidelines and frameworks, which resulted in more IP-related regulations applied. The highest number of laws in this field were taken in 1993, which is predictable as the state was only starting to form and shape its legislation framework, thus there was a need for numerous laws to be taken.



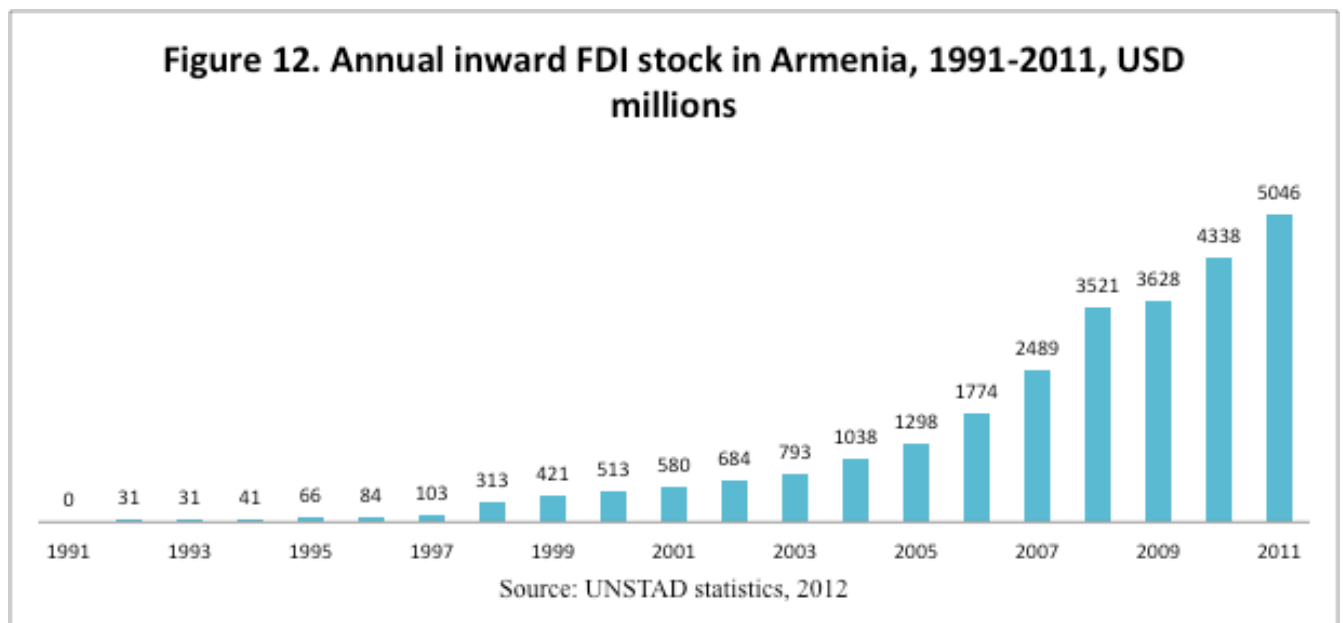
Source: WIPO database, 2012

Armenia accessed WTO in 2003 and simultaneously signed TRIPS agreement. The positive influence of TRIPS can be traced in the dynamics of the major IP protection laws taken in Armenia. A 2010 law on trademarks specified rules of filing trademark applications and their examination, set rules of prolonging the terms of registrations, and enforced their protection. The law on inventions, utility models and industrial design was adopted in 2008 and regulates the property and non-property personal relationships connected with the creation, legal protection and utilization of utility models,

industrial designs and inventions. One more highly important IP law was adopted in 2006 and regulates the relations connected with creation and use of works of science, literature and arts (copyright), performances, phonograms, programs of broadcasting organizations (neighboring rights) (WIPO, 2013). Thus most of the key regulations in the sphere of IPR were taken under an influence of TRIPS, signed in 2003.

However, in spite of numerous successes of Armenian government in terms of IPR enforcement, there are still some gaps in IPR legislation. For instance, it needs legislative-related improvements on registration and maintenance of IPR rights, including pharmaceutical data protection, IPR enforcement actions regarding legislation, institutional reform and multiple awareness-raising actions, such as seminars, dissemination of brochures, trainings, etc (Calles-Sanchez, 2010).

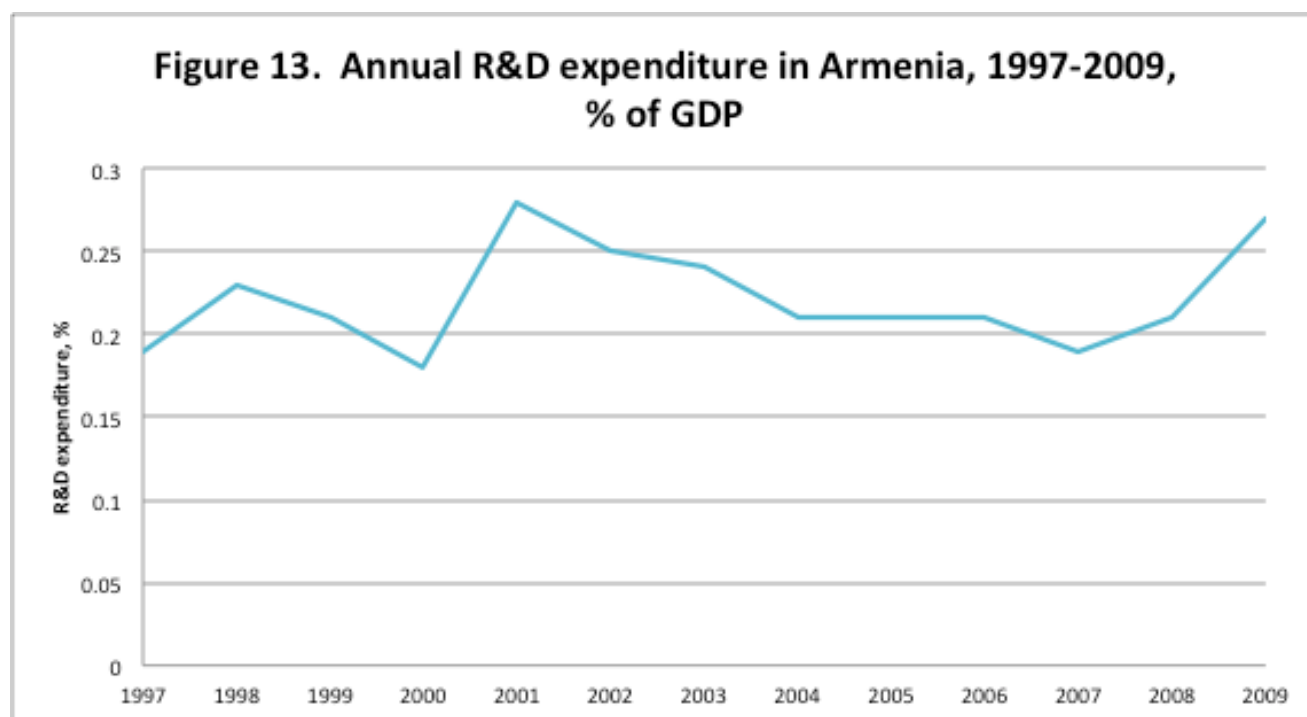
Thus if the IPR have been getting stronger since TRIPS adoption, FDI is expected to increase as well. The FDI volumes were growing steadily from 1995 to 2003, and from the year 2003 the curve is taking a sharper upward turn and FDI starts to grow much faster, increasing sharply and even a global economic recession of 2008 does not influence a positive dynamic. An upward turn corresponds to the year Armenia entered WTO, thus it is most likely connected with this event. The reason for higher volumes of FDI might be numerous: it can be more recognition and trust from the Western investors and liberalization of trade, which came with the membership in WTO, or it could be an influence of stronger IPR ensured by TRIPS and led to investors being more confident in Armenia as investment target - most likely it has been a combination of these factors.



Source: World Development Indicators, 2012

It is peculiar though that the effect of WTO accession on FDI is more visible for Armenia than for the previous states probably because of lower initial FDI volumes in Armenia: before WTO membership annual FDI was around 600 millions USD and for Lithuania and Poland it was around 3500 USD (a year before WTO accession). Low levels of FDI in Armenia might have been a consequence of several factors: for Armenia it was harder to join international trade due to longer transition from Soviet economy on the one hand and because of geographical positioning on the other hand - Europeans are more likely to be more cautious when it comes to investing in an unknown country in the far East. In addition, both Lithuania and Poland are more economically successful countries: GDP per capita in both countries in 2003 was several times higher than in Armenia (World Development Indicators, 2013).

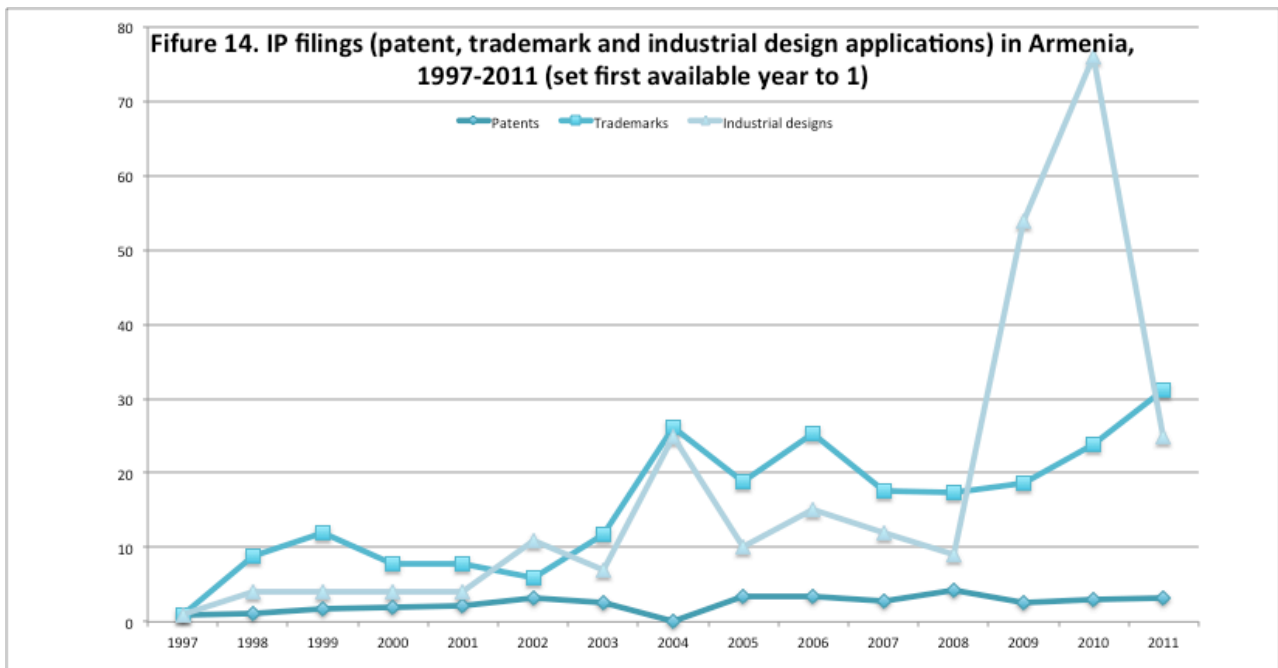
Thus inward FDI volumes in Armenia actually increased after WTO accession and TRIPS agreement adoption. In theory the incentives to invest in R&D should have increased as well due to higher IPR protection. However, it seems not to be the case.



Source: World Bank Development Indicators, 2012

R&D expenditure in Armenia is extremely low and cannot even be compared in volumes to average European spending. Even taking into the account a substantial relative increase of this indicator, the spendings constitute merely 0.27% of GDP. In general, after a short improvement in 2001, R&D investment figures have been falling steadily. Probably quite unfavorable economic conditions resulted in the choices to spend GDP on more vital and short-term projects and needs. As R&D

expenditure figures go up from 2007 could be a sign that the state starts to realize how important innovations are for economic growth and participation in international trade.



Source: WIPO database, 2012

Right after Armenia joined WTO in 2003 trademark and industrial design applications boosted. One more great increase in industrial design filings occurred in 2008, which coincides with the law on industrial design protection, which was taken in the same year. However, there is no evidence that other laws, like the law on trademarks protection, issued in 2010, have influenced application number. Patent applications numbers have remained extremely low for an entire period, which could be due to the fact that the law on patents, which was taken in the previously discussed countries, has never been taken in Armenia. However, as we can see, WTO accession has to some extent influenced increase in innovations.

#### 8.4 People’s Republic of China

People’s Republic of China joined WTO in 2001, and since then the country has changed in many respects. China as a large state with communist past shares many economic features with Russia and they are very often compared in the context of WTO accession: in some academic papers China even serves as a proxy to predict what will happen to Russia after it joins WTO (Green, 2012). Assessing consequences of WTO accession for this state is more probably more complex than for the previous countries due to its much larger size and more factors influencing its growth and innovations, thus it is necessary to be reasonably critical towards potential findings.



Source: WIPO database, 2012

The number of IP related laws has increased very much in the 1998 and kept being high from then, meaning that from around 1998 the Chinese government started to acknowledge the importance of IP protection laws for cooperation with the West. In general, before the WTO accession China already had several basic laws concerning IP, like laws on patents and copyrights. Thus instead of adopting new laws, China implemented the TRIPS agreement and the Protocol through the modification of its intellectual property laws and regulations: China revisited its Patent law (latest amendment in 2008), Trademark law (latest amendment in 2001) and copyright law (latest amendment in 2001) (Iida, Nie, 2006).

These amendments have led to some significant alterations in Chinese IPR agenda. Patent law amendments, adopted within TRIPS framework do not affect substantive patent law, but change enforcement regulations, like ensure the ability of local patent offices to award damages and not simply fines or an administrative injunction to stop infringement and guarantee the availability of treble damages by the courts and administrative agencies for willful infringement (Cohen, 2012).

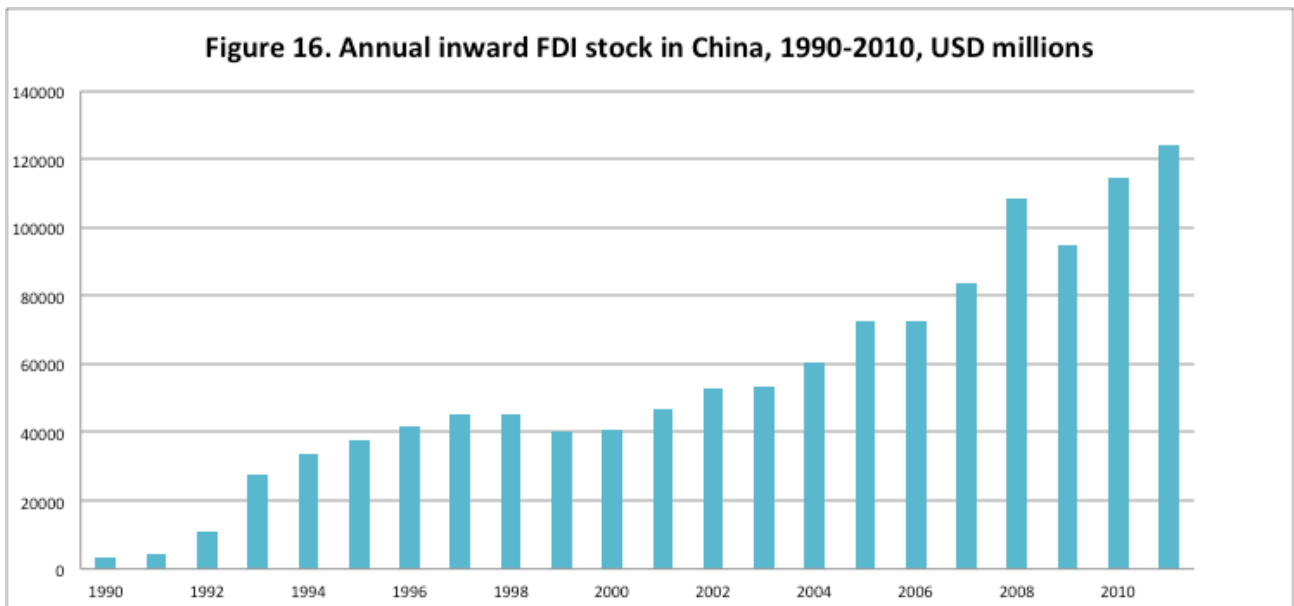
As for the trademark law, it was enacted in 1982 and has been amended twice so far, first in 1993 and again in 2001 when China joined the WTO. The 2001 amendment enforced IPR protection giving the State Administration for the Control of Industry and Commerce stronger investigatory power and a right to inspect any act of infringement upon the exclusive right to use a registered trademark (Nie,

Iida, 2006). This was a very important change in Chinese IP legislation as even though the IPR protection framework existed before WTO accession, lack of these laws' enforcement and prosecution of infringers was often criticized.

Copyright law of People's Republic of China was also amended in 2001 as a part of TRIPS agreement compliance procedures. The amendment specified penalties for copyrights infringement, which include confiscation of the unlawful gains and infringed copies, collect administrative penalties, etc. Basically this amendment has considerably strengthened administrative measures against copyrights violations. The new amendments for the software regulations, taken in 2001, have also strengthened administrative sanctions against software copyrights infringement.

Thus WTO membership and TRIPS adoption led to positive transformations of Chinese IPR enforcement. Higher protection of foreign and domestic patents and trademarks in theory should have resulted in higher volumes of FDI with high technology and positively influence overseas investors' decisions to bring production and technology to China. In general, many scholars recognize a positive relationship between WTO accession and FDI: Walmsey et.al. (2006) even asserts that drop in FDI during late 1990s was one of the main factors which pushed China towards WTO accession, as organization's membership would fix several drawbacks of Chinese investment climate: absence of rules-based economy, corruption, inefficient state enterprises which dominate many key sectors of economy, etc.

In general, according to many researchers (Guoqiang, cited in China Daily, 2002), China's WTO membership boosted foreign investor confidence in the market with heightened expectations of transparency, stability and predictability in Chinese trade and investment policies and an improved business environment. In general, high volumes of foreign investment are quite typical for Chinese economy, and the FDI numbers increased especially during early 1990s up. During 1997-1999 there was a short stagnation period which happened partially due to the Asian crisis of 1997, partially due to the fact that investors' high expectations in early 1990s failed to fully materialize (Walmsey et.al., 2006). After Chinese WTO accession foreign capital inflow in China boosted again, making China a leading international FDI target. In addition, even though foreign investment in China has been high for decades before WTO accession, it was focused mostly in labor-intensive industries due to low IPR protection, and changes in legislation led to more investment in capital- and knowledge-intensive fields (Kraar, 1994, cited in Prater, 2008).



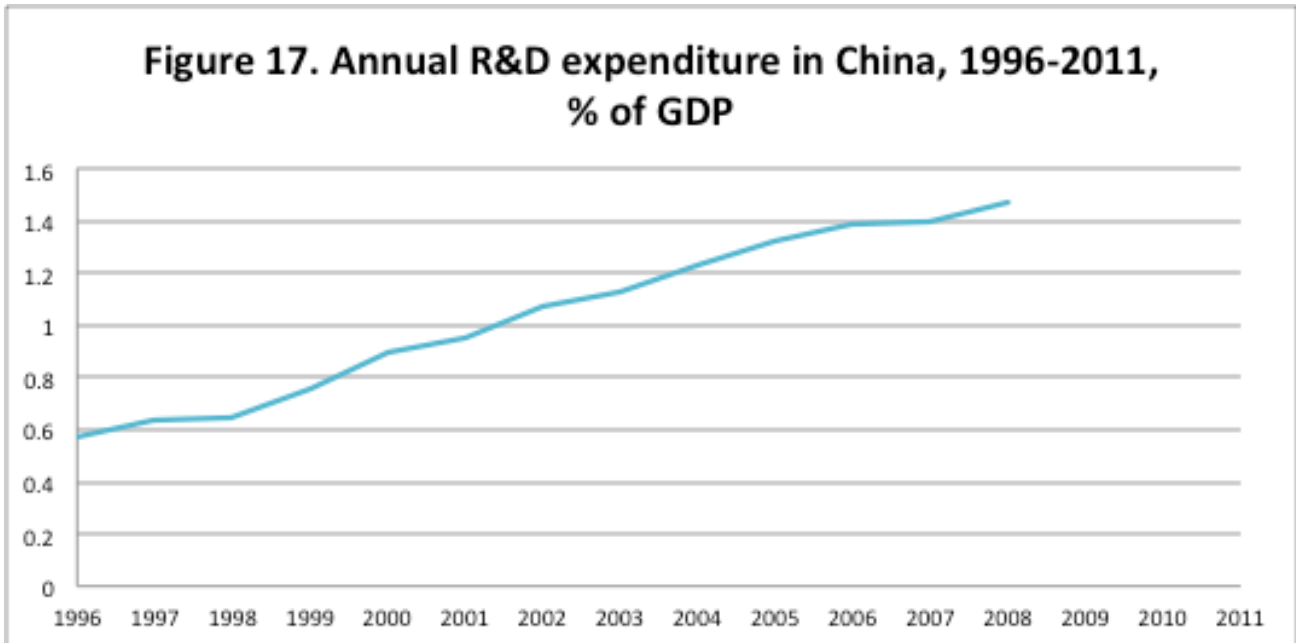
Source: World Bank Development Indicators, 2012

However, it is important to point out some other causes for higher FDI as a consequence of Chinese WTO membership. Liberalization of trade, opening of numerous sectors of economy for international trade, implementation of TRIMS (Trade-related Investment Measures) – all these factors also had positive influence on FDI growth and were as important as increased IPR protection.

On the other hand, even though increase of FDI in general is undisputed, some scholars (Chen, 2011) emphasize low quantities of FDI from industrialized states due to remaining problems with IPR enforcement. Therefore it is still very important for China to further improve the legal framework and strengthen the enforcement for intellectual property rights protection if it wants to attract high-technology FDI inflows from the world's leading high-tech countries.

As for R&D expenditure, in general, as long as up to the late 1990's big Western corporations were reluctant to move their research operations in China largely due to the fear of IPR violations (Plafker and Wolff 1997). In light of these issues, some scholars (Prater, 2008) outline that China's entrance into WTO has changed the situation, being a major driver of R&D investment, which has been growing rapidly since the end of 1990s. Nowadays promotion of R&D and technological development becomes increasingly important in China as indigenous innovations are essential to avoid middle-income trap, which is threatening China today due to the specificity of its development. Middle-income trap is a situation where a developing economy stalls out after a period of rapid growth, cutting short advancements in living standards before its citizens reach the level of well-being that residents of advanced economies enjoy (Vaughan, 2013). This is often a consequence of developing countries enjoying extremely fast economic growth due to technological catch up and

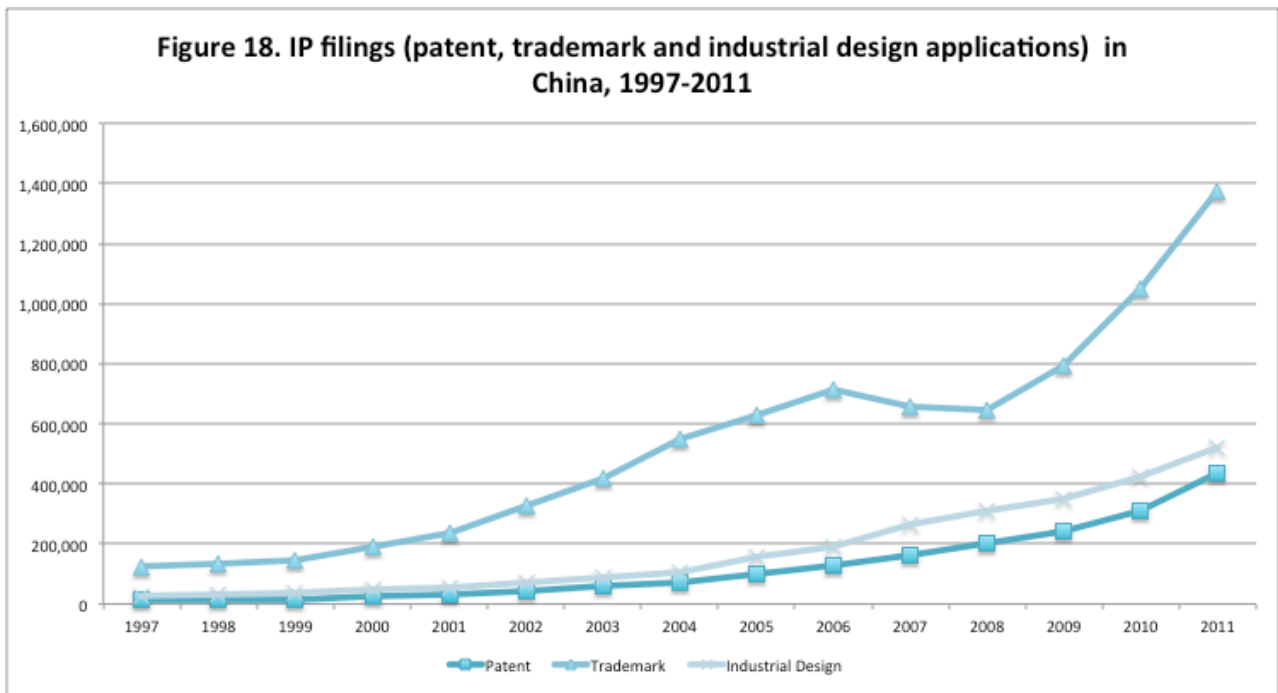
“advantage of backwardness” and when the technological surplus from the West is exhausted the country is left in a situation when it has to develop its own innovative capacity in order to be competitive.



Source: World Bank Development Indicators, 2012

R&D investments in China have been growing rapidly since the 1998 which is probably due to the fact mentioned above: R&D is crucial for China in order to sustain high growth figures and remain internationally competitive. Thus high R&D investment rate and considerable changes in IPR legislation should have resulted in higher numbers of IP filings in terms of trademarks, patents, industrial designs. In reality all of the above types of IP applications increased in volumes after WTO accession when the most important IP protection laws were established.





Source: WIPO database, 2012

After the second amendment in 2001 the number of trademark applications filed with the Trademark Office increased dramatically. In 2001 270,417 applications were filed and 202,839 applications were approved for registration by the Chinese Trademark Office, whereas in 2008 this administrative authority received a number of trademark applications totaling 698,119 and issued 403,469 approvals for registration over the year. In general, it is widely recognized that WTO membership had a very positive influence on the number of trademark filings and registrations. One of the reasons for the rapid growth of trademark filings after 2001 amendment is that this amendment made Chinese natural persons eligible to file trademark applications (Wiegand, Cao, 2012).

On the other hand, high volumes of trademark applications cannot be considered as an entirely positive phenomenon: there have also been some problems. For example, a drastic increase in trademark applications within such a short period of time has resulted in a huge backlog at the Chinese Trademark Office, with the trademark registration process currently taking more than three years. Another problem identified by the Chinese Trademark Office is that a large percentage of the registered trademarks have never been used.

To conclude, TRIPS agreement has definitely altered Chinese IP system and numerous important laws were implemented within its framework. According to our data, FDI and IP filings have been positively influenced by these changes, and it is especially true in case of trademark applications. As for R&D investment, the situation is not that clear. R&D investments are constantly growing, but there no patterns showing connection with IPR were found.

## 9. Results:

The results of this study to a large extent correspond to the hypothesis. In all of the countries under study situation with IP protection and enforcement has improved considerably after WTO accession and the most important laws and amendments were adopted directly after TRIPS agreement implementation. In all of the studied cases changes in IP filings related to on specific laws, which protected these types of IP. This fact shows that there is a connection between stronger IPR and innovation.

Also we found quite little connection between TRIPS and R&D expenditure in all of the studied countries except China: in Lithuania, Poland and Armenia R&D numbers are extremely low, in comparison with both European and Eastern European countries. This fact raises questions about connections between R&D expenditure and scale of innovations: probably high R&D spending are not imperative for high innovation levels.

Notably, most of the studied countries have not yet fully implemented Western IPR frameworks. Some are still criticized for lacking specific intellectual property laws or lack of enforcement of the existing ones. China, for instance, is often critiqued for lack of legal prosecution and control of IPR infringement. This might be so because of the specificities of Chinese development: China has a quite a few well-known international companies which need intellectual property protection, but it gets very much profit from counterfeit goods. Secondly, in a country big like China it is harder to secure fulfillment of all the IP laws than in smaller nations like Lithuania. Lithuania in its turn is still lacking laws protecting internet-related data and Armenia needs to specify IP application procedures. In all the studied countries it is important to raise awareness and spread information about importance of IPR protection, as it takes much longer to change people's minds than legislation. Thus it is possible that in the long run improved IP systems will bring about even higher volumes of inventions.

The chosen methodology is suitable to provide an overview of qualitative changes which happened to countries' IPR systems and innovations, but it is important to bear in mind that official regulations and laws, even though accepted by the government, may not always be adequately implemented and enforced and the presence of rules de-jure does not necessarily means their presence de-facto.

In addition, it is important to be careful with the attribution of effects as it is especially tricky in this field, since the implementation of TRIPS and stronger IPRs in the studied countries was combined

with multiple changes in other areas connected with WTO accession and the present paper tries to evaluate the consequences of new IPR frameworks in a wider political and institutional context.

In general, the study has shown that WTO accession leads to positive results in terms of all studied indicators except R&D. Thus Russian TRIPS implementation has a strong potential to be beneficial for its innovation framework. In theory, benefits of WTO accession, such as more favorable FDI climate, growth of innovations should outweigh its disadvantages in case of Russia.

## 10. Conclusion

The notion of IPR will be surrounded by heated debates for many years to come as international IPR system is far from being harmonized and infringement and violation of intellectual property rights are still very common. A discussion whether strong IPRs are detrimental or beneficial for innovation are also still going on and much more research is needed to reach some conclusive results. In general, it is important to study various IPR regimes and their implications in order to produce a balanced IPR system and address various limitations of an existing framework. This paper sheds some light on this issue examining how higher IPR protection influences innovations and FDI in transitional economies.

Unlike the earlier academic research, which almost excluded post-Soviet republics from the scope and often focused on IPRs in broad terms, this paper examined specific IPR changes, which happened in light of implementation of TRIPS agreement, and their direct influence on inward FDI, R&D and IP filings. The study of post-Soviet republics is additionally interesting because of its almost lacking previous IPR framework and FDI – intellectual property rights in the USSR were virtually nonexistent. Thus former communist republics can be seen as a kind of a polygon for a natural experiment, where the effects of IPRs are assessed in the absence of previous intellectual property protection history or any FDI history.

A hypothesis, which was tested in the present paper, found some empirical support in our findings. First, the statistics on FDI for all the studied countries had correlations with IPR strengthening: as the main laws on IPR protection were taken, FDI increased substantially. Secondly, we found some correlation between specific intellectual property protection laws, such as those on trademark applications and industrial designs, with IP filings for those specific types of IP. As for R&D, no clear pattern reflecting IPR and R&D spending was found.

However, more research and examination of stronger IPR consequences in terms of innovations is needed. It especially concerns studies of developing countries, as they are specifically vulnerable to the imperfections in IPR legislation. Econometric analysis of the indicators used in this paper would also be useful to find more reliable causal relationships. More detailed analysis of FDI in terms of observation of FDI in various industries might also be promising.

Word count: 13758

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