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„Technological Innovations and Imitations (Focus on Particular EPO States and Comparison of Japan and EPO)"

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Content:

I Introduction

Increase of output of a country can be reached as an implementation of developed foreign technology. This raises output of a state directly or as knowledge about technology of production of goods that incorporate foreign technology and its positive affect on domestic innovation and imitation. That's why my study focuses on technological imitation (further just imitation) and technological innovation (further just innovation) of two (respectively three) of the biggest economies in the world and some of new and old European Patent Organization (EPO) member states. I also focus on their per capita GDP, GDP growth rate, research and development expenditures (from technical reasons expressed in percentage point of GDP) and their foreign direct investment net inflows (same as by R&D in percentage point of GDP). Same I focus on high technology imports in percentage point of total imports and human resources in science and technology in percentage point of total population in case of particular EPO states and spending on education in case of the Trilateral Patent Offices (TPO) member states.

There is, as far as I am aware, no problem with measuring innovation. The point where difficulties can arise is when we try to measure imitation. There is very little evidence with regards to imitation measures. That's why I decided to follow the work "The Dual Nature of Trade: Measuring its Impact on Imitation and Growth" by Michelle Connolly (1998) and its imitation and innovation proxies. It is a study that covers imitation and innovation in USA comparing to other 40 worldwide countries, for which data were available.

In my paper I am going to focus on European Patent Organization member states, on comparison of some EPO member states and their rates of innovation and imitation. I would also like to explore differences in rates of innovation and imitation between EPO and Japan. From technical reasons I skipped comparisons in case of U.S. which are currently together with EPO and Japan the most innovating states. These states together form the biggest patent database known as Trilateral Patent Offices. That's why I decided to structure my work as follows. Section II describes the definition of imitation and innovation as I use them in my paper with more background. Section III presents data for each chosen country and gives definition of the imitation and innovation proxies. It also presents some information about patents and patent organizations. Section IV focuses on the background, fluctuations and deviations of imitation and innovation data. Section V covers empirical results, Section VI discuses findings and Section VII concludes.

II Theoretical Consideration

It is well known that innovation same as imitation in some sense has the biggest influence on the progress of the country's economy.

Imitations same as innovations are in literature broadly defined. I just want to mention some of them. We can define imitation as replication of some form of behavior or describe it as copying of behavior process or ideas by observing them. Innovation can be seen as finding a new idea how to solve the problem or as a strategy, management practice or technology that a corporation uses for the first time. Same the innovation can be expressed as an important, meaningful restructuring or improvement in some technological process. Further the amount of innovation can be described as all innovation levels including bringing a new idea into use resulting from R&D process, the presentation of new inventions (patenting process), followed by marketing of new product.

Thereby technological innovation can be seen as implementation of new ideas, methods, processes or products, same as changes. These can create new dimension of performance. The goals are most of all to improve the quality of a good, to spread out the portfolio of the product. As goals can be seen also lowering wage costs, decreasing the demand for material input or energy, substituting the out-of-date products and services through new and fashionable one. We distinguish between four types of innovation as follows: I) product innovation (implementation of brand new goods or services to the market or improving quality or parameters of the product that is already at the market), II) innovation in production process (improving the production or inventing new methods of producing goods), III) marketing innovation and IV) organization innovation. In this paper I will concentrate on the first two types of innovations.

Under words technological imitation, we can see effective copying or reproducing of already existing technology or know-how of another firm. Imitation is most of all preferred if firms can undercut the prices of corporations that innovate and make higher profits because of lower marginal costs. But also if firm imitates a technology and reaches the same level as inventor, the imitator has more money left for next level of research and development. In other words if the imitator saves the cost on the first level of innovation and imitates on this level, the money can be spent in some higher innovation stage. There are also some positives about imitation for a firm in non material sense. This can be learning-by-doing meaning that by imitating the other firm there is huge amount of learning about technologies, processes…

This knowledge can be used as an advantage in the next step in manufacturing. It can probably lead to invention of new technology, technological process or a new final good or service.

I think it is clear that in current world there is an urgency of innovations. All companies from Tokio to New York want to be the first who introduces new product or technology to the market. Innovation is a great power, meaningful factor of survival, growth and prosperity of a company or an individual. It is a source of monopoly gains that float into the company until the imitators appear. And you can be sure they will appear. Thirty four from forty eight significant world novelties were copied already in the phases of study and development. The degree of imitation of a final product is currently higher than eighty percent. But the degree of imitation is already higher than 80% in cases of some product categories. For example the highest degree of imitation is in category of cereal products and so 98%. The same tendencies occur in many categories of services that we use daily or in company practice or business models. We can see it on particular examples. Novelties are copied by meaningless players – for example like hundreds of copies of the YouTube website – but they are also copied by great leaders like the IBM Company. This is currently seen as the world greatest creative imitator. It just followed the creator of typewriters, Remington Rand, when it began to sell the central computers to the companies. However, IBM becomes the leader four years after the original entered the market. IBM repeated the same strategy also in case of personal computers. Here it simply combined the best functions of computers from companies like Apple, Commodore machines and many more. These computers were the first commercially viable products that were overcome by the clones of Dell and Compaq.

It is pure reality that the imitation is for many companies vitally important. It could be at least same important as innovation. But it is also important for effective process of innovation itself. Sometimes the imitation is described as unique and complex strategic ability that is important to be carefully and correctly developed. Imitation can be seen as copying, repeating or imitating of innovations, or pioneering procedure. But we must be careful by using these words. Firstly, imitated can be product, method, and procedure, process or business model. Secondly, imitation can be a copy of original as well as it can be its variation, or adaptation. Thirdly, it may have any form from exactly copy of solution to rough sketch of idea. Fourthly, imitation could be something from instinctive adoption as far as I am aware, totally completed and fully fledged imitation. Fifth, there are illegal forms of imitation, which can be plagiarism and falsification. And finally imitation cannot be described as an opposite of innovation, but it is necessity of purposeful and effective exploitation of innovative ability.

But why are many imitators so successful? While the innovator pave the way forward and pays for this way, "imitator's way" and his knowledge how and where is already included in the costs of innovator. Not all the costs of imitator, of course, but large part of it. Imitator saves the costs not only on the research and development but also on marketing. This is because the customers have already learned to use new product, technology or service. If the imitator is clever enough he can not end in deadlock, because the product, service or technology will be proofed before he invests his money into imitation. Although the innovator has a monopoly on the product, service or technology is guaranteed for a particular time period. During this period he tries to get back invested money. His follower has his own monopoly. The result from the study of innovations from years 1948 to 2001 shows that the innovators have just 2.2% market share on current value of their innovation. From this we can simply deduce that the rest of the market share belongs to imitators. Imitators have just very low starting costs of research and development. They can invest this amount of money and modify the original good, technology or service and fit it to the requests and wishes of customers. Or they can simply skip the step of research and development and create the product or technology of a so called new generation. Best example of such a behavior is Samsung Company. Samsung lag behind the other firms in analog technologies and so simply jumped to the world of digital technologies. Thanks to study of a market behavior and reactions, imitators can better fit the product to the market expectation and place the product where the gain is more probable and expected. Growth in productivity is not a result of primary innovation but simply a result of improvements that have followed. From this reason imitators are in better position and they can offer customers not just something potentially better but also something marketed cheaper. Imitation process also needs a lot of investment and costs a lot of money, with respect to necessity of repeating many, but not all production steps of innovator. However in many cases the costs of imitation is visibly lower than by those of innovations. Imitation costs can be between 60 and 70 percent of costs of innovations. In time of great added value such amount has great influence. It gives imitator the opportunity to determine significantly lower price than the competitor. There is also the possibility to offer more qualitative goods or services for the same price, same as better distribution and more accurate service. Or just simply the saved costs can be used in next step of innovation.

First of all I faced the question: How to measure technological innovation and imitation? As I found out there are many ways. There are many ways to measure innovation. Usually used measures involve R&D inputs, patent counts as well as a new product and process

publicizing and survey-based apprise. Some researchers use single indicator, while some studies use more measures. But what most of studies do not measure is the level of imitation. This is exactly described in Michelle Connolly's (1998) work. She uses many factors that can influence imitation possibilities like expenditures on research and development, real imports of capital goods from developed countries. She uses also transportation within a country and communication and infrastructure stage, and past experience. The other factors of her paper that have significant effect on imitative behavior are market size, human capital and foreign direct investment. Foreign technology or foreign capital goods has also great influence on imitation. These can be used as inputs in the last step of production and therefore there is a possibility of immediate gains. There is an opportunity to reduce imitation costs and to increase technological progress through imitation or innovation.

There is a difficulty to distinguish between innovations and imitations. If we see the innovation as inventing new product or new way to produce it, there is no guarantee that such a product or production (or at least similar one) is not already invented somewhere in the world. If it would exist than we would not talk about an innovation but about imitation. And that's where unfortunately the problem with data can arise.

In my thesis I follow data published in Annual reports of Industrial Property Office of the Czech Republic (UPVCZ), German Patent and Trade Mark Office (DPMA), Industrial Property Office of the Slovak Republic (UPVSR), Spanish Patent and Trademark Office (SPTO) and Trilateral Patent Offices (TPO) (amended by data of Annual reports of Japan Patent Office (JPO), European Patent Organization (EPO) and United States Patent and Trademark Office (USPTO)). I use these data to measure the innovation and imitation level of a particular country. In the first part I compare innovations and imitations between EPO and Japan within Trilateral Patent Offices. In this part I use U.S. as a basis state because of the U.S patent system. The next section covers the comparison of EPO states. In this part I will take the EPO as a basis state. Following this data I will get results for domestic innovation and imitation.

III Data, Innovation and Imitation Proxies

All data I use in my paper are taken from Annual Reports of Patent Offices of a particular state. For data since 2000 for European Patent Organization countries and since 1996 for TPO member states I always use an actual Annual report, because there are some differences in

data from year to year report. There are several reasons why there can be variation in data. For example there may be some patents that were assessed as invalid nine months after they came into force, because that's the usual period for raising protest against patent. That's why fluctuation in data in reports can arise.

Data that are really relevant for my thesis are data since year 2000 and for TPO since 1995. It is really hard to find Annual Reports of Patent Offices or only a meaningful data for period before these years. I also use number of patents granted and number of patent applications for 1999 and older for European Patent Organization members. These I use just to illustrate the development of patents by each particular country. Furthermore I was interested in the variation in patents granted and applied and how does it depend on the economical and political situation in the country.

Firstly I will present a within EPO comparison that will include new EPO member states. These are represented by the Czech Republic (CZ) and Slovakia (SK) and old member states represented by Germany (DE) and Spain (SP). Thereafter I will calculate the number of imitations and innovations for each country according to imitation and innovation proxies described below. In next two sections I would explain fluctuations that arise over time and a significant or insignificant correlation between imitation and FDINI in percentage point of a GDP, GDP growth rate, R&D expenditures in percentage point of GDP, high technology imports in percentage point of total imports, human resource in science and technology in percentage point of total population of a country and same as between innovation and FDINI in percentage point of a GDP and R&D expenditures in percentage point of GDP, high technology imports in percentage point of total imports, human resource in science and technology in percentage point of total population of a country.

Secondly I decided to do comparison of imitation and innovation between Japan and European Patent Organization. Here I will calculate the number of imitations and innovations in a country (or in a union of countries – further I just consider the European Patent Organization as a county in this comparison) and thereafter I will continue in the same way as before.

If we want to talk about the area of the European Patent Organization and patent applications or grants we need to look at the European Paten Organization (EPO) itself. It is an international regional organization that involves all the countries that signed the European Patent Convention (EPC). The EPC is a unique agreement under the Paris Convention for the Protection of Industrial Property. From this follows that, according to Paris Convention, foreign patent applicants are treated same as domestic. This is also valid for European

governance and European applications. EPO granted patents depend on the EPC that is contractually binding for all member states. Patents granted by EPO are managed in each EPO member state according to the national legislation of a particular country. European patent offers to its owner same rights as the national patent granted in the country. If the object of patenting process is technological method then also the unique products directly obtained in this process are part of patent protection. EPO follows the first-to-file principle but there is a broader examination of patent application compared to the other countries because EPO need to search all member states. If the patent rights are violated then the national low intervenes in the process. The validity time of the European patent is twenty years since the application for a patent was announced. European patents should be granted also according to the application filled in accordance to PCT (Euro-PCT). If the applicant decides to get the European patent and also wants to obtain protection in EPC member states he or she can choose between two alternatives. It is either direct way via application by EPO or indirect way that is called Euro-PCT. Direct European way means that the whole process of granting a patent follows the EPC rules. Whereby the second alternative Euro-PCT follows the rules of PCT by the first - international phase of Euro-PCT patent applications and it follows the EPC rules in the second - regional stage. By both ways the applicant must state the countries where he or she applies for the patent. After the patent is granted there is a nine months long period during which the third parties can lodge protest in a form of reasoning report This report leads to further decision process if the patent would be retained in the current form or it would be removed from the patent list.

But what does exactly PCT or a Paten Cooperation Treaty mean? It is an international patent law treaty that was signed and designed in 1970 in Washington and came into force at the beginning of 1978. Since 1978 it was modified twice where the last modification was in 2001. At the beginning it was a pact of eighteen countries. The last enlargement took place in May 2011 when the treaty was signed by the 143rd state. PCT guaranties a uniform process to filling the application for a patent to protect the invention in each treaty member state. It takes a role of international application but it does not guarantee that the patent right will also be granted. But when the patent is granted it has a form of a PCT-patent not a form of an international one. The PCT application has two phases. First one is international patent application phase. Then there is phase in-between. Here the International Searching Authority (ISA) examines whether it makes sense to enter the national phase and in how many countries according to the expenditures of a patent grant. When it is meaningful than the second – the

national phase takes place. The first phase usually lasts for thirty months but on the request of the applicant this can be shortened and the national phase can start earlier. The fact that the PCT patent application way is successful is demonstrated by the statistics. The number of patent applications through PCT way reached n 2004 one million and in 2011 the number two million was reached. It is truly an international organization. For example last year there were three companies from Japan (Panasonic, Sharp and Nec) in the top ten PCT patent applicants. Here was also one from U.S. (Qualcomm) and three from EPO countries (Philips from Netherlands, Bosch from Germany and Ericsson from Sweden).

In contrast with the EPO, U.S. is the only country that has perfectly implemented the first-to-invent principle. That means that the first inventor has the right to get the patent grant. If another inventor occurs to apply for the same patent in the last twelve months after the application was sent to USPTO he or she has a right to institute interference proceedings. This proceeding has a goal to find out who was the real first inventor that will get the patent. Furthermore the part of the first-to-invent principle is a good examination by USPTO of all patents granted as well as home as abroad. That is because "no U.S. patent can be obtained if the invention was patented abroad before applying in the United States by the inventor or his/her legal representatives if the foreign application was filed more than 12 months before filing in the United States. Six months are allowed in the case of designs." ("Foreign Applicants for United States Patents" Source: www.uspto.gov) Therefore we can conclude that U.S. patents are about exclusion. And that in the sense that the owner of the patent has a right to exclude other individuals from exporting, selling, using or doing anything related to the subject of the patent. In U.S. there is no discrimination according to origin of the applicant. There is six months period after the patent is granted where the third party can comply against the patent grant. Then the further examination takes place. After the patent is granted to innovator it is valid for twenty years since the application was announced to the USPTO. From this first-to-invent strategy we can conclude that there is zero possibility to get the patent grant for imitation in U.S.. Therefore I skipped the U.S. in the comparison of TPO states.

There is a high share of domestic patent applications by Japan Patent Office that can be caused by Japan patent system that follows the first-to-file principle. This means that the first person that filed the patent application for a particular innovation is also a person that has a right to get the grant for the patent for this invention. The word innovation or invention is

really questionable in this case. That is because JPO does not investigate if the same innovation does or does not already exist somewhere in the world. It just assumes that when the innovation is not patented in Japan it simply does not exist and can be registered as an innovation. But in fact it could be an imitation of already existing invention. In Japan system we can find many definitions of inventions. In principle an invention in Japan is a high advanced creation of technical idea by which the law of nature is utilized. That in fact does not say much about the origin of the innovation. But Japan is not the only patent system that does not define the invention directly. The only system that follows the pure first-to-invent principle and has the sufficient definition and protection of innovation is U.S. as mentioned before.

Otherwise Japan patent system is similar to the others. Every patent applicant has a six month long period within which he or she should publish the innovation application through a publication or presentation. Such an application should be made in Japanese or in English. After applying for the patent the decision and examination phases take place. Then the patent is either granted and is valid for twenty years from the date when the application was submitted. Or the application is refused. In this case the applicant can submit an amendment against the refusal result within sixty days (in case of domestic applicant) or within three months (in case of foreign applicant) since the result was reached. After further examination the patent is granted, and is valid same as in the previous case, or refused as a final decision.

When we talk about European Patent Organization, U.S. Patent and Trademark Office and Japan Patent Office we also think of the three worlds biggest patent offices with the highest number of patent applications. That was the reason why these offices decided to form the Trilateral Patent Offices (TPO) in 1983. It was the cooperation program with goal to "improve efficiency of the global patent system" (EPO website, Trilateral cooperation, Projects. Consulted on March 19th, 2008). The program of TPO involves exchanging information about patent applications and applicants, about patent grants. There is involved also administration information exchanges same as innovations in electronic information system. Through the information exchange, patent offices gain another view on patent administration and examination of applications. There are also other areas of cooperation. These offices share an electronic system to exchange information, documents and there is a harmonization of patent practice. The offices share a common policy system. In 2008 "as one major player in the worldwide intellectual property activity the Korean Intellectual Property Office (KIPO) has joined the Trilateral Statistical Working Group in their effort to improve statistical

cooperation." (Four Office Statistics Report 2008 Edition, Edited by JPO, Tokyo, October 2009, p. i) That is why I have used reports of TPO at the beginning and for the last years I have gained data from Four Office Statistics Report (FOSR). (Further I will use just TPO description in my thesis).

All EPO countries follow the first-to-file principle. Also the process for granting patents is almost the same in all countries I am mentioning in my paper. That means that in all countries patent application must be filed out. Thereafter there is a search if the application is sufficiently broad to grant the patent. Eighteen months after the application is filed, it is published by the Patent office in Patent office report. The report publishes the name of invention, the name of inventor and also description of innovation. There is also a possibility for the inventor to stay in anonymity. After the invention is published there is a thirty six month period during which the inventor places a request for detail examination of the patent application. If it is not done so within this period the patent application is rejected. After all these steps the patent is either granted or rejected.

What I have been working on for a while is how to express innovations and imitations of EPO countries. In many papers there are different methods how to measure innovation. Some of them take into account investment in research and development process that are taken as inputs into innovation. Others look at total productivity factor that provides to measure the advantage, profit or welfare of innovation. There is also a possibility to take into account many factors and total their affect together. But what is logically true is simply that innovations are highly dependent on investment capacity of firms and companies. Following Connolly (1998) I decided to measure *innovation* for within EPO comparison as

$$IN_{it} = EPO_{Git}$$

where IN_{it} stands for innovations in country i in period t and EPO_{Git} stands for patents granted by European Patent Organization to residents of country i in particular year t. So the innovation proxy is modeled as an effective outcome of a new research. The main thing is, that it is expected that if an innovation is genuinely new the researcher or inventor will apply for a patent by EPO and finally a patent will be granted to him or her. There are certainly some other factors that can influence the inventor's decision. For example he or she is not

applying for the patent by EPO because he or she would not sale or export the product to other European Patent Organization countries and will just stay at domestic market. Or there are some industrial branches where there is a very high probability and also very easy way to copy products or invented technologies. That could be a reason why the inventor is not willing to apply for the patent because he or she would like to keep the product or technology secret as long as possible. This is why this innovation proxy usually underestimates the number of real innovations.

Following Connolly (1998) I specify *the imitation proxy* for within EPO comparison as

$$IM_{it} = i_{Ait} - EPO_{Ait}$$

where IM_{it} stands for the total amount of imitations in country i in period t, i_{Ait} shows the number of domestic patent applications by home residents in year t. EPO_{Ait} displays the patent applications by European Patent Organization by residents of country i in period t. This proxy expects for example that there exists an invention patented by EPO. There occurs an imitator of already invented innovation and he or she would apply for same patent in his or her home country. Here the imitator expects innovation is not patented yet for many reasons. Such that, the innovator would not patent in a particular country because of patent costs or too long and complicated patent granting process. Same as the inventor would not want to sell the product or technology in a particular country. But if the domestic country has a strict requirements for granting a patent, then the imitator will not get grant in his home country. There may also be sufficient reason why an applicant for a patent wants to get only a domestic patent grant and does not apply for a patent by EPO. For example: the product is invented and fitted for a domestic market. That could also cause that the number of imitations will be overestimated.

I decided to measure innovations and imitations for these EPO and Japan as follows. For EPO and Japan I use US as a basic state. And this is because U.S. is the only patent office that follows first-to-invent principle. That means that when we consider innovation we mean real inventions. From this reason I skipped U.S. in my comparison because I assume the imitation of U.S. would be zero over time.

The innovation proxy for EPO and Japan looks as

$$IN_{it} = USPTO_{Git}$$

where IN_{it} stands for innovations in state i in period t same as in the previous proxy and $USPTO_{Git}$ stands for patents granted by U.S. Patent and Trademark Office for residents of country i in period t.

The imitation proxy for residents of EPO and Japan looks as

$$IM_{it} = i_{Ait} - USPTO_{Ait}$$

where IM_{it} stand for imitations in country i in period t. This is counted as a difference between i_{Ait} patent applications by patent office of country i by home residents in period t and $USPTO_{Ait}$ patent applications by U.S. Patent and Trademark Office by residents of country i in period t.

What I expect to show with the comparison of innovation and imitation, foreign direct investment net inflows in percentage point of GDP, GDP growth rate and research and development expenditures in percentage point of GDP, is that FDINI does not significantly affect the imitation and innovation. Same as that GDP growth rate is positively related to innovation.

I made a comparison of two Central-European countries and two Western-European countries. Here I want to show that there is more imitation in new EPO member states – Czech Republic and Slovakia. These are also less developed as their Western neighbors. In the old EPO member states – Germany and Spain - innovation should be in higher percentage point as in the Czech Republic and Slovakia.

IV Imitation and Innovation Results

In 90s there were many economic and political reforms in Central-European countries. The privatization of state-owned firms took place that made space for establishing of private companies and competition between firms, domestic or foreign. This tendency of economic

development continued over time. There was a new tendency with Czech Republic and Slovakia entering the European Union in 2004. It resulted in higher investment into research and development in domestic markets as well as in supporting innovations as a key factor in further productivity growth process in domestic companies. In first development stage there should be a prevailing part of imitation. In further development levels there should be tendency or convergence to innovation processes. By imitations there can be learning-by-doing effect. Here the imitators learn by the whole process and the knowledge helps them to improve the research or technology in later stages of the research. In addition in these Central-European countries such learning can be seen as a novelty. In these countries there has not been enough data to see the development of imitations and innovations in decades. This can be meaningful and also there is only a small possibility to do forecasts that would really make sense.

According to the formulas from previous section I counted the numbers of innovations and imitation for each state separately. But the numbers as whole do not say much about the development of innovation and imitation in these countries. There are huge differences in numbers of patent applications and grants same as in population and R&D expenditures or in GDP between observing countries. That's why I decided to measure it as innovations per thousand capita and imitations per thousand capita in each state.

There should also be a question why I decided to follow the paper by Michelle Conolly. Same as why I define innovation and imitation proxies as written in the previous section. When I was searching for data of patent applications and grants I found interesting data in annual reports by German Patent and Trade Mark Office. Germany is one of the countries that has a database and provides information in annual reports about patent applications and grants that were registered for the first time in the world. In DPMA documents there is an obligation to write down whether it is the first known patent application of that particular technology or product, by filling out the application. Therefore we can conclude whether we can talk about real invention or imitation. Following this data from DPMA I compared data that I got from different methods and proxies for innovations and imitations (proxies that I use in previous section, proxy with research and development expenditures by a country). Thereafter I have chosen the proxy that was best fitted according to data. That means proxy that has results nearest to the real numbers from DPMA annual report. And that was exactly the proxy that Conolly has used in her paper.

In resulting data for patent applications and grants for Czech Republic we can see that in 2000 there is an increase in patent applications. The number of patent applications and also patent grants in this year by UPVCZ is highest in the whole history of the Czech Republic. This may be because of an increase in number of foreign applications by UPVCZ. In the same year there was a decrease in domestic patent applications by home patent office compared to the previous year. There was an increase in PCT applications in foreign countries by domestic applicants by about fifty percent. We can say that Czech patent applicants successfully discovered foreign markets this year. Main areas of patenting by Czech patent applicants were biology and medicine. In 53% of all cases the patent was granted to the applicant.

On the 1st July 2002 Czech Republic became a member of European Patent Organization. Beginning with this year there is a rapid decrease in patent applications directly by UPVCZ. Patent applicants seem to prefer the European way to get the patent grant.

The novelties for the Community trademarks and industrial designs came into force in Czech Republic with entering the European Union in 2004. There is also an accession of EPO by Czech Republic that can be the case why the foreign patent applications decreased by 21% within one year. The same year domestic patent applications rose by about 19%. In statistics for Czech Republic and also other countries in my paper we can see the prevalence of foreign patent applications that is a characteristic sign for open economies. Among the countries that applied for most patents by UPVCZ through the PCT this year are Germany, United States, Switzerland and France.

In 2009 we can see that most of the applications for patents in Czech Republic are filed through the Euro-PCT system. But this year we can see the increase in domestic application by 11%.

What is also interesting is data in Table VIII for patents granted by Industrial Property Office of the Czech Republic. In this table there is data for patent applications that was addressed directly to the UPVCZ and announced by EPO. Year 2003 was the first year in which granting the patent in the Czech Republic was possible in shortened period of application process also through the EPO. Only three inventors used this possibility in that year. Since that year there was a huge increase in patents granted through the EPO. If we compare years 2003 and 2004 we get an increase in patents granted by 3300%. And increase between year 2004 and 2005 was about 638%.

Same thing but in opposite direction can be observed by patents granted directly by UPVCZ. Since 2003 there is a decrease in patent applications. What seems to be interesting here is the tendency of stabilization of patent grants in last three years. Here imitation is the

case. Applicants imitate technology, processes or inventions from abroad and try to get it patented at home. It can also be the case that producers are more interesting in domestic markets and do not want to export and they just want to satisfy the domestic market.

If we firstly consider the innovation and imitation data for Czech Republic we can see a prevalence of imitations, as we expected. Number of imitations in 2002 was almost 35-times higher than the number of innovations. If we compare it to the last year of my observation, year 2009, here the number of imitations was about 16-times higher than that of innovation. This shows a tendency to innovation process. But what is also true is that results for innovations and imitations per thousand capita. This shows that Czech Republic has lower number not only of innovation but also of imitations than Germany and Spain. This can be caused by the fact that we compare small Central-European countries with much bigger Western-European countries. But when we look at the resulting data carefully we can see that when we compare innovations per thousand capita in Germany and in the Czech Republic in 2002, Czech Republic has about 99-times lower rate of per thousand capita innovation than Germany. It also has just about 8-times lower rate of per thousand capita imitation than Germany. That is really a huge difference. It is not even much better in 2009 where the number of innovations per thousand capita in Czech Republic was just 37-times lower than in Germany. The gap between imitations per thousand capita between Czech Republic and Germany decreased. In Czech Republic the number for imitations per thousand capita was just about 4-times lower than in Germany. This situation may be caused by decrease in the number of imitations in Germany or, what is more likely, by increase of imitation activity in the Czech Republic. Following comparison of 2002 and 2009 we can conclude that in Czech Republic there is a tendency to innovation but it has a long way to go to be comparable with the old EPO member states.

What is also true is that during the last eight years there was just 50% increase in the rate of per thousand capita imitations. The number of innovations per thousand capita in 2009 has increased three-times comparing to 2002, when Czech Republic entered the EPO.

Data from annual reports for Slovakia show that in year 2000 the number of patent applications reached its maximum. When we compare it to the previous year there is an increase of 8% and when we compare it to the 1993 there is an increase of 26% in patent applications by UPVSR. When we look at the number of domestic patent applications by home residents we see that it is just a small share from total number of patent applications. Interesting fact is that just 5 applicants, from the whole amount 241 domestic applications,

used the international PCT way to apply for the patent. This is interesting because it is expected a higher share PCT applications. That's because there is much higher protection when the applicant uses the opportunity and patent is granted through PCT way. We should simply interpret the increase in patent application as: inventors from home as well as from abroad are more interested in domestic market in Slovakia. This is a positive sign because growth in domestic patent applications and grants can be seen as a prediction for stabilization and development of a domestic industry. In 2000 53% of patent applicants got the patent granted whereby most of foreign patent applications came from residents of USA, Germany and Great Britain. Most of patents were granted in field of chemistry, biology and medicine.

In 2001 the number of PCT patent applications, in which Slovakia was a designated state, increased of 62%.

Same as the Czech Republic also Slovakia signed the European Patent Cooperation Treaty on the 1st of July 2002. There is an increase in domestic patent applications in the same year. This is a result of increasing activity of UPVSR in field of popularization and propagation of technological creativity and protection of its results. Since this year the patent applications delivered directly to the Industrial Property Office of the Slovak Republic started to decrease. That is because the patent applicants began to use Euro (whether PCT or direct) way to get the patents granted. Same as that the inventors are no longer interested in activities on Slovak market.

After 2003 there is a rapid decrease in PCT patent applications. This may be a result of applicants´ possibility to choose between patenting through EPO or directly by UPVSR. Here the EPO way simply altered the PCT way.

At the beginning of 2007 there was a huge information campaign about patents and patenting in Slovak Republic. That resulted in increase in EPO patents valid and registered until 31st December 2007 by135,8% compared to the year before. That means that on the 31st December 2007 there were 4266 national patents granted and valid in Slovakia same as 2622 patents valid and granted by EPO in this country. Therefore almost 20% of the patents were applied via PCT way.

When we look at the data for patent applications same as on patents granted by Industrial Property Office of the Slovak Republic we see a stagnation and just a small fluctuation in data in the last five or six years. Is it really a case of stagnation in some point without any movement in the future? The answer to this question should be probably found when we look at the results for innovations and imitations for Slovakia. In tables for imitations and innovations same as in results for innovations per thousand capita and imitations per thousand

capita we truly see the stagnation. What we have expected was same tendency as by Czech Republic and so a tendency to increase the number innovations and decrease the number of imitations. When we compare the amount of per thousand capita innovation from 2002 to 2009 there is an increase just about 50%. And when we compare the results for per thousand capita imitations from 2002 to 2009 we see just about 40% decrease. This is really a very small movement for the eight-year long period. The case can be for example that the Slovak market is not as attractive for foreign inventors as expected as for home investors which enter the home market. Usually with arrivals of the firms to the market there comes also their know-how, their technologies and production processes same applies to related inventions and patents.

If we consider Table XI for patent applications by German Patent and Trade Mark Office we can see two interesting things. Firstly, that there is only a small movement in number of patent applications observed in last few years. We can talk here more or less about fluctuation that is stable over time. Secondly what is interesting is the high number of patent applications from German applicants comparing to the foreign residents by DPMA throughout the history. The possible explanation can be that there is a greater willingness to protect the inventions through some of the more international ways meaning Euro-direct, Euro-PCT, or just simply the PCT way.

In 2000 we saw record patent application numbers. There is a visible development of Germany to an international market and tendency to globalization. There was an increase in patent application numbers by 17,4% compared to the previous year. Most of the patent applications this year came from German residents. When we talk about the foreign applicants, most applications came from USA (21.2%), Japan (14.3%), France (5%) and Switzerland (3.3%). What is also growing is the number of patent applications through PCT way. There is a high increase in patent applications by residents of Germany applying for a patent by EPO designating Germany instead of applying by DPMA directly. Whereby, one of a possible explanation is an agreement of EPO member states. This was signed and came into force in year 2000. It was a treaty called Community Patent Regulation. It says that when once the patent is granted by the EPO and it is done in one of the procedural languages of EPO and it is published, there is no need to translate the whole documentations into other two procedural languages. The procedural languages of EPO are German, English and French, which are all valid by applying for a patent. It is enough when the claims are translated and therefore there is a high reduction of translation costs. It is logical that applicants by whom there is a

probability that they will export or expand into other countries, apply for the patent directly by EPO. At the same time they mark in patent application each country they would like to get a grant of the patent, because they can save a great amount of costs.

The number of Euro applications same as the number of PCT applicants has grown further in 2001 and that by about 35.4% compared to 2000. That's because of the lowering of PCT taxes and costs of patent application from the beginning of 2001.

In 2003 there is 2% increase in patent application number by DPMA. There is also an improvement of 16% in PCT patent applications that entered into the national phase. Therefore 5095 PCT applications came from residents of Germany and 2483 PCT applications were from residents of other countries. Here the countries of origin of the patent applicants that are most interested in German patents are stable over the time. First place belongs to USA with 21,9% followed by Japan with 13,8% and France with 4,8%.

In 2004 there is big jump in number of PCT patent applications from German residents where Germany was a designated state. The reason for such behavior can be found in PCT reform or an amendment to PCT regulation that came into force on the 1st of January 2004. Incidentally other paragraphs, there is also a point about increase or further improvement of the quality of an international search and preliminary of an examination system. Since 2004 the number of PCT application by DPMA continued to grow.

When we take a look at the Table XIV for innovations per thousand capita we can clearly see the tendency of growing innovation. When we compare innovation per thousand capita in 2000 and in 2006, there is an increase by about 165% in the number innovations per thousand capita. After 2006 there is a visible fluctuation in number of per thousand capita innovations in Germany. But what we can say for sure is, that there is a decrease in per thousand capita imitation over time in Germany as I have expected. There is a continuous decrease of about 46% in per thousand capita imitation in last decade.

In 2008 there is again an increase in patent applications by DPMA by 2,3% comparing to the year before.

When we take a look at Table XII for patent applications by Spanish Patent and Trademark Office we see that the number of domestic patent applications is increasing over last decade. Same increases the whole patent application number. The number of foreign patent applicants directly by SPTO decreases over time. The number of PCT patent applications by SPTO increases since its ratification in 1989. Than there is a jump in 2001

when the number of PCT patent application decreased by about 16,5 percentage point and than continues to increase.

When we consider the Trilateral Patent Offices we also think of contracting states. The European Patent Office, the Japan Patent Office and the United States Patent and Trademark Office make about 81 percentage point of the applied and valid patents world-wide.
The innovations and imitations of a state are influenced not just by events and affairs at home but also by that world-wide. Most of all by economic growth that in 2001 was estimated as 2.5 percent as reported by IMF. That was a continuation of a global showdown started in 2000. In the same year the worldwide cost of research and development activities grew with the global economy. The characteristic sign for 2001 in the world was globalization of markets and production As a sign can also be seen countries joining Patent Cooperation Treaty and harmonizing patent laws towards common international standards of patent applications across boarders. In 2006 there was decrease in research and development growths. Although the applications for patent among the Trilateral Patent Offices once again increased by 2,5 percentage point in the same calendar year compared to the year before, in 2005. Than in 2008 there was a significant decline in stock market prices as a result of beginning of a international financial crisis. This crisis led also to a world-wide economic recession. The forecasts for patent applications and grants had still shown some degree of growth in the same year 2008 before moving up faster in 2009. But the reality was, that the Trilateral Patent Offices show the slight decrease in patent applications in calendar year 2008 of 0,1 percentage point compared to 2007. Thereafter in 2009 the patent applications decreased slightly among the TPO but than in 2010 we can again see the growing number of patent applications.

European Patent Office is a perfect example of successful political and economic cooperation between European states grants a patent protection in up to 38 member states in 2010. This all is provided on the basis of a unitary patent application and single grant procedure. Here EPO acts as receiving, searching and examining authority under the Patent Cooperation Treaty.
Considering the patent applications in EPO area we can talk about continual increase in patent application by home residents. (This can be also caused by increasing number of member states over time.) It can be because of positive economic output of Euro area. For example in 2002 the output was 1,2%. It was lower than year before but still positive. But what we can observe here better than in particular EPO states is the influence of international financial

crises since 2008. In 2008 there is still an increase in patent application number, but than in 2009 there is the only one decrease in patent applications we can observe over time. From this it is clear, that the lowest number of patent applications was at the beginning of my observation in 1995. The highest number of patent applications was observed at the end of considered period in 2010.

When we take a look at the table for patent grants, there is a continual decline at the beginning of observation from 1995 to 2000. Here the number of granted patents reached its lowest point. After this period, we can observe an increase in patents granted to the residents of EPO member states by the European Patent Office until 2003. Since this year there is just a small fluctuation in granted patents. Whereby the highest number was reached in 2006 and amounted to 32487 patents granted.

The number of imitations, counted according to imitation proxy in Part III of the thesis, is in some cases negative, which I believed would happen. What I also expected, there was a high imitation number before the international financial crisis in 2008. This may be because there was an excess of finances in the research and development sector. Here companies did not have a problem to invest money at the same time in innovation and imitation. Imitation of already existing product or technology can bring gain but compared to a brand new product or technology this gain would be just negligible. Whereby after 2008 there are the lowest numbers of imitations in my observation. This can mean that the firms have a clear goal to invest money just in new inventions. This can mean sure net profit to the firm or to invest into new technologies which can save the money in production process for next steps of innovations.

The number of innovations in EPO counted as patents granted to the residents of EPO member states by Unites States Patent and Trademark Office has many fluctuations. These are mostly caused by global economic and political situation. There is just a very small decline in innovations in 1996 in comparison to the year before. After this there was a growth until 1998. Since 1999 there is an increase in innovations until 2001 than there is once again a decrease until 2005. Thereafter there is a year to year fluctuation which resulted in high increase in 2010 in number of 32473 innovations.

The patent applications by Japan Patent Office by home residents decreased from 1991 until 1994. Thereafter there is an observable increase in applications for a patent over next six years until 2000. Here the patent applications number reached its maximum on 387364 applications in calendar year 2000. Since this year there is almost a continual decrease

in applications over time. One reason for decreasing number of applications could be strengthening and reform of patent system in Japan. The same year the percentage point of online patent applications accounted for 96 percent of whole patent and utility models registrations. The online patent application system started in Japan in 2000. In the same year Japan Patent Organization started to provide new service. This service placed into the operation search function for information related to patents, utility models and trademarks. This service also involved a function of an automatic Japan to English translation. This was followed by a difficult economic and geopolitical situation in Japan which resulted in negative economic growth in 2001. In 2002 there was a small rise in economic factors by 0,2 percentage points in Japan. The format for the domestic application forms for patents and utility models with that for the PCT international applications was unified in 2003. In 2005 there is once more strengthening of the examination system by patent applications.

The patents granted by Japan Patent Office to the home residents decrease from the beginning of the observation in 1991. The decline lead to absolute bottom number of the observing patents grants by JPO in 1994. Next year there was an increase followed with a big jump in 1996. That year the number of patents granted almost doubled compared to the year before. This was caused by the first generation of the on-line patent application system, which was introduced and used first time in 1996 in Japan. This system was not running on personal computers. This system was used on personal computers first time in April 1998 in Japan. In the same year the policy was adopted to perform patent examinations before the publication of the application. An interview system was introduced in the same year that used a TV conference system. In 1996 Japan committed itself to shorten the examination and appeal period to be in line with international standards before 2000 and it succeeded to do so.

The imitation numbers in Japan contain only positive numbers which I expected as there was still not very strict patenting system in place. Of course, there is cooperation between Trilateral Patent Offices system. But still there is not enough research for similarities between patent applications from JPO. That's probably why there is just a small fluctuation, whether upwards or downwards, in numbers of imitations in period between 1999 until 2005. Since 2005 there is a visible decline in imitation numbers in Japan which is caused by moving towards the other two biggest patent offices in the world.

Innovations in Japan declined since the beginning of my observed period in 1995 for eight years until 2003. The following year there was stagnation in number of innovations and in 2005 there was a decrease by about 15 percentage point compared to the year before. Since

this year there was just a small up and down fluctuation. In the last year of my observation there was an increase in innovations by about twenty six percent compared to the year before.

The main goal of the United States Patent and Trademark Office can be characterized as promoting of technological and industrial progress in the United States and strengthening of national economy. There are up and down fluctuations in patent applications by USPTO at the beginning of the observed period. These fluctuations stopped in 1997. There was 10,3 percentage point increase in patent applications over the previous year registered by United States Patent and Trademark Office. The same year also the patent validity length changed. Now it starts at the issuing date and ends twenty years after the earliest date when it came into use claimed by the applicant. Before that it was just seventeen years after the issuing date. Another innovation by the USPTO system was a possibility of electronically processed patent application filling. The reason is so we can find in commitments of USPTO from year 1997 that give, in some sense, guaranties. There was a promise of a reduction of processing time for patent original inventions to twelve months until 2003. USPTO also promised to approve reengineering process and automated systems and to be prepared to use electronic processing of patent applications more effectively until 2003. They also committed to succeed in electronic recording of PCT by 2000 and electronically accept and process PCT application at the USPTO as a partner of World International Patent Organization. USPTO had a goal to enable customers to be able to ask for the status of their patent and trademark applications, to place orders and get products and to reach patent and trademark data through the internet. Since 1997 there had been a continual increase in patent applications until 2007. In 2008 there was almost 10% decrease in patent applications. This decline was highly likely again as a consequence of global economic crises that started in the second half of 2007. Since 2008 there has been once again a continual increase in patent applications until the end of observed period.

When we take a look at the table for Patents granted by USPTO to the home residence we can see an increase in granted patents since the beginning of the observing period until 1994. In 1995 there is just a decrease by about one percentage point followed with an increase in next six years. There can be seen an up and down fluctuations in patent grants after 2001. In 2001 there is still a felling of a global slowdown which started in 2000. That is a possible reason of an economic growth of US that was just at the average value of advanced economies with 1,2 percentage points. The following year there was an increase in economic growth by 1,2% compared to the year before. The USPTO determined in 2003 its 21st Century Strategic Plan. It was a long term plan with a goal to change an agency into an organization that is reacting

with interest to a world economy. In 2010 there was a highest number of granted patents in observed period. It was about 30 % higher than year before.
In this particular case the number of patents granted to the home residents of U.S. by USPTO is identical to the number of innovations in U.S..
As I mentioned before in my thesis I assume the number of imitations each year to be zero because of a very strong and specific patenting system of USPTO. It is almost impossible to get a patent granted in some types of imitation.

V Empirical Results

Tables on GDP growth rate, R&D expenditures in % of GDP, foreign direct investment net inflows in % of GDP, per capita GDP same as innovation and imitation tables both in per thousand capita, concerning the Czech Republic, show that innovations increase with rising amount of per capita GDP. Imitations are in case of the Czech Republic in negative connection to per capita GDP. That means that with rising amount of GDP per capita there is a decrease in imitations. By GDP growth rate we can see the same behavior of imitations and innovations as by GDP per capita. This means that with rising GDP growth rate there is an increase in number of innovations and at the same time there is a decrease in imitations. Whereby, the results for research and development expenditures in % of GDP show opposite direction to the previous two cases. With increasing spending in research and development sector decreases the number of innovations and increases the number of imitations. Increase in the foreign direct investment net inflows in percentage point of GDP into the Czech Republic causes increase in amount of innovation same as decrease in number of imitations.

Considering same tables as in previous description I work out results for Germany. First result will be same as in the Czech Republic and so hat there is a positive relationship between GDP per capita and innovation same as a negative relationship with imitations. This means that with rising amount of per capita GDP there is an increase in innovations and a decrease in imitations. We can observe by GDP growth rate positive relationship with innovations same as with imitations. Whereby increasing GDP growth rate causes increasing amount of innovations same as of imitations. R&D expenditures have in case of Germany same effect on innovations and imitations as the per capita GDP. That means that with increasing research and development expenditures there is rise in amount of innovations and

decline in amount of imitations. Net foreign direct investment inflows have the opposite effect as research and development expenditures. With increasing amount of foreign direct investment net inflows in percentage point of GDP we note decline in number of innovations and at the same time rising amount of imitations.

Considering Table IV, VI, XIII, XIV, XV, XVII, XVIII, XIX and Table XX we can conclude, in case of Spain, that there is a negative relationship between per capita GDP and innovations. At the same time there is a positive relationship between GDP per capita and imitations in prevailing number of cases. Here rising amount of GDP per capita in Spain causes decrease in number of innovations and increase in number of imitations in Spain. It is exactly an opposite tendency in Spain as it was in Germany by talking about per capita GDP. The same direction, in GDP growth rate positively related innovations and negatively related to imitations, as in case of Germany can be seen in Spain. The research and development expenditures are in positive relationship with innovations same as with imitations. This means that with increasing amount of R&D expenditures in percentage point of GDP raises the amount of innovations in Spain same as it was in Germany. But in the same time increases also the number of imitations. Same is the relationship with foreign direct investment net inflows in percentage point of GDP. With rising amount of foreign direct investment net inflows in Spain also the number of innovations same as the number of imitations.

We can presume that both, Czech Republic and Slovakia as new member states of EPO could have another tendencies in innovations and imitations compared to Germany and Spain. Other tendencies can occur also by research and development expenditures, foreign direct investment net inflows and GDP growth rates. At the same time I expect some similarities in behavior of innovations and imitations with respect to R&D expenditures, GDP growth rate, foreign direct investment net inflows in Slovakia and Czech Republic. But in contrast with my expectations the only similarity between these two countries is negative relationship between GDP per capita and imitations. The rest is exactly in opposite direction in Slovak case compared to the case of Czech Republic. So there is a negative relationship between the per capita GDP and the amount of innovations, same as a negative relationship between innovations and GDP growth rate. With rising amount of GDP growth rate there is an increase in number of imitations. In case of Slovak Republic we can also see that increasing amount of spending on research and development increases the number of innovations and at the same time lowers the number of imitations. The opposite is true by the foreign direct investment net inflows. And so that by increasing of the foreign direct

investment net inflows into Slovakia in percentage point of GDP the number of innovations decreases and the number of imitations increases.

With regards to the same tables mentioned above the case of EPO shows following facts. Firstly, that the innovations same as innovations per thousand capita are positively related to the data on per capita GDP. This means that with growing per capita GDP also the number of innovations in EPO area grows. In case of imitations we can see an opposite effect that means that with increasing per capita GDP there is a visible decrease in imitations same as in imitations per thousand capita. But in some data there is a delay of one year. It simply means that if in one year there is an increase in per capita GDP followed by the same tendency next year, there can be small increase in imitation first year. The following year there will be a visible decrease in imitations for sure. In case of GDP growth rate there is an opposite case in EPO compared to the per capita GDP. The results of prevailing number of data may be interpreted as decrease in GDP growth rate which has a positive effect on innovation. This means that by lowering of GDP growth rate there is an increase of innovations. In the case of imitations, in prevailing number of cases, we can observe increasing the number of imitations with increasing GDP growth rate. We cannot clearly say if there is a positive or a negative effect on the innovation number by increasing of research and development expenditures. But we can say that with rising spending on research and development there is a tendency of decreasing imitations in prevailing number of cases. The same situation occurs by foreign direct investment net inflows and innovations. With rising amount of foreign direct investment net inflows decreases the number of imitations and increases the number of imitations in prevailing part of observations.

Following the tables from EPO description above, the results for Japan can be interpreted that there exists a positive relationship between per capita GDP and innovations and a negative relationship between per capita GDP and imitations in Japan. The same but in opposite direction is true for the GDP growth rate. With increasing amount of GDP growth rate there is a decrease in innovations and at the same time increase in imitations in prevailing number of observations in data for Japan. Foreign direct investment net inflows into Japan have same effect on innovations and imitations expressed in percentage point of GDP. The amount of imitations rises with increasing net foreign direct investment net inflows and it lowers the number of innovations. There is positive relationship between research and development expenditures and innovations. There is a visible negative connection between R&D expenditures and imitation in Japan, according to observations.

By the countries of Trilateral Patent Offices I expect some similar tendencies in effects of R&D expenditures, GDP growth rate and foreign direct investment net inflows on innovations and imitations. There is a same relationship between per capita GDP and innovations and imitations in Japan and EPO. By R&D expenditures and innovations there is a positive relationship in Japanese case same as by EPO case. In both member states of TPO there is a negative relationship between GDP growth rate and innovations. We can clearly say that the EPO and Japan have in all observations the same tendency to decrease or to increase not just concerning the innovations but also concerning the imitations.

Following the previous section innovation and imitation both per thousand capita should depend on GDP growth rate, foreign direct investment net inflows, and research and development expenditures same as on high technology imports into a particular country same as on an amount of human resource. Hence I estimate the equation for innovations per thousand capita for a particular EPO member states as follows:

$$IN_{it} = \beta_0 + \beta_1 GDPG_{it} + \beta_2 FDINI_{it} + \beta_3 RDE_{it} + \beta_4 HTI_{it-1} + \beta_5 HR_{it} + \varepsilon_{it}$$

where IN_{it} stands for innovations per thousand capita in country i in period t. $GDPG_{it}$ expresses gross domestic product growth rate of country i in period t. $FDINI_{it}$ shows the foreign direct investment net inflows into a particular country i in percentage point of GDP in period t. RDE_{it} stands for research and development expenditures of country i in percentage point of GDP invested in period t. HTI_{it-1} represents high technology imports in percentage point of total imports into county i in period t-1. HR_{it} stands for human resources in science and technology in percentage point of total population in country i in time period t and ε_{it} stands for standard error, which is supposed to be identically, independently distributed with zero mean and constant variance, σ^2 over time.

For the estimation of imitation per thousand capita of particular EPO states regression I use following equation:

$$IM_{it} = \beta_0 + \beta_1 GDPG_{it} + \beta_2 FDINI_{it} + \beta_3 RDE_{it} + \beta_4 HTI_{it-1} + \beta_5 HR_{it} + \varepsilon_{it}$$

where the IM_{it} stands for the result of imitation proxy per thousand capita for particular EPO states *i* in time period *t*. The rest of independent variables is the same as in the previous equation for innovation.

The equations for TPO member states are not the same as that for the EPO member states due to data. That's why I skip the high technology imports and human resource and instead of these independent variables I use just education spending. Than the equation for innovation per thousand capita estimation looks as follows:

$$IN_{it} = \beta_0 + \beta_1 GDPG_{it} + \beta_2 FDINI_{it} + \beta_3 RDE_{it} + \beta_4 ES_{it} + \varepsilon_{it}$$

where the IN_{it} stands for results of innovation proxy per thousand capita in period *t* of TPO member state *i*, the ES_{it} stands for public spending on higher education in percentage point of GDP of country *i* in time period *t*. The rest of the independent variables can be expressed as in the previous equations.
Than the equation for estimation of imitations per thousand capita of TPO member states looks as follows:

$$IM_{it} = \beta_0 + \beta_1 GDPG_{it} + \beta_2 FDINI_{it} + \beta_3 RDE_{it} + \beta_4 ES_{it} + \varepsilon_{it}$$

with the identical independent variables as in the previous case and dependent variable IM_{it} which stands for imitation per thousand capita of TPO member state *i* in time period *t*.

VI Findings

In general we describe the relation between GDP growth rate and innovation same as with imitation. Here I would rather talk about the impact of innovation or imitation on GDP growth rate. Whereby, in all other cases we talk about the affect of an independent variable on innovation or imitation. Here we can argue that with increasing innovations the GDP growth rate rises and it also rises in case of rising imitations. This is the result of prevailing cases in my regression. The opposite case occurs just by impact of imitations on GDP growth rate on EPO and Japan. It can just be the situation that in such big economies the costs of imitations

are higher than the gains from it. Because of the large market it is simply accustomed to the original trademark. The same reasoning can be used for small economies and innovations like it is in case of the Czech Republic. And so, that the invention from such a small country cannot be applied or is simply not relevant for other, bigger countries. Same as the gains from invention cannot cover the costs of it. Therefore there will be a negative effect of innovation on GDP growth rate in case of the Czech Republic.

Table XXI

Results of Panel Least Squares Cross-section Regression for Czech Republic, Germany, Slovakia and Spain and Panel Least Squares Regression of Innovations per Thousand Capita and Imitations per Thousand Capita

	Innovation				**Imitation**			
	Czech Republic and Slovakia	**Germany and Spain**	**EPO**	**Japan**	**Czech Republic and Slovakia**	**Germany and Spain**	**EPO**	**Japan**
Constant	-0.0016 (0.0005)	-0.0026° (0.0007)	0.0004 (0.0007)	-0.8643*** (0.3699)	0.0523 (0.0829)	-0.0092° (0.0029)	0.0489 (0.0697)	-1.6819 (1.9610)
GDP Growth Rate (GDPG)	-0.0698* (0.0156)	0.0093** (0.0009)	0.0030 (0.0051)	0.0026 (0.0132)	0.0140* (0.0029)	0.0327** (0.0037)	-0.0144** (0.0007)	-0.0756 (0.0697)
Foreign Direct Investment Net Inflows in Percentage Point of GDP (FDINI)	-0.0003 (0.0001)	-0.0006 (0.0005)	-0.1129** (0.0542)	-0.0529 (0.0460)	0.0003 (0.0005)	0.0218** (0.0022)	0.0006 (0.0009)	-0.0140 (0.2440)
Research and Development Expenditures in Percentage Point of GDP (RDE)	0.0017 (0.0008)	0.4856*** (0.0414)	0.0609** (0.0336)	0.2006**** (0.0378)	0.0254** (0.0043)	0.6268° (01775)	-0.0654° (0.0432)	-0.7313**** (0.2005)
High Technology Imports in Percentage Point of Total Imports (HTI) in t-1 period	-0.0001° (0.0000)	-0.4953* (0.0916)	-	-	0.0002 (0.0001)	2.7795** (0.3924)	-	-
Human Resource in Science and Technology in Percentage Point of Total Population of a Country (HR)	0.4376* (0.0932)	1.5896** (0.1612)	-	-	-0.2992 (0.4952)	-8.2469** (0.6905)	-	-
Public Spending on Higher Education in Percentage Point of GDP (ES)	-	-	0.0096* (0.0059)	0.1380* (0.0852)	-	-	0.0132** (0.0076)	1.7771**** (0.4518)
Observations	15	17	16	16	15	17		16
R^2	0.9769	0.9899	0.5760	0.7281	0.9875	0.9899		0.8343
F-statistics	0.3150	0.0062	0.0372	0.0039	0.1388	0.0131		0.0003

**** Significant at the 1% confidence level *** 5% confidence level ** 10%confidence level

* 15% confidence level ° 20% confidence level

standard error is in parentheses

Previous empirical and statistical studies on foreign direct investment show a negative relationship between FDINI and innovations. They also expect positive relationship between foreign direct investment net inflows and imitations. This can be justified with simpl consideration. Such that, when the foreign technology, technological procedure and also the final product is imported to a country there is no need of innovation in the particular category of product (see the example with cereals). From this follows that with increasing FDINI there is a decrease in innovations at the home market. And similarly with imports of technological process there is an import of know how. This means that when the product is produced in a particular country there need to be workers with particular knowledge and skills. The workers gain the knowledge and the skills from the company in form of training, certificates or courses. Therefore we can expect that for such skilled workers is easy to give know how to a third person or to a competitor or just simply to establish a new competitive company. From this follows, that the outcome from the table XXI met expectations with the exception of the result of negative relation between FDINI and imitations of Japan. One possibility why it is may be a presence of a large initial investment of imitation.

Relatively much of existing literature says that there should be a positive relationship between research and development expenditures and innovation. Not only because more money is in invention process but also because it can mean more qualified researchers and for many other reasons. And really, in my results we can see a positive effect of R&D expenditures on innovation by all of observed countries. This means that there is prevailing quality against quantity in research and development sector. Research and development expenditures are most of the time used as a measure of innovation in particular countries. We can also expect negative effect of R&D expenditures on imitations. This is true in case of EPO and Japan. Research and development expenditures prevails positive effect on imitations in new as well as in old members of European Patent Organizations. This can be due to misuse, or rather said, incorrect use of research and development expenditures on imitations instead of on innovations.

Theoretical studies within the framework of education and schooling represent ideas that with raising expenditures on higher education or just education as whole raises imitation instead of innovation. I think that when there is an increase in higher education spending it means either more qualified researchers, better environment, and more qualified education process. Or on the other hand there can be argument that more spending in higher education sector can just be seen as mass education and therefore less effective and on lower quality level. I think that the relationship between high quality education and innovation same as

imitation depends on how the investment in higher education is spent. If it is oriented on mass education there should be an increase in imitation and decrease of innovation with rising spending on higher education. And if we can talk about quality increased spending on higher education than with rising outlays there should be an increase in innovation and decrease in imitation amount. From the results of my study there is not exactly clear if there is a quality or a mass oriented education. The reason is that increase in public spending on higher education indicates at the same time increase in innovation and also in imitation amount.

Same case occurs by human resource in science and technology. There is not uniformed opinion regarding the effect of human resources in science and technology but I think it is the same as in higher education spending. When there are mass human resources in science and technology they may not be all enough qualified. Human resources in science and technology are automatically negatively related to innovation and positively related to imitation. The results from my cross-section regression show that with rising human resource there is an increase in innovations same as decrease in imitation. Therefore we can say that in case of all focused EPO member states increase in human resource in science and technology need not mean just increase in number of workers. It also increases number of qualified workers and researchers. But the numbers for human resource have not much significance according to regression results.

By high technology imports there is supposed to be a same trend as I used by foreign direct investment net inflows. We can say that with increase in high technology import the number of imitations rises and the number of innovations declines.

VII Conclusion

This paper generally shows that in small economies same as in big economies there is not just innovation. Imitation has also very important role. In particular, domestic innovations have positive impact on research and development expenditures and public spending on education. Innovation negatively depends on foreign direct investment net inflows, high tech imports and human resource in science and technology. Whereby, the GDP growth rate is positively related to innovation as well as to imitation. Domestic imitation depends positively on foreign direct investment net inflows, high tech imports and human resource in science and technology. It negatively depends on research and development expenditures and public spending on education. These suggestions are most of all same as the results of my regression.

What I have expected was higher significance in case of GDP growth rate and mainly by foreign direct investment net inflows.

Results of the regression are consistent with the expectation that in more developed countries there is higher interaction between GDP growth rate, FDINI and R&D expenditures and innovations and imitations.

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Appendix

Table I

Data for Patent Applications by Japan Patent Office 1991-2010

*(Following data from Trilateral Statistical Reports and Four Office Statistics Reports)**

Year	Domestic	Foreign	Thereof PCT °	Total
1991	NA	NA	NA	369369
1992	338019	33875	NA	371894
1993	332345	34141	NA	366486
1994	319938	33363	NA	353301
1995	334612*	34603	NA	369215
1996	340101*	36514	NA	376615
1997	350807*	40765	NA	391572
1998	359381*	42551	6022	401932
1999	360180*	45475	7429	405655
2000	387364*	49501	9447	436865
2001	386767*	52408	11688	439175
2002	369458*	51586	13879	421044
2003	362711*	50381	17097	413092
2004	368416*	54665	19850	423081
2005	367960*	59118	24290	427078
2006	347060*	61614	26422	408674
2007	333498*	62793	26935	396291
2008	330110*	60892	28027	391002
2009	295315*	NA	NA	NA
2010	290081*	NA	NA	NA

° *International Applications which Entered the National Phase (thereof PCT)*

Source: www.trilateral.net, www.jpo.go.jp

Table II

Data for Patents Granted by Japan Patent Office 1991-2010

Year	Domestic	Foreign	Thereof PTC °	Total
1991	NA	NA	NA	36100
1992	78993	13107	NA	92100
1993	77311	11089	NA	88400
1994	72757	9643	NA	82400
1995	94804	14296	NA	109100
1996	187681	27419	NA	215100
1997	129937	17749	NA	147686
1998	125704	15744	NA	141448
1999	133960	16099	NA	150059
2000	112269	13611	NA	125880
2001	109375	12367	NA	121742
2002	108515	11503	NA	120018
2003	110835	11676	NA	122511
2004	112527	11665	NA	124192
2005	111088	11856	NA	122944
2006	126804	14595	NA	141399
2007	145040	19914	NA	164954
2008	151765	25185	NA	176950
2009	164459*	NA	NA	NA
2010	187237*	NA	NA	NA

° *International Patents Granted in the National Phase (thereof PCT)*

Source: www.trilateral.net, www.jpo.go.jp

Table III

Data for Patent Applications by European Patent Organization 1995-2010

*(Following data from Trilateral Statistical Reports and Four Office Statistics Reports)**

Year	CZ	DE	ES	SK	EPO Residents	JP	EPO	US	Foreign Residents	Total
1995	NA	NA	NA	NA	NA	NA	30000*	17423*	NA	NA
1996	NA	NA	NA	NA	NA	NA	31598*	18531*	NA	NA
1997	NA	13846	386	NA	36510	12856	36510*	20429*	36394	72904
1998	NA	16117	432	NA	41190	13813	41190*	23853*	40897	82087
1999	NA	18190	478	NA	45071	14617	45028*	25010*	44288	89359
2000	NA	20104	525	NA	49760	17124	49760*	28194*	50932	100692
2001	NA	21308	582	NA	53737	19845	53737*	30837*	56288	110025
2002	39	21039	603	10	53440	15912	53475*	29748*	52803	106243
2003	58	22701	695	14	58255	18534	58255*	31534*	58358	116613
2004	84	23044	846	12	61189	20584	61207*	32164*	62517	123706
2005	73	23789	972	16	63650	21461	63650*	32189*	65029	128679
2006	79	24867	1093	20	65606	22144	65776*	35148*	69577	135183
2007	96	25190	1283	19	68991	22887	68290*	35360*	72448	141439
2008	111	26653	1322	25	72183	23081	72337*	36640*	74378	146561
2009	136	25107	1258	25	68597	19933	68597*	33636*	65945	134542
2010	NA	NA	NA	NA	NA	NA	74408*	39250*	NA	NA

Source: www.trilateral.net, www.epo.org

Table IV

Data for Patents Granted by European Patent Organization 1995-2010

***Innovations** (counted according to innovation proxies) 1995-2010*

*(Following data from Trilateral Statistical Reports and Four Office Statistics Reports)**

Year	CZ	DE	ES	SK	EPO Residents	EPO	US	Foreign Residents	Total
1995	NA	NA	NA	NA	NA	20368*	10305*	NA	NA
1996	NA	NA	NA	NA	NA	19214*	10131*	NA	NA
1997	NA	7796	144	NA	19430	19430*	9981*	20216	39646
1998	NA	7486	126	NA	18376	18376*	9380*	18342	36718
1999	NA	7384	118	NA	17885	17885*	9151*	17473	35358
2000	NA	5395	125	NA	13536	13536*	7428*	13987	27523
2001	NA	8135	171	NA	18303	18303*	8583*	16401	34704
2002	14	11255	198	6	25449	25495*	11845*	21935	47384
2003	18	13429	329	8	32078	32078*	15090*	27914	59992
2004	25	13621	373	3	31458	31449*	14202*	27272	58730
2005	26	12499	321	10	28034	28034*	13007*	25225	53259
2006	21	14274	361	8	32483	32487*	14834*	30297	62780
2007	37	11935	331	9	28408	28220*	12506*	26292	54700
2008	44	13498	418	7	32249	32249*	12733*	27570	59819
2009	40	11384	348	9	27601	27601*	11352*	24368	51969
2010	NA	NA	NA	NA	NA	30702*	12506*	NA	NA

Source: www.trilateral.net, www.epo.org

Table V

Data for Patent Applications by U.S. Patent and Trademark Office 1991-2010

(Following data from Trilateral Statistical Reports and Four Office Statistics Reports)*

Year	Domestic	EPO	JP	Foreign	Thereof PCT °	Total
1991	87955	NA	NA	76351	NA	164306
1992	92425	NA	NA	80650	NA	173075
1993	99955	NA	NA	74788	NA	174743
1994	107233	NA	NA	82624	NA	189857
1995	123953*	31857*	40352*	88419	NA	212372
1996	106892*	31230*	39037*	88295	NA	195187
1997	120445*	32289*	40899*	94812	NA	215257
1998	135483*	38890*	46182*	107579	NA	243062
1999	149825*	45932*	48634*	120362	NA	270187
2000	163699*	44389*	50307*	131131	NA	294830
2001	174709*	48976*	62037*	148997	NA	323706
2002	184245*	53511*	60200*	150200	NA	334445
2003	188941*	51366*	61639*	153500	NA	342441
2004	189536*	53541*	64250*	167407	NA	356943
2005	207867*	54703*	70332*	182866	NA	390733
2006	221784*	59635*	76674*	204183	NA	425967
2007	241347*	63862*	77546*	214807	NA	456154
2008	219099*	68448*	82138*	224733	NA	443832
2009	220122*	73414*	82455*	231194	NA	451316
2010	241977*	78436*	83338*	NA	NA	NA

°*International Applications which Entered the National Phase (thereof PCT)*

Source: www.trilateral.net, www.uspto.gov

Table VI

Data for Patents Granted by U.S. Patent and Trademark Office 1991-2010

*(Following data from Trilateral Statistical Reports and Four Office Statistics Reports)**

Year	Domestic	EPO	JP	Foreign	Total
1991	51177	NA	NA	45334	96511
1992	52253	NA	NA	45191	97444
1993	53231	NA	NA	45111	98342
1994	56066	NA	NA	45610	101676
1995	55739*	17868*	21764*	34680	99419
1996	61107*	17844*	23052*	48541	109648
1997	61707*	18633*	23179*	50276	111985
1998	80292*	25693*	30841*	67228	147520
1999	83911*	24807*	31105*	69579	153490
2000	85072*	26324*	31296*	72426	157498
2001	87607*	28459*	33224*	78435	166042
2002	86980*	28428*	34859*	80360	167340
2003	87901*	28209*	35516*	81130	169031
2004	84271*	26246*	35350*	80020	164291
2005	74637*	22182*	30341*	69169	143806
2006	89823*	25636*	36807*	83949	173772
2007	79527*	23884*	33525*	77756	157283
2008	78267*	24007*	33912*	80270	158537
2009	82382*	23677*	35501*	84967	167349
2010	107792*	32473*	44814*	111822	219614

Source: www.trilateral.net, www.uspto.gov

Table VII

Data for Patent Applications by Industrial Patent Office of Czech Republic 1993-2009

Year	Domestic	Foreign	Thereof PCT °	Total
1993	880	2053	751	2933
1994	756	2593	1160	3349
1995	627	2892	1631	3519
1996	617	3241	2041	3858
1997	585	3652	2576	4237
1998	626	3761	2722	4387
1999	598	4199	3251	4797
2000	556	4382	3405	4938
2001	578	4155	3370	4733
2002	528	3759	3200	4277
2003	627	2952	2745	3579
2004	619	633	524	1252
2005	586	244	145	830
2006	641	195	109	836
2007	716	192	95	908
2008	712	142	88	854
2009	789	92	52	881

° *International Applications which Entered the National Phase (thereof PCT)*

Source: www.upv.cz

Table VIII

Data for Patents Granted by Industrial Patent Office of Czech Republic 1993-2009

Year	**Domestic**	**Foreign**	**EP ~**	**Total**
1993	524	336	NA	860
1994	419	306	NA	725
1995	577	722	NA	1299
1996	407	883	NA	1290
1997	300	1177	NA	1447
1998	291	1160	NA	1451
1999	228	1254	NA	1482
2000	272	1339	NA	1611
2001	241	1478	NA	1719
2002	241	1564	NA	1805
2003	259	1543	3	1802
2004	293	1221	102	1514
2005	349	1202	753	1551
2006	264	1060	1993	1324
2007	227	976	2741	1203
2008	239	1041	3513	1280
2009	376	917	3412	1293

~ EP Patents Validated in the CZ

Source: www.upv.cz

Table IX

Data for Patent Applications by Industrial Patent Office of Slovak Republic 1995-2009

Year	Domestic	Foreign	Thereof PCT °	Total
1995	269	1400	939	1669
1996	195	1498	1078	1693
1997	224	1578	1199	1802
1998	214	1612	1257	1826
1999	214	1682	1416	1896
2000	241	1799	1550	2040
2001	247	1695	1529	1942
2002	260	1598	1484	1858
2003	212	1435	1393	1647
2004	215	238	199	453
2005	155	95	56	250
2006	193	90	58	283
2007	240	106	69	346
2008	165	75	36	240
2009	176	63	45	239

° *International Applications which Entered the National Phase (thereof PCT)*

Source: www.indrop.gov.sk

Table X

Data for Patents Granted by Industrial Property Office of Slovak Republic 1996-2009

Year	Domestic	Foreign	Thereof PCT °	Total
1996	78	120	8	198
1997	143	419	33	562
1998	130	715	162	845
1999	75	698	273	773
2000	83	811	390	894
2001	86	957	599	1043
2002	71	616	448	687
2003	64	588	437	652
2004	36	519	380	555
2005	52	508	412	560
2006	72	471	387	543
2007	89	485	454	574
2008	89	477	448	566
2009	66	488	469	554

° *International Patents Granted in the National Phase (thereof PCT)*

Source: www.indrop.gov.sk

Table XI

Data for Patent Applications by German Patent and Trademark Office 1997-2009

Year	Domestic	Foreign	Thereof PCT °	Total
1997	45345	10384	2077	55729
1998	47633	9733	2201	57366
1999	51105	10178	2920	61283
2000	53521	11341	3828	64862
2001	52650	11501	5184	64151
2002	51513	11931	6535	63444
2003	52425	12093	7580	64518
2004	48448	10786	1450	59234
2005	48367	11855	2471	60222
2006	48012	12573	3008	60585
2007	47853	13139	3598	60992
2008	49240	13177	3662	62417
2009	47859	11724	3645	59583

°*International Applications which Entered the National Phase (thereof PCT)*

Source: www.dpma.de

Table XII

Data for Patent Applications by Spanish Patent and Trademark Office 1995-2009

Year	Domestic	Foreign	Thereof PCT °	Total
1995	2047	507	46	2554
1996	2274	486	38	2760
1997	2236	466	31	2702
1998	2270	446	31	2716
1999	2438	421	86	2859
2000	2709	402	86	3111
2001	2523	381	91	2904
2002	2763	292	76	3055
2003	2804	277	89	3081
2004	2864	236	84	3100
2005	3027	225	88	3252
2006	3098	254	75	3352
2007	3244	195	93	3439
2008	3599	184	101	3783
2009	3764	168	125	3932

° *International Applications which Entered the National Phase (thereof PCT)*

Source: www.oepm.es

Table XIII

Imitations *(counted according to imitation proxies) 1995-2010*

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	-1857	294260	NA	0
1996	NA	NA	NA	368	301064	NA	0
1997	NA	31499	1850	4221	309908	NA	0
1998	NA	31516	1838	2300	313199	NA	0
1999	NA	32915	1960	-904	311546	NA	0
2000	NA	33417	2184	5371	337057	NA	0
2001	NA	31342	1941	4761	324730	NA	0
2002	489	30474	2160	-36	309258	250	0
2003	569	29724	2109	6889	301072	198	0
2004	535	25404	2018	7666	304166	203	0
2005	513	24578	2055	8947	297628	139	0
2006	562	23145	2005	6141	270386	173	0
2007	620	22663	1961	4428	255952	221	0
2008	601	22587	2277	3889	247972	140	0
2009	653	22752	2506	-4817	212860	151	0
2010	NA	NA	NA	-4028	206743	NA	0

Table XIV

Data on Innovations per Thousand Capita 1995-2010

(Counted from Table IV Innovations and Table XVI Data on Population in Thousands)

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	0,037458	0,173322	NA	0,039212
1996	NA	NA	NA	0,037342	0,183373	NA	0,038197
1997	NA	NA	NA	0,03893	0,183944	NA	0,037273
1998	NA	NA	NA	0,053425	0,244094	NA	0,034709
1999	NA	NA	NA	0,051508	0,24572	NA	0,033558
2000	NA	0,065585	0,003088	0,054527	0,246569	NA	0,026324
2001	NA	0,098678	0,004159	0,058824	0,261008	NA	0,030107
2002	0,001372	0,136363	0,004733	0,058659	0,273543	0,00111	0,041156
2003	0,001763	0,162713	0,007702	0,057966	0,278297	0,001487	0,051976
2004	0,002446	0,165101	0,008635	0,053695	0,276849	0,000558	0,048463
2005	0,002536	0,151617	0,007277	0,045165	0,237469	0,001859	0,043979
2006	0,002041	0,173407	0,008074	0,051978	0,288072	0,001486	0,04968
2007	0,003564	0,145163	0,007323	0,048222	0,262383	0,00167	0,041468
2008	0,004203	0,164606	0,009056	0,048237	0,265835	0,001298	0,041833
2009	0,003807	0,139165	0,007444	0,047382	0,278669	0,001666	0,036976
2010	NA	NA	NA	0,0648	0,352378	NA	0,040506

Table XV

Data on Imitations per Thousand Capita 1995-2010

(Counted from Table XIII Imitations and Table XVI Data on Population in Thousands)

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	-0,00389	2,343394	NA	0
1996	NA	NA	NA	0,00077	2,39489	NA	0
1997	NA	NA	NA	0,00882	2,459373	NA	0
1998	NA	NA	NA	0,00478	2,47884	NA	0
1999	NA	NA	NA	-0,00188	2,461122	NA	0
2000	NA	0,406236	0,053953	0,01113	2,655539	NA	0
2001	NA	0,38018	0,047207	0,00984	2,551084	NA	0
2002	0,047927	0,369216	0,051628	-0,00007	2,42679	0,046477	0
2003	0,055724	0,360151	0,049371	0,01416	2,359147	0,036803	0
2004	0,052343	0,307924	0,046715	0,01568	2,382122	0,037697	0
2005	0,050044	0,298139	0,046589	0,01822	2,329441	0,025793	0
2006	0,054632	0,281176	0,044846	0,01245	2,116193	0,032073	0
2007	0,059724	0,275645	0,043384	0,00894	2,003209	0,040918	0
2008	0,057413	0,275445	0,049331	0,00781	1,943842	0,025868	0
2009	0,062149	0,278135	0,053609	-0,00964	1,670866	0,027834	0
2010	NA	NA	NA	-0,00804	1,625645	NA	0

Table XVI

Data on Population in Thousands 1995-2010

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	477010	125570	NA	262803
1996	NA	NA	NA	477856	125711	NA	265229
1997	NA	NA	NA	478630	126011	NA	267784
1998	NA	NA	NA	480920	126349	NA	270248
1999	NA	NA	NA	481618	126587	NA	272691
2000	10267	82260	40480	482768	126926	5403	282172
2001	10206	82440	41117	483797	127291	5379	285082
2002	10203	82537	41838	484635	127435	5379	287804
2003	10211	82532	42717	486646	127619	5380	290326
2004	10221	82501	43198	488798	127687	5385	293046
2005	10251	82438	44109	491135	127768	5389	295753
2006	10287	82315	44709	493210	127770	5394	298593
2007	10381	82218	45201	495292	127771	5401	301580
2008	10468	82002	46158	497686	127568	5412	304375
2009	10507	81802	46746	499705	127395	5425	307007
2010	10687	81987	46962	501126	127176	5461	308746

Source: www.epp.eurostat.ec.europa.eu, www.stat.go.jp, www.census.gov

Table XVII

Data on Per Capita GDP 1995-2010

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	21116,02	27534	NA	34055
1996	NA	NA	NA	21896,201	28225	NA	34906
1997	NA	NA	NA	21875,19	28600	NA	36042
1998	NA	NA	NA	22036,24	27944	NA	37112
1999	NA	NA	NA	22653,384	27862	NA	38323
2000	5985	25095	23132	23784,285	28600	5773	39292
2001	6750	25664	24406	24902,398	28565	6298	39187
2002	7841	25984	23468	23888,415	28602	6843	39432
2003	7933	26222	19850	20110,74	28959	7550	40050
2004	8644	26798	18345	18666,34	29732	8391	41137
2005	9789	27190	18699	18944,87	30312	9154	41961
2006	11074	28246	18964	19283,415	30929	10217	42725
2007	12337	29569	17667	18104,73	31652	11406	43170
2008	14181	30214	16433	16963,884	31446	12395	43250
2009	13069	29278	16532	17053,92	32424	12100	45854
2010	NA	21468	17257	18160,77	33612	13169	46844

Source: www.epp.eurostat.ec.europa.eu, www.stat.go.jp, www.census.gov

Table XVIII

Data on GDP Growth Rate 1995-2010

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	0,3	0,9	NA	1,77
1996	NA	NA	NA	0,43	0,6	NA	4,47
1997	NA	NA	NA	0,8	0,07	NA	4,77
1998	NA	NA	NA	0,57	-0,73	NA	4,27
1999	NA	NA	NA	0,9	-0,13	NA	4
2000	0,93	3,1	1,11	0,87	1,17	0,97	3,13
2001	0,6	1,47	0,87	0,3	-0,5	0,63	0,1
2002	0,33	0,13	0,63	0,37	0,57	1,23	2,53
2003	0,9	-0,27	0,74	0,17	0,3	0,97	3,93
2004	1,2	0,97	0,88	0,5	0,37	1,43	2,77
2005	1,7	0,77	0,89	0,53	0,6	1,7	3,07
2006	1,73	2,8	0,96	0,83	0,27	2,27	2,27
2007	1,47	2,97	0,81	0,6	0,2	2,3	2,37
2008	0,4	1,8	-0,34	-0,07	-0,57	0,27	-1,4
2009	-1,2	-5,83	-0,99	-0,73	-0,8	-1,77	-2,23
2010	0,73	3,57	0,43	0,53	1,07	0,8	3,4

Source: www.epp.eurostat.ec.europa.eu, www.stat.go.jp, www.census.gov

Table XIX

Data on R&D Expenditures in Percentage Point of GDP 1995-2010

Year	CZ	GE	ES	EPO	JP	SK	US
1995	NA	NA	NA	1,76	2,91	NA	2,5
1996	0,97	2,19	0,81	1,79	2,8	0,9	2,54
1997	1,08	2,24	0,8	1,77	2,87	1,07	2,57
1998	1,15	2,27	0,87	1,8	3,04	0,78	2,6
1999	1,14	2,4	0,86	1,82	3,02	0,65	2,64
2000	1,21	2,45	0,91	1,86	3,05	0,65	2,73
2001	1,2	2,46	0,91	1,85	3,13	0,63	2,74
2002	1,2	2,49	0,99	1,89	3,18	0,57	2,64
2003	1,25	2,52	1,05	1,86	3,2	0,57	2,63
2004	1,25	2,49	1,06	1,84	3,17	0,51	2,56
2005	1,41	2,48	1,12	1,83	3,32	0,51	2,57
2006	1,55	2,53	1,2	1,86	3,4	0,49	2,61
2007	1,54	2,54	1,27	1,87	3,44	0,46	2,67
2008	1,47	2,68	1,34	1,68	3,44	0,47	2,79
2009	1,53	2,82	1,38	1,84	3,46	0,48	2,81
2010	1,52	2,73	1,32	1,92	3,46	0,46	2,85

Source: www.epp.eurostat.ec.europa.eu, www.stat.go.jp, www.census.gov

Table XX

Data on Foreign Direct Investment Net Inflows in % of GDP 1995-2010

Year	CZ	GE	ES	EPO	JP	SK	US
1995	4,65	0,48	1,35	1,08	0	0,94	0,79
1996	2,31	0,26	1,55	1,14	0	1,29	1,11
1997	2,25	0,59	1,56	1,25	0,08	0,64	1,28
1998	5,98	1,08	2,38	2,41	0,08	1,92	2,06
1999	10,49	2,61	3	4,98	0,28	1,18	3,14
2000	8,79	11,14	6,69	11,62	0,18	7,15	3,25
2001	9,12	1,39	4,62	5,75	0,15	8,12	1,63
2002	11,29	2,67	5,83	5,31	0,23	11,85	0,8
2003	2,21	1,28	2,9	3,59	0,15	1,22	0,57
2004	4,54	-0,36	2,37	2,04	0,17	5,42	1,24
2005	9,32	1,68	2,17	4,35	0,07	3,93	0,9
2006	3,87	1,95	2,52	3,96	-0,16	6,04	1,82
2007	6,09	2,42	4,62	6,62	,51	4	1,58
2008	3,04	0,13	4,89	2,92	0,5	3,3	2,17
2009	1,51	1,18	0,58	3,37	0,24	-0,04	1,13
2010	3,5	1,41	1,75	2,72	-0,02	0,63	1,62

Source: www.epp.eurostat.ec.europa.eu, www.stat.go.jp, www.census.gov

Abstrakt Deutsch

Diese Magisterarbeit konzentriert sich auf die Mitgliedsstaaten der Europäische Patent Organization (EPO), auf den Vergleich von EPO Mitgliedsstaaten und ihre Raten von Innovationen und Imitationen. Ich möchte auch die Unterschiede zwischen Innovationen-und Imitationen zwischen EPO und Japan erforschen. Aus technischen Gründen lasse ich die U.S., die derzeit gemeinsam mit EPO und Japan zu den innovativsten Staaten weltweit gehören, aus dem Vergleich aus.

Ich werde auch einen Vergleich von zwei mitteleuropäischen Ländern und zwei westeuropäischen Ländern beschreiben. Hiermit möchte ich zeigen, dass es in neuen EPO Mitgliedstaaten – Slowakei und Tschechische Republik - mehr Imitation existiert. Diese Staaten sind auch weniger entwickelt als ihre westliche Nachbarstaaten. In den alten EPO Mitgliedsstaaten – Deutschland und Spanien – sollen die Innovationen überwiegen.

Es kann Schwierigkeiten machen, zwischen Innovationen und Imitationen zu unterscheiden. Wenn wir die Innovationen als erfinden neues Produkts oder neue Art und Weise dieses Produkt zu produzieren sehen, gibt es keine Garantie, dass ein solches Produkt oder Produktion (oder zumindest ähnliche) nicht bereits irgendwo in der Welt erfunden ist. Wenn so ein Produkt oder Produktionsprozess vorhanden wäre, werden wir nicht mehr über Innovation sondern über Imitation sprechen.

Ich werde auch die Auswirkung von einigen ökonomischen Faktoren auf Innovationen und Imitationen beschreiben. Insbesondere sollten inländische Innovationen positive Auswirkung auf Forschung- und Entwicklungskosten und auf öffentliche Ausgaben auf Bildung zeigen. Innovationen sollen einen negativen Einfluss auf die Nettozuflüsse ausländischer Direktinvestitionen, High-Tech-Importe und Humanressourcen in Wissenschaft und Technik haben. Hierbei sollte die BIP Wachstumsrate positiven Einfluss auf Innovationen sowie auf Imitationen zeigen. Inländische Imitationen sollen positive Wirkung auf die Nettozuflüsse der ausländischen Direktinvestitionen, High-Tech-Importe und Humanressourcen in Wissenschaft und Technik haben. Da soll auch ein negativer Zusammenhang zwischen Imitationen und Forschung- und Entwicklungskosten oder öffentlichen Ausgaben für Bildung entstehen.

Abstract English

In my thesis I am going to focus on European Patent Organization member states, on comparison of some EPO member states and their rates of innovation and imitation. I would also like to explore differences in rates of innovation and imitation between EPO and Japan. From technical reasons I skipped comparisons in case of U.S. which are currently together with EPO and Japan the most innovating states.

I made a comparison of two Central-European countries and two Western-European countries. Here I want to show that there is more imitation in new EPO member states – Czech Republic and Slovakia. These are also less developed as their Western neighbors. In the old EPO member states – Germany and Spain - innovation should be in higher percentage point as in the Czech Republic and Slovakia

There is a difficulty to distinguish between innovations and imitations. If we see the innovation as inventing new product or new way to produce it, there is no guarantee that such a product or production (or at least similar one) is not already invented somewhere in the world. If it would exist than we would not talk about an innovation but about imitation.

I also search for impact of some economic factors on innovations and imitations. In particular, domestic innovations should show positive impact on research and development expenditures and public spending on education. Innovation should negatively depend on foreign direct investment net inflows, high tech imports and human resource in science and technology. Whereby, the GDP growth rate should be positively related to innovation as well as to imitation. Domestic imitation should depend positively on foreign direct investment net inflows, high tech imports and human resource in science and technology. It should negatively depend on research and development expenditures and public spending on education.

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1997 – 2006	Gymnasium A. Bernolaka, Senec, Slovakia

Language Skills

Slovak: Mother Tongue
German: Advanced Level
English: Advanced Level