

EU member states`intellectual property systems as seen by local actors. The case of patents.

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1 Introduction

In the 21st century which is characterized by fast technological pace and convergence of technologies, the possession of IPR, especially patents, has become centric for technology-orientated companies, regardless of their size. Patent portfolios allow companies to produce novel products, block competitors, and litigate successfully. Patent trading has become strategically important and one of the framework conditions that determine companies' competitiveness.

Governments across the world are emphasising the importance of IPR for their countries' economic growth while it supports the national innovation capacity. Asian Tigers as well as China are taking active steps to facilitate technology transfer through various means, e.g. by launching patent aggregation funds which make patents accessible to local SMEs on favourable terms.¹ The European Union does not want to be left behind in the patent race. The EU has adopted Industrial Property Rights Strategy and plans to achieve single IPR regime in Europe (European Commission, 2008 and 2011). Secondly, the EU has been working, since several years, towards unitary EU patent and unified patent litigation system. The EU's goal is to achieve a patent system with high-quality patents, affordable costs, and with unified litigation system. The EU member states have been asked to take this into account upon shaping their national IPR strategies.

The EU has a difficult task to combine 27 different IPR systems into single IPR market in Europe. The goal of this study is to shed some light on some of these different systems. The IPR systems of eight European countries were compared and implications on domestic and foreign patenting activity within these countries were shown. To get a comprehensive picture, national strategic documents were analysed and complemented with the views of actors within the IPR systems of the EU countries. First, a brief literature review on how patents influence the economic system is given and results of important empirical studies are presented. In the following section methods and data are explained as well as important findings of a policy document evaluation and results of qualitative and quantitative empirical research are offered. The last section concludes this paper with some policy implications for the European Commission (EC) as the main policy maker within the EU as well as for the national policy makers in each country.

¹ See for example Bailey, C. (2011). China's emerging patent trading market. *Intellectual Asset Management*. July/August 2011, 78 – 82; Computex.biz (2010). World's Leading ICT B2B Website. The patent war between Taiwanese and South Korea enterprises starts. Retrieved August, 22, 2011 from http://www.computex.biz/HeadlineNews_Detail.aspx?list_id=34730; Kim, Hong & Associates (2011). Newsletters. Available at: <http://pkkim.com/resources/new.asp?LetterNum=198&bType=A> (10.11.2011).

2 Literature review

In this section a short summary of theoretical aspects concerning the impact of patents on economic development is provided. Additionally to the theoretical discussions, results of empirical studies on the importance of patent systems on innovative activities, R&D expenditures, and in conclusion for one country's economic growth are shown.

One interesting finding is, that there is no clear picture both in theory and in the empirical research that rights on intellectual property, especially patents have an impact on economic development and how intense this impact might be. This study will focus on patent protection, since patents are by far the most prominently discussed intellectual property right and the patent system is seen as crucial system factor for the economically development of modern economies in a knowledge based society. „A knowledge economy (KE) relies on knowledge as the key engine of economic growth. It is an economy in which knowledge is acquired, created, disseminated, and applied to enhance economic development. Intuitively, conditions for a knowledge-based development process would seem to include an educated and skilled labour force, a dense and modern information infrastructure, an effective innovation system, and an institutional regime that offers incentives for the efficient creation, dissemination, and use of existing knowledge.“ (World Bank (2007), p. 23.) And since knowledge is becoming a more and more important production factor securing intellectual property is increasingly in the focus of economic actors.

2.1 The trade-offs of the patent system

Among various IP types (industrial designs, trademarks, copyrights, brands), patents protect technological innovations and thus are most closely associated with the need of countries to secure investments into technological advance (Putnam, 2008; Levin, et al 1987). Patent laws help innovators to recoup investments into R&D once the products involving protected technology are launched on the market. Patent protection gives companies the right to deny other's the manufacture and production of products that would infringe the underlying patented products or process. Patents allow companies to attain monopoly power during the validity term of a patent (generally 20 years). In addition, companies that have patented technologies attract investors, because the latter have the certainty that investments can be recouped. This relates to the signaling function of patents. Patents signal the firm's value to potential investors even if patented product is not yet developed to marketable good (Dosi, et al, 2006). Hence, companies are interested in investing in innovation if they know that they can collect also benefits associated with the results.

For reasons of assuring monopoly power patent rights also change the social welfare distribution by cutting consumer rents and raising producer rents. Society is not willing to give this monopoly right to someone without getting any benefits in return. Innovation is often a cumulative process. Society's development depends on new knowledge and subsequent innovations built on existing knowledge. By patents innovators are obliged to disclose their innovation to public and this contributes to the diffusion of new knowledge (Scotchmer, 2006).

The trade-off between the benefits (knowledge diffusion) and costs (monopoly power) of the patent system can both boost innovation and hinder it, similarly it can facilitate competition and counteract to it. Hall (2007, see Table 1) finds, that patent system benefits innovation by boosting R&D investments and by diffusing knowledge. On the other hand innovation can be hindered because of high transaction costs. Modern technologies and products need/are a combination of many other (patented) technologies and products. That means innovators have to carry out negotiations with several patent owners to combine several technologies or products. If we consider competition, patent system helps newcomers to enter into the market by making them information in knowledge intensive industries available and enabling trading with inventive knowledge. On the other hand, the cost of the patent system for competition is that it creates monopolies that are not only temporary, but can evolve to be also long-term (network industries).

Table 1: Trade-offs of the patent system

Effects of the patent system on:	Benefits	Costs
Innovation	Incentivizes R&D; Diffuses knowledge	Hampers combination of inventions; Raises transaction costs
Competition	Supports entry of small companies; Enables trading with knowledge	Enables short and long term monopolies

Source: Hall (2007).

The complexity of the patent laws reflects also in the diverse opinions of scholars. For example institutional economists D. North (1991) and H. Demsetz (1967) have found that patent laws lead to the development of innovative industries, and that patent rights boost the development of ideas. Fisher (2001) on the other hand finds that patent laws can induce socially wasteful duplicative or uncoordinated inventive activity. Firstly, because possible patent grant on an innovation or on its improvement can motivate many researchers to conduct research to the same direction. Secondly, because many companies may try to invent around already existing innovation, which constitutes again waste of social resources even if it is beneficial to a company doing it.

2.2 Empirical studies on the role of the patent system

There are many empirical studies analysing the influence of patent and patent laws on economic decisions and economic prosperity. Interestingly there seems to be evidence that patents are useful or used only in some industries and by having positive impacts on innovation and R&D activities. There seems to be evidence that patents have a positive impact on economic growth in developing countries whereby stronger patent laws boost technology transfer. In respect of developed countries the results are ambivalent. There is still a question of whether growth follows stronger patent laws or is it vice versa. Strengthening the patent system seems to be in many cases a response on economic growth. A further result is, that society's cost of patents seems to be higher if industry starts to use patents strategically.

Conclusively it can be said that scholars seem to agree that IP regime alone is not sufficient factor to improve countries economic performance. Countries' other complementary conditions, such as presence of R&D sector, overall level of development, as well as country specific characteristics such as institutions and policies affect the efficiency of IP regimes in boosting innovative activities (e.g. Park and Ginarte 1997a, 1997b; Cohen, et al 2000; Cohen, et al 2002; Qian 2007). One of such characteristics is also costs of patenting that is handled in the following.

Table 2: Overview of empirical studies on the impacts of patents and patent protection regimes

Study	Description	Results
Mansfield, 1986; Levin, et al, 1987; Arundel and Kabla, 1998; Cohen, et al, 2002	When we speak whether patents at all are relevant for innovative activity, then positive relationship between innovative activities and patent system has found to be present only in few industries such as pharmaceuticals and chemicals, machinery and precision instruments. Other industries tend to use other measures to recoup their investments from R&D such as lead time, secrecy, learning advantages, complementary sales and services, and complementary manufacturing.	Patents have impacts only in few industries on innovation activities
Qian, 2007	Strengthened patent protection has positive impact on domestic innovation in pharmaceutical industry only if accompanied by country's higher level of development. Domestic innovation is estimated by US pharmaceutical patents issued to the residents of the country where pharmaceutical patent laws were lately implemented, and domestic R&D expenditures.	Patent protection regime has impacts on innovation activities in developed countries
Hall and Ziedonis, 2001; Danguy, et al, 2009	Even if patents are not seen by all industries as an incentive to innovate, then even firms in the patent-reluctant industries still tend to patent more when patent laws become more stringent. For example semiconductor industry, that has shown to be patent reluctant, started to patent their innovations after reforms that strengthened patent protection (Hall and Ziedonis, 2001). Similar effects can be seen regarding communication equipment and computers (Danguy, et al, 2009).	Firms use patents for strategic reasons to obstruct competition
Branstetter, et al, 2006 Lerner, 2009	Reforms that strengthen patent laws tend to increase technology transfer into reforming country captured by the increases in royalty payments made from multinationals' affiliates to parent companies for the use and sale of intangible assets. In addition, also subsidiaries' R&D expenditures tend to rise. Also patenting activity of foreigners in the reforming country raises.	Stronger patent regime affects technology transfer in development countries
Branstetter and Sakakibara, 2001; Branstetter and Nakamura, 2003; Lerner, 2009	Scholars have yielded to different results regarding the question whether stronger patent protection leads to increased patenting by domestic entities and what is the influence of stronger patent laws on countries' growth. It has been found that strengthening of patent laws does not necessarily lead to increased patenting rates by residents or increased R&D expenditures.	Stronger patent regime not necessarily affects patenting activity or increased R&D expenditures
Park and Ginarte, 1997a	Stronger IP regime is positively associated with investments into R&D investments, but only if country shows higher development level. Less-developed countries do not benefit from stronger IP regimes. The larger is the domestic R&D base of a country (or presence of multinationals that transfer technology into market), the greater are the benefits of having stronger IP regime. Strong IP system is likely to attract R&D expenditures, but on the other hand (less-developed) countries may see no motivation for the development of their IP systems if there is no demand for it (lacking R&D base).	In higher developed countries patent regime affects R&D investments
Dosi, et al., 2006	R&D base and IP system are independent. Semiconductor industry, software industry, telecom industry and mobile telephones all emerged under weak IP system. Strengthening of the IP system followed late 1980s and after the ICT sector boom.	Patent regime does not affect R&D investments
Kanwar and Even-son, 2003; Chen and Puttitanun, 2005	Once the IPR protection in a country is stronger, R&D expenditures in the country raise.	Patent regime has positive effect on R&D investments

2.3 The trade-offs of patenting costs

SMEs are the drivers of economic growth in Europe by making the highest contribution to job creation (European Commission, 2010a and 2011). Therefore, their access to IPR and its valorisation should be simple and affordable. SMEs especially need patents to attract more investments into their business (see e. g., Mazzoleni and Nelson, 1998). In Europe, SMEs access to IPR is impeded due to high patenting costs. For this reason, the EU has been working for years towards unitary EU patent that would lower patenting costs. Under the current proposals, the unitary EU patent would have effect in 25 EU member states (excluding Spain and Italy). At present, European patent validated for example in 13 countries costs approx. 20,000 Euros, of which approx. 14,000 Euros form translation costs. In comparison, US patent costs approx. 1,850 Euros. European patent system's difference with Japanese patent system is only slightly narrower (European Commission 2010b, van Bottelsberghe and François 2006). EU member states have been urged to make patenting in their countries more affordable.

Policy makers can choose between different patent fee models. Although there are only few studies on patenting fees and they often include different recommendations on optimal patent fees, the main differences between high and low fees can be pointed out (Table 3). Increased fees could be non-friendly for businesses, but on the other hand higher fees can reduce patent backlogs and ease the workload of patent offices. Reduced workload may in turn improve the quality of patent examination. Lower fees in turn can be applicant friendly, but induce high social cost if patents are kept valid for long (van Bottelsberghe and Rassenfosse, 2010).

Table 3: Trade-offs of patenting costs

Fees	Administration	Economy
High	Reduced backlogs, reduced workload of patent offices	Fewer patents Higher quality patents
Low	High administration costs	Increased number of patents Increased social cost (monopoly power)

Source: van Bottelsberghe, Rassenfosse (2010).

3 Differences in the IPR systems and policies within the EU

The European Commission argues that an integrated IPR regime is crucial for economic growth, job creation and competitiveness of the EU (European Commission, 2011). The EC recognizes that capitalisation on IPR portfolios is essential for European creators and businesses for their operations, revenues and expansions on the market. The current fragmentation of the IPR market in

Europe is seen as an impediment, especially harmful for SMEs that lack the resources or expertise to handle the multiple patenting systems in the EU. Although the EC recognizes its key role in shaping the intellectual property strategy for Europe, the EU member states are invited to take the Industrial Property Strategy for Europe from 2008 into account when shaping their national strategies (European Commission, 2008). Commission considers the responsibility, to realize the full potential that industrial property rights can provide to the economy in Europe, as a shared one. The strategy sets forth that the intellectual property system in Europe should be high-quality (through tough examination standards), affordable (balance of cost and quality and legal certainty), consistent (common interpretation of laws and unified court proceedings), and balanced (rewarding intellectual creation and ensuring easy circulation of knowledge). The EU member states have the following common goals:

- improvement of the quality of industrial property (e.g., by increasing the patent examination standards and by improving collaboration between national industrial property offices),
- granting SMEs better access to industrial property rights (e.g., by reducing patenting costs and by offering targeted subsidies for SMEs),
- improving SMEs` access to dispute resolution procedures (e.g., by facilitating alternative dispute resolution mechanisms),
- increasing the quality of support services concerning the management of IPR (e.g., by raising researchers` and businesses`, including SMEs`, awareness on intellectual asset management and by combining technical, legal and business expertise of different support services),
- improving the enforcement of IPR (e.g., by adopting effective criminal law procedures, and by facilitating the cooperation between national law enforcement authorities as well as their cooperation with right holders).

In summary, the European Union values IPR as an incentive for innovation, which leads to new products and services, new consumer demand and thus, enhances growth and employment. Next, starting by reviewing the IP policies of the European countries one can see to what extent the goals of the EC are followed. Thereafter the review is concretised by comparing the strength of IPR protection in the countries, and the implications on domestic and foreign patenting activity are shown within these countries. To get a comprehensive picture the analysis is complemented with the views of actors within the IP systems within the countries.

To get a comprehensive picture within Europe focus was laid on eight European countries: Austria, Croatia, Czech Republic, Finland, Germany, Poland, Portugal and Romania. This sample is carefully selected to allow the comparison between countries like Germany, Finland, and Austria,

to which generally leading or good innovative capacity is attributed, and between catching-up countries. Special attention is paid to the central and eastern European (CEE) catching-up countries. The study includes Poland as the biggest economy in the region, the Czech Republic as the economically most successful EU-member state in the region measured by the GDP per capita ratio, Romania as country that is due to its institutional reforms interesting; and Croatia, that is historically and institutionally very promising EU-candidate.

3.1 Method and data

Considering the results of the literature review different indicators for the selected group of countries were analysed and compared. The data originates from different sources. To measure the strength of the IPR, businesses executives' opinions about the strength of IP protection from World Economic Forum's Global Competitiveness Report (GCR), 2010 – 2011, were considered. Business executives were asked to rate intellectual property protection, including anti-counterfeiting measures, on the scale from 1 (very weak) to 7 (very strong). Terms as "intellectual property protection", "strong" or "weak" are not defined in the questionnaire. This index shows the subjective perception of each respondent about country's IP protection. Such perception is dependent on many factors, such as respondent's awareness of intellectual property types, his experience in using its intellectual property, his experience with enforcement bodies, and his experience about the IP strength in other legal regimes. So the IP protection in the countries is being evaluated based on personal experiences. Even if such evaluation shows (dis)satisfaction with country's IP system, then the GCR index alone is not enough to make conclusions about the strength of countries' IP systems. Therefore the analysis includes also indicators that measure the statutory strength of the laws and regulations on which intellectual property rights are based on.

For this, the Patent Rights Index, Copyrights Index and Trademark Rights Index developed by Park (Park and Ginarte, 1997a, 1997b; Park and Wagh, 2002; Park, 2005; Park and Lippoldt, 2008) are used. The indices were updated to 2005 by W.G. Park and D. Lippoldt (2008)². The Patent Rights Index consists of five components, the Copyrights Index of four components and the Trademarks Rights Index of three components. Each component consists of various legal features. Each feature is a fraction of the component and is weighed equally within the component. Each component is scored on a scale from 0 – 1 (Park and Lippoldt, 2008).

² W.G. Park agreed to provide the values of the indices for the year 2005. The values of the indices for Croatia are based on own survey and are calculated using the methods developed by Park et al. One legal expert in Croatia was asked to fill in a questionnaire that enabled to do relevant calculations for the country

Patenting activity is measured as EPO filings and set into relation to one million inhabitants. Furthermore, we see which percentages of domestic inventions that are patented (EPO filings) are owned by foreigners. This shows country's own IP experience/awareness and whether patenting rates in the country are driven mainly by residents or non-residents. The data originates from Eurostat database with reference year 2007.

Patenting costs are measured by dividing patenting fees into patent filing fees, including examination fee, and to patent renewal fees for the time period of 20 years. The data is drawn from the national industrial property offices with reference year 2010. Unfortunately the data does not reflect all costs that might occur during patent application proceeding (e.g. attorney fees, publication fee, fee for amendments, fees for patent claims excess of ten etc.) and these costs may show great variations. Only absolute fees in Euros were compared, comparison of fees e.g. based on purchasing power parity or to number of inhabitants may yield to different results.

Finally, to gain more practical insight into the IP systems of the reference countries questionnaires with managers of business incubators in each country were conducted. The questions covered different aspects of legislative framework as well as enforcement of intellectual property rights in their country. The questionnaires were sent via email. Where possible, managers were additionally interviewed by telephone.³ The interviews followed the questionnaire. To get a deeper understanding, the most relevant questions were thoroughly discussed again. In total 72 managers were asked and 35 questionnaires filled.

3.2 National IP policies

Austrian policy makers are focused *on stimulating innovativeness* to improve the *competitiveness of local businesses* within and outside the country. *Strong IPR regime* is considered as an important incentive for innovative activities. Policy makers have adopted several strategies to facilitate innovative activities in Austria. For example, recently in 2011 the national strategy "The Way to Become a Leader in Innovation" was adopted by the Federal Ministry for Transport, Innovation and Technology. In addition, in 2009 the Austrian Council for Research and Technology Development prepared the "Strategy 2020". Both policy documents stress the role of IPR protection, *importance of knowledge transfer* and the need to *improve the access of businesses to the patent system* so that they can easily *commercialize their innovations*. Importance of IPR is also addresses in a recommendation prepared in 2003 by the Austrian Council for Research

³ In conclusion, 5 interviews were made in Finland, Poland, Czech Republic, and Romania, 3 interviews in Austria, Croatia, and Portugal. In Germany only one interview out of 17 attempts was possible.

and Technology Development “Utilization of Research and Development: Intellectual Property Rights – Patents”.

Developments in **Croatia’s** IP system are greatly influenced by the expected accession of the country to the EU. The EU has launched several programmes (e.g. CARDS) that would assist Croatia in **shaping its IPR framework** (e.g., legislation and policies). Croatia intends to take **IP protection to similar level as provided in other EU member states**. The most fundamental policy documents regarding IP is the “National Strategy for the Development of Intellectual Property System of the Republic of Croatia” adopted by the government in 2005. Many later policies also focus on the IPR matters. Some examples are:

- Science & Technology Policy of the Republic of Croatia 2006 – 2010 (Ministry of Science, Education and Sports, 2006),
- Action Plan 2007 – 2010, Science & Technology Policy of the Republic of Croatia 2006 – 2010 (Ministry of Science, Education and Sports, 2007),
- Action plan to Encourage Investment into Science and Research (Ministry of Science, Education and Sports, 2008).

Although the **Czech Republic** has addressed different IP issues (e.g. exploitation, protection, management) in a number of analytical studies on Czech’s R&D landscape and innovation as well as in national development strategies, then until now the country has not adopted a single IP strategy. The policy discussion in Czech Republic on IP issues is fragmented and unstructured, consisting of **(overlapping) goals and measures**. Hence, it is not easy to determine which are clear IP related goals for the country. Some of the policy documents in Czech Republic that address also IP matters are:

- National Strategic Reference Framework 2007 – 2013 (Ministry for Regional Development, 2007),
- Operational Programme Enterprise and Innovation 2007 – 2013 (Ministry of Industry and Trade, 2010),
- Operational Programme Research and Development for Innovations (Ministry of Education, Youth and Sports, 2008),
- National Innovation Policy of the Czech Republic for the years 2005-2010 (Research and Development Council, 2005),
- National Research, Development and Innovation strategy of the Czech Republic 2009-2015 (Research and Development Council, 2009).

Most “IP orientated” policy document is the government’s 2007 “The Czech Republic improvement measures Action plan” which addresses the problems regarding **intellectual property rights enforcement**.

In contrary, **Finland** has a single IP strategy which consider IP matters in their complexity and which may ease achievement of state's IP related goals. Finland's government considers **strong national IPR regime** as one cornerstone that facilitates Finnish **businesses competitiveness**. Government decided in its 2007 program to draw up a national innovation strategy, and as a part of it also national IPR strategy. The IPR strategy was adopted in 2009 and it stresses the increasing importance of intellectual property rights for Finnish companies (Ministry of Employment and Economy, 2009a). The strategy points out that the value of economic activities associated with the exploitation of copyrights is approx. 3.5 % of Finland's GDP, or more than five billion Euros per year. In addition to the IPR strategy, in 2009 a report that offers insight into the main challenges that the Finnish IPR regime has to confront in the forthcoming years was released (Ministry of Employment and Economy, 2009b).

Policy makers in **Germany** recognize **innovativeness** as the growth engine in the economy and work on setting an innovation-friendly environment, encouraging the entrepreneurial spirit, enhancing the **participation of SMEs** in R&D activities, their access to venture capital and highly qualified workforce and facilitating the cooperation between science and industry for **more efficient commercialization of research results**. One of the most important state's innovation-oriented policy document is the High-Tech Strategy 2020 for Germany (Federal Ministry of Education and Research, 2010). It addresses also IPR related matters, for example it considers important that in the coming years **IPR protection is made more affordable for SMEs**.

Poland does not have a single national IPR strategy, and therefore the country resembles to Czech Republic. Hence, the political **discussion on IPR matters is very fragmented**. No clear statements can be made on the IPR related goals of the country. There are various policy documents that address the IPR topics in one way or another. Some of the most important documents are the following:

- Poland's national development strategy for years 2007 – 2015 which works as a basis for country's other strategies and sets forth priorities for boosting socio-economic development of the country (Ministry of Regional Development, 2006),
- National Strategic Reference Framework for 2007 – 2013 in support of growth and jobs, which is implemented through various operational programs (Ministry of Regional Development, 2007a),
- Operational Program Innovative Economy (Ministry of Regional Development, 2007b),
- Strategy for Increasing the Innovativeness of the Economy in the years 2007 – 2013 (Ministry of Economy, 2006).

Most "IP orientated" policy document is the Programme for the Protection of Copyright and Related Rights 2008 – 2010, which deals with **IPR enforcement** (Ministry of Culture and National Heritage, 2008).

Portuguese policy makers have not elaborated a specific IPR strategy (cp. Poland and Czech Republic). Still, the **efficient use and protection of IPR** is recognized by some policy documents as a field where there exists room for improvements. One of the relevant strategic documents is the "Technological plan", approved by the Council of Ministers in 2005, which provides measures for boosting the growth and the **competitiveness of the economy** on the basis of knowledge, technology and innovation. Its priority axis "Innovation" focuses on IPR, encouraging the creation of **a platform for protecting and commercializing IPR and improving the possibilities for industrial property pre-diagnosis** (adaption of IP strategies to the needs of innovative companies). The "Simplex" programme prepared by the Secretary of State for Administrative Modernisation since 2006 represent another national strategy that touches upon the problems in the IPR field (Secretary of State for Administrative Modernisation, various years). The programme introduces measures for creating a better working public administration, providing an **easier access to IPR services at reduced costs**. Also in the "Operational programme 2007-2013: Thematic Factors of Competitiveness" focusing on the knowledge and innovation based economic development and financed by European Regional Development Fund (ERDF) can be also found some IPR-related measures (European Commission, 2007).

Romania adopted in 2003 a National Strategy in the Field of Intellectual Property 2003-2007 which outlined main goals for the national IP system, including **harmonization of legislative framework with EU standards, enhancement of law enforcement** and **establishment of well functioning administration of IP matters by state authorities** (State Office for Inventions and Trademarks, 2003). The strategy set forth as goals also **intensified international cooperation in IPR matters** as well as **increased qualification of domestic human pool dealing with IPR**. At the time writing this study, the named strategy is being renewed by Romanian policy makers. There are also various other policy documents that address IPR matters:

- National Research, Development and Innovation Strategy 2007 – 2013 (Ministry of Education and Research, 2007),
- Strategic Reference Framework 2007 – 2013 (Government of Romania, 2007),
- Operational Programme Increase of Economic Competitiveness 2007 – 2013 (Ministry of Economy and Finance, 2006),
- Operational Programme Human Resources Development 2007 – 2013 (Ministry of Labour, Family and Equal Opportunities, 2007).

Conclusively, all countries recognize the economic importance of IPR, and strong IPR regime is often set as an overall goal. However, our countries differ first in the systematic they deal with IPR related matters in their country. Some countries have single or few concrete strategies towards the IPR. Others prefer to have multiple innovation and development strategies that address IPR only vague. The countries differ also regarding their specific IPR related policy measures. For example, Croatia and Romania distinguish from other countries by having policy measures that deal with setting up and improving the IPR institutional framework (authorities, legislation). It is interesting to point out that the patenting fees, topic that is repeatedly addressed by the EC in its multiple policy documents, is rarely or never handled in national IP policies.

In the following one step further from the policy level is taken and strength of IPR protection in the countries is shown. Thereafter, the implications of the IPR strength on the domestic and foreign patenting activity within these countries are shown. The analysis includes the results of our interviews with the actors in each country.

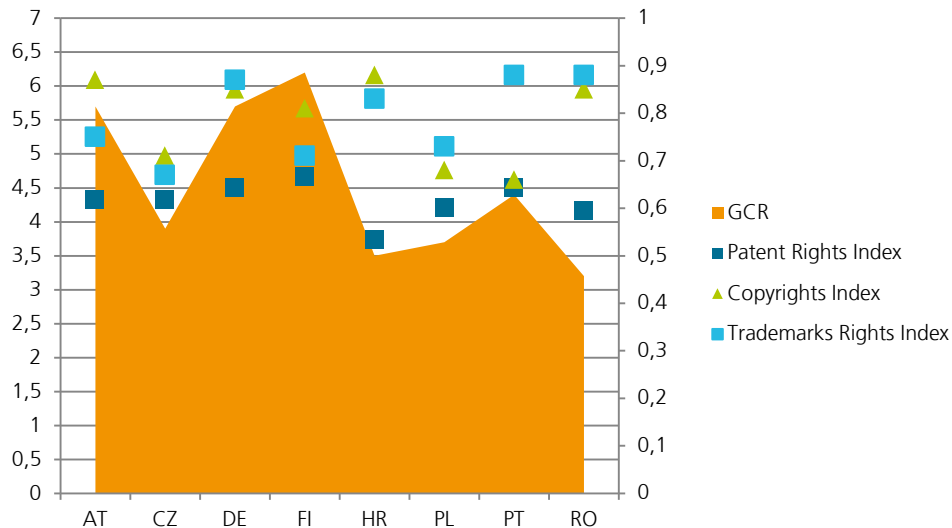
3.3 Strength of the IPR protection

The comparison of the IPR strength measured by GCR index gives different results from the strength measured by Park et al. indices. Hence, the statements on the strength of IPR protection in the countries may vary and depend on the specific indices used by scholars (see Figure 1).

GCR correlates the most with the Patent Rights Index. It can be concluded that the GCR rates reflect foremost the business executives' opinions about the strength of patent laws. GCR shows the strongest IP (patent) protection within the sample is in Finland, followed by Germany and Austria. The three countries are top performers also in the world comparison (GCR measures the IP strength in 139 countries). Patent Rights Index similarly shows that these three countries provide the strongest patent protection.

Based on Park indices (Park and Ginarte, 1997a, 1997b; Park and Wagh, 2002; Park, 2005; Park and Lippoldt, 2008) trademark protection is the strongest in Romania, Portugal and Germany. Copyrights are best protected in Croatia, Austria and Germany. So, surprisingly Finland, the top performer in GCR ratings, performs best only regarding patent protection. But, with regard to other IP types, the country falls behind other countries.

Figure 1: Strength of IPR protection in the European countries, in 2005*, index points



* 2010 Croatia. Left scale: GCR, Patent Rights Index; Right scale: Copyrights Index, Trademarks Rights Index.
 Source: World Economic Forum, the Global Competitiveness Report 2010 – 2011; W.G. Park, Patent Rights Index, Copyrights Index, Trademarks Rights Index, in year 2005 (non-published), in respect of all countries except Croatia; Croatia's data, except GCR, is based on Park and Lippoldt indices (2008) and on own calculations in year 2010.

The results from questionnaires and interviews give also slightly different picture of the IPR protection in the countries compared to the GRC or Park (Park and Ginarte, 1997a, 1997b; Park and Wagh, 2002; Park, 2005; Park and Lippoldt, 2008) indices (see Table 4). Hence, this confirms the assumption that the strength of IPR protection is complicated to measure and ratings concerning the strength of IPR protection have to be handled with caution. Respondents tend to assess the strength of IPR protection based on their personal experiences, e.g. regarding the professionalism of judiciary. Shortcomings in the work of law enforcement authorities are interpreted as the weakness of IPR protection in the country. Strong IPR protection is often related to the proficiency of enforcement authorities.

Table 4: Survey respondents` assessment to the strength of IPR protection in their countries

Country	Patents	Trademarks	Copyrights	Advantages/shortcomings of IPR protection
Austria	Very strong	Very strong	Very strong	Efficient law enforcement, well trained and experienced enforcement authorities, highly qualified judiciary, low level of infringement cases
Croatia	Strong	Strong	Weak	Inefficient law enforcement, less trained and experienced enforcement authorities
Czech Republic	Strong	Strong/Weak*	Weak	Inefficient law enforcement, less trained and experienced enforcement authorities, low availability of financial resources for law enforcement authorities, high workload of courts and shortage of judges
Finland	Very strong	Strong	Strong/Very strong*	High motivation of the country to enforce IPR, high level of training and experience of enforcement authorities, high availability of financial resources for enforcement authorities
Germany	Strong/Very Strong*	Strong	Strong/Weak*	Efficient law enforcement, well trained enforcement authorities, rapid reaction to IPR infringements by the state's authorities
Poland	Strong	Strong	Weak	Inefficient law enforcement, low level of experience and training of law enforcement authorities
Portugal	Strong	Strong	Strong	Inefficient law enforcement, slow judicial proceedings
Romania	Strong	Strong	Weak/Very weak*	Inefficient law enforcement, ignorance by the state's authorities towards IPR, judiciary lacks IPR competence

Note: Respondents had to select whether IPR protection in their country is very weak, weak, strong or very strong. * No clear statement can be made, respondents ratings were equally divided.

In the following the patenting activity in the sample countries is analysed. Within the sample countries Germany, Finland, and Austria are countries that regardless of the used measures are ranked as top performers in respect of patent protection. In the subsequent section, the impact of strong patent protection on patenting activity in these countries is analysed.

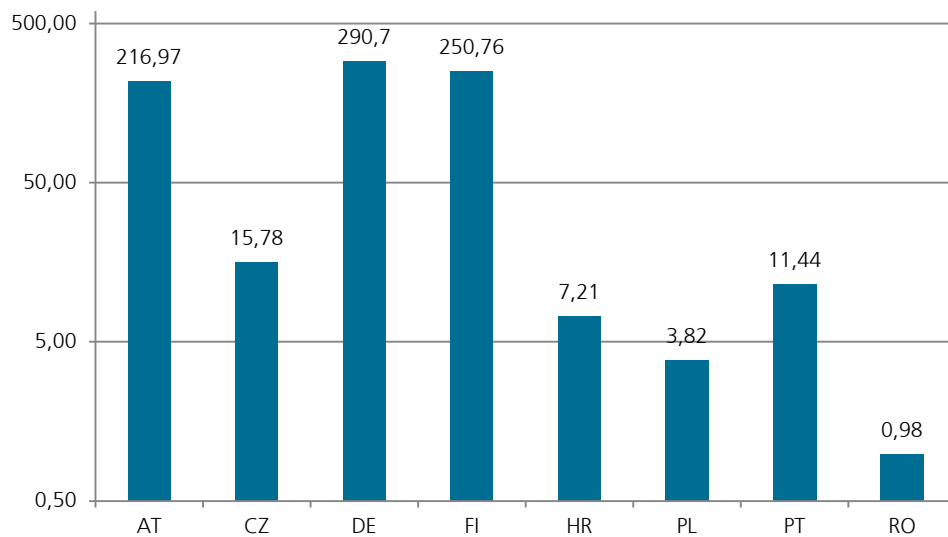
3.4 Patenting activity and ownership of inventions

3.4.1 General patenting activity

Figure 2 shows that Germany (290 EPO applications per 1 Million capita), Finland (250) and Austria (216) have the highest patenting activity, whereas Poland (3) and Romania (1) file the least

number of patents. Hence, this confirms the basic assumption that countries with strong patent protection witness also high patenting rates. The reasons behind high patenting rates however differ across the countries. Respective results of our interviews are presented in the following. This supports the theoretical approach that there are variety of factors, specific for each country, that influence innovative activities, patenting and investments into R&D. The strength of patent protection is only factor among many.

Figure 2: Patent application to EPO 2007, per one million inhabitants



Source: Eurostat. Applications are assigned to the countries according to the inventor's country of residence.

In **Austria** the high patenting rate is driven both by businesses and research organizations. Many of our interview partners argued that research-industry collaboration in Austria is relatively well working, especially between academia and young spin-off companies. "Traditional" SMEs on the other hand are rather reluctant to collaborate with research organizations. Businesses are aware of the market conditions, and research organizations of the technologies, but there should be more state support for bringing these two actors closer to each other to exchange the information. Regardless of the shortcomings, the already existing research-industry collaboration generates enough output that is patentable and thus drives patenting rate in Austria to be high. Another explanation for high patenting rate in Austria can be also that the rate includes inventions that are domestically invented, but owned by foreigners. The rate does not reflect only patent applications filed by domestic patentees. As later below is shown, the share of foreign owned innovations in Austria is relatively high.

In **Croatia** the low IP awareness, low innovative culture, low entrepreneurship as well as lack of funds for innovative activities were mentioned by our interviewees as reasons for low patenting activity in Croatia (7 applications per one million inhabitant). One of our respondents even pointed out that existing innovative activities are concentrated to the capital Zagreb that has innovative tradition as well as infrastructure that supports it. Companies in other regions may lack funds to begin with R&D neither there are support services for protecting IP. Reason for low patenting rates is also weak research-industry collaboration. Scarce research output reflects also in the low patenting statistics. Our respondents pointed out that motivation of research organizations for such collaboration as well as their research facilities should be improved so that they could offer development services to industry.

In **Czech Republic**, that shows the highest patenting rate (15 filings per one million inhabitants) after the three top countries (Germany, Finland and Austria). Our interview partners considered that the moderate patenting rate is driven mostly by universities that are well motivated by the country to exploit IPR. Since past few years universities are being evaluated and financed according to the success in transforming their results to the industry. This implies that research results are patented and technology is thereafter licensed to companies. Companies on the other hand are considered reluctant users of patent system. It was mentioned that companies might lack the knowledge how to commercialize their IP and thus avoid patenting. Another reason why patenting by companies is low is that fewer Czech companies are internationalized and thus have a valuable innovation that should be patented. Third reason for low patenting activity can be that (smaller) companies find patenting despite existing support measures too costly. Additionally, it reflects from the interviews that companies are concerned about the high piracy and counterfeit rates in the country. As a result, instead of patenting, that is due to weak law enforcement unable to protect products against imitation, many companies are rather using first mover advantage to recoup investments into R&D. It is also interesting to point out that that our interview partners considered IP awareness good in the country, academia having nevertheless greater knowledge (due to the "obligation" mentioned above to transfer technology to the industry) than industry. So the lack of general knowledge about IP can not be seen as a reason for moderate patenting rates in the country.

In **Finland** most of the interviewed managers referred to high IP awareness of Finnish residents as well as companies' experience dealing IPR related questions. These factors lead to high patenting rates. It was also pointed out that industry and research sector are working very actively together in exploiting IP, but there is still room for improvement.

In **Germany**, high patenting rates are driven by both by companies and research organizations. For example our interview partner pointed out that patenting is considered a good practice by scientific community in Germany.

Similarly to Croatia, also **Poland** is suffering of low IP awareness. All our interview partners referred to low IP awareness of Polish residents as well as companies' inexperience dealing IPR related questions. Intellectual property rights are either not respected or persons have less information about them. It was also pointed out that the low patent activity in Poland is mostly driven by universities that tend to have better IP awareness in Poland. In 2008, only 30,5% of the resident patent filings at national patent office were filed by businesses whereas research institutions filed 43,6% of the total resident applications, the rest was filed by individuals (GUS Poland, 2010). In addition to low IPR competence, companies also do not have enough funds to develop innovations and prefer licensing instead of investing in product development. Overall, the respondents assess industry-research collaboration to be weak. This also substantiates why there is less innovation output in Poland that can be patented.

Portugal's moderate patenting activity (11 applications per one million inhabitant) is substantiated with low entrepreneurship and lack of funds for companies to use IP. Also in Portugal one cannot speak of lack of IP awareness that could keep patenting rates low. The respondents found that the IP awareness in the country is relatively high because the state has since past decade promoted the use of IPR (e.g. by establishing advisory offices for IPR matters across the country). It was mentioned that research organizations and larger companies have the highest experience in IP matters. Universities and their spin-offs are the most active users of patent system. Small and less sophisticated companies have the smallest experience with IP. Nevertheless, there is less entrepreneurship in the society; both research organizations and businesses consider patenting often risky and costly. It is general that instead of managing IP for longer term, both actors sell their patents or quickly license them to avoid high costs associated with IP. The respondents mentioned that state should provide more funds for IP protection and as well as more private (risk) capital should be involved in supporting research-industry collaboration that could generate IP. One of the interviewees suggested that system of public funding should be reshaped in the country so that companies receive public funds from state and are obliged to outsource research work from universities, the latter in turn would renounce from the IP for the benefit of companies. Currently, negotiation on the IP between companies and universities are often time-consuming, both parties are investing in the collaboration and both are interested in owning IP that is generated. These negotiations make collaboration complicated. Additional explanation for low patenting activity can be also that the country is more service oriented and thus there is less research output that

can be patented. As pointed out by one of the respondents, primarily three economic sectors are active in generating IP: pharmaceuticals, biotechnology and ICT.

Romania`s situation is very close to the Polish one. Also here low IP awareness was seen by our respondents as one of the main reasons why patenting activity is low, whereby research organizations were said to possess higher IPR competence than businesses. One of the respondents also pointed out that the IP awareness varies across the country, being highest in the capital, Bucharest (cp. Croatia). Another reason for low patenting activity is the absence of well functioning research-industry collaboration that would result to innovations that are also patentable. It was noted that only few technical universities are collaborating with industry to develop research output. Companies in turn are not motivated for cooperation because there is less state support for commercializing research results and thus companies would be "forced" to use their own means for it. It is also interesting to point out that one of the respondents found that the low patenting activity can be substantiated also by the fact that Romania`s industry is more service oriented and thus country has are overall fewer companies that would create patentable inventions.

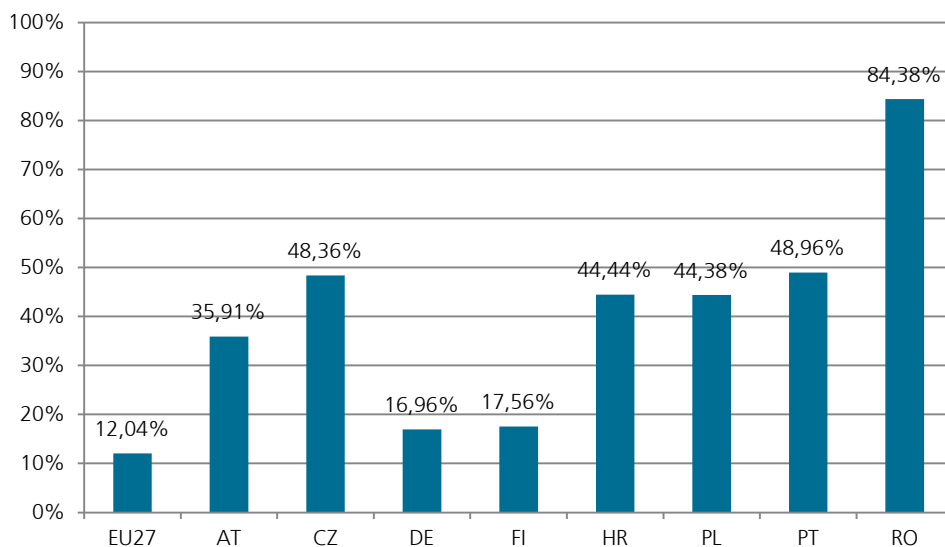
Conclusively, the analysis shows that strong patent protection is accompanied by high patenting rates. It is also likely that high patenting rates have encouraged the countries to improve their patent protection. As we saw from the theory, both approaches are likely. The interviews further clarified that IPR awareness can be one of the decisive factors that impact the level of patenting. In countries where the experience and competence to handle intellectual property topics is low, it cannot be expected that the use of patent system is high.

In the countries with low IPR awareness, even the already existing patenting rates may be driven in large part by foreign patent owners. They may have higher IPR awareness than domestic firms and research institutions. It was presumed that in the countries with low IPR awareness, innovators renounce their ownership more easily because they lack the knowledge and skill to commercialize their patents. To test this hypothesis, the share of foreign owned patents in total patent applications filed in the sample countries is regarded.

3.4.2 Foreign ownership of domestic inventions

Figure 3 illustrates that the countries with high patenting activity are also the ones who have least foreign-owned patents. Both in Finland and Germany, the foreign ownership is approx. 17% whereas in Romania the share of such patents is 84%.

Figure 3: Share of foreign ownership of domestic inventions in total patent applications to the EPO, 2007



Source: Eurostat. Applications are assigned to the countries according to the inventor's country of residence.

Surprisingly, in **Austria** still 36% of all patent applications are filed by non-residents. This is relatively high if one consider the high IPR awareness and competence of local innovators. If the respondents were asked to clarify this, then it was mentioned that domestic innovators may consider patenting too costly and risky, and thus rather sell their rights in innovations. Several interview partners pointed out that especially SMEs and young companies may find it too costly to obtain a patent and state should provide more financial support measures than it currently does. Such companies may lack often venturesome and funds to proceed further with patenting.

Both in **Croatia** and in **Poland** the low IPR awareness of innovators as well as the weak link of domestic businesses to the research sector allows foreign patentees to take advantage of the IP market. It can be expected that foreign business show higher interest in joint collaboration projects than their local counterparts and thus gain easily ownership to the research output.

The interview partners in **Czech Republic** pointed out that foreign companies tend to collaborate with Czech research sector more actively than domestic entities, and thus the rights in the inven-

tion often go to foreign businesses. Despite state's active efforts, there is still room for improvement of collaboration of domestic research organizations and entities. High foreign ownership is caused also by lack of competence of local businesses to manage their IP and the tendency to rather easily renounce from rights in return for investments.

Foreign ownership of inventions developed in **Finland** is very low, amounting only to 18%, but is above EU average of 12 %. Also most of the interviewed incubators' managers referred to high IP awareness of Finnish residents as well as companies experience dealing IPR related questions. It was pointed out that industry and research sector are working very actively together in exploiting IP, but there is still room for improvement.

The level of foreign-owned patent is low, 17%, also in **Germany**. The low rate of foreign owned domestic innovations reflects good IP awareness of domestic inventors and experience in dealing with IP matters. The interview partners mentioned that innovators in Germany are often simply convinced that patenting is always good and fail to see the costs of it. Patenting is only then worthwhile if it can be commercialized afterwards. If commercialisation does not take place, then the cost associated with patent protection is too high. This pro-patent approach of innovators in Germany is supported by patent agencies that earn profits from supporting innovators at patent filing and patent valuation. There is a threat that these profit driven agencies conduct patent valuation partially and recommend patenting even in cases where the benefits from patent commercialisation are less than the cost associated with patenting. This behavioural in turn results to many registered patents that actually are not commercially used.

Interestingly, the interview partners in **Portugal** mentioned that similar situation as in Austria prevails also at their small domestic market. Also here domestic innovators are not willing to invest in IP management, but prefer to assign IPR in their research results to foreign businesses. Another explanation for high level of foreign ownership of domestic innovations in Portugal can also be that the country is attractive location for foreign companies to conduct R&D activities due to research facilities that have been modernized. One of the respondents mentioned that the country has been investing since past decade in improving its research infrastructure, e.g. by building better facilities for researchers and setting up research centres.

Within the sample, the lowest IP awareness and experience is in **Romania** whereby even the low patenting rates are mostly driven by foreigners. One of the interviewees pointed out that local companies are selling ownership in their patents easily and cheaply, but they see it as a way of getting investments into further innovative activities. Similar, "patenting for selling the ownership" strategy was said by another of the interviewees to be applied also by private inventors in the country.

The following Table 5 summarizes the patenting activity each country by showing the overall patenting activity and the foreign ownership of inventions in each country. Furthermore, the table also summarizes the reasons for patenting activity that were given by the interviewees. These reasons should be taken into account upon considering policy measures for boosting patenting activity by domestic firms and research institutions.

Table 5: Patenting activity and challenges

Country	Patenting activity (own assessment based on Figure 2)	Foreign ownership of inventions (own assessment based on Figure 3)	Reasons for patenting rates (based on questionnaires and interviews with actors in each country)
Austria	High	Moderate	Moderate industry-research collaboration; patenting costs may be too high relative to market size and too high for SMEs
Croatia	Low	High	Low industry-research collaboration; low IPR awareness; low innovative culture; low entrepreneurship; patenting costs for SMEs may be too high, especially in less developed regions; concentration of funds and innovative activities into the capital of the country
Czech Republic	Moderate	High	Low IPR awareness of companies; patenting costs may be high for SMEs; high piracy and counterfeit rates that reduce motivation to use patents; low industry-research collaboration
Finland	High	Low	Industry-research collaboration could be improved; patenting costs may be too high relative to market size and too high for research sector
Germany	High	Low	High patenting rates may include high number of patents that are commercially worthless; patenting costs may be too high for innovators
Poland	Low	High	Low IPR awareness of companies; companies' lack funds to develop innovations; weak industry-research collaboration
Portugal	Moderate	High	Low entrepreneurship; lack of funds to use IPR; private (risk) capital is less involved in industry-research collaboration; country is service-orientated
Romania	Low	Very high	Low IPR awareness; low industry-research collaboration; concentration of innovative activities in the capital of the country; low financial support from the states for IPR commercialisation

In summary, the analysis shows that in countries with low IPR awareness, the share of foreign owned patents is high. Besides renouncing the ownership to innovations, there are multiple other reasons that lead low level of patent applications by domestic firms and research institutions. The

most prominent example is Austria, where regardless of strong patent protection and high patenting rates, the share of foreign-owned patents within the rates is considerably high.

In the following the patenting cost in the surveyed countries is analysed. It is interesting to see whether countries with strong patent protection and high patenting activity have high or low patenting costs. It is also interesting to see how the respondents assess the level of patenting costs in their countries.

3.4.3 Differences in the level of patenting costs

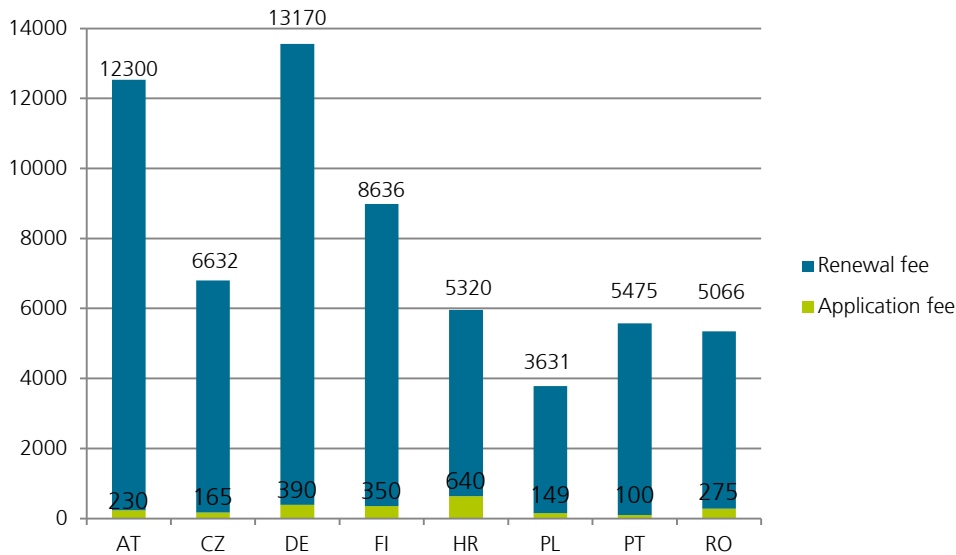
Germany tops the list of the sample countries in respect of the cost of patenting (see Figure 4). The cost of patent protection amounts to approx. 13,560 Euros. Closest country to Germany is Austria with total costs of approx. 12,530 Euros. In comparison, in other high patenting activity country Finland, the total cost of patenting amounts to approx. 9000 Euros. Hence, these three countries with high patenting activity show also the highest patent protection costs.

Although especially Germany and Austria are similar in respect of high patenting cost, then the countries differ regarding the fee structure. Austria shows low patent filing fee (approx. 230 Euros), whereas in Germany patent filing costs approx. 390 Euros. In comparison, also in Finland patent filing is costly (approx. 350 Euros), but on the other hand renewal fees are less than in Germany. So Germany is characterised by both high filing fee as well as high renewal fees.

In all other countries the patenting is cheaper. The cost is between 3800 Euros (Poland) and 6800 Euros (Czech Republic).

It is interesting to point out that all the respondents found patenting cost in **Austria** to be high. The interview partners mentioned several times that the patenting cost in the country is too high especially relative to the market size. Comparison was brought also with Germany that has much larger market, but the patenting cost does not differ from Austria considerably. In Austria, the cost of patenting may be unproblematic for big companies that have sufficient funds for it, smaller companies on the other hand have to count on state support upon patent protection. It was expressed that state's support on IP protection should be increased. It was also pointed out that state could focus more extensively also on businesses wishing to protect their innovations abroad (e.g. in China and India). Patenting abroad is necessary condition for higher competitiveness. Concern was also expressed about the patenting cost in Europe. Policy makers should reduce patenting cost in Europe by adopting unitary EU patent.

Figure 4: Patenting costs* 2010, in Euro



* Divided into application fees (including examination fees) and validity renewal fees for 20 years. Source: National industrial property offices, own calculations (2010).

Croatia has considerably lower total patenting costs (approx. 6000 Euros) than many other countries within the sample. However, Croatia differentiates clearly from other countries due to its very high initial patent filing fee (approx. 640 Euros). Almost all other countries, including countries with high innovative activity, have considerably lower patenting filing fee. High initial fee can be disadvantageous and may keep potential applicants away from the patenting system. Lower initial fee can work as an incentive for innovators to invest in R&D and use IP to protect innovations. For example Austria has low initial fee and high patenting activity. In total of 60% of the respondents assess patenting cost in Croatia to be moderate and 40% consider the costs to high. Further many of the respondents mention even if the costs may prove too high for some companies then there are enough support measures offered by the state to get the costs covered. First of all the companies in less wealthy regions may consider the patenting cost too high and thus refrain from patenting.

The Czech Republic has total patenting costs of approximately 6800 Euros, thus providing patent protection considerably cheap if compared to countries with high patenting activity (Germany, Austria and Finland). On the other hand, in comparison to the less patenting intense countries, Czech Republic has the highest total cost. In Portugal a person has to pay approx. 5600 Euros for patent protection, in Croatia approx. 6000 Euros and in Romania approx. 5300 Euros. Poland is exceptional in comparison to all countries with only approx. 3800 Euros. Even if the total patenting costs in Czech Republic can be considered relatively high, then it is worth noting that

Czech Republic has low initial patent filing fee (approx. 165 Euros). Similarly low filing fee can be seen only in few countries: in Portugal (approx. 100 Euros), in Poland (approx. 149 Euros) and in one of the high patenting activity country Austria (approx. 230 Euros). So despite of the total high costs of patenting in Czech Republic, patent filing in the country is advantageous due to the low patent filing fee. It should support at least patenting activity of inventors that do not necessarily intend to keep their patent valid for the whole validity period of 20 years. In total of 50% the respondents found patenting cost in Czech Republic to be moderate. 25% found the cost to be low, and the rest 25% high. The interview partners pointed out that generally companies do not have difficulties with domestic patenting cost, except small companies. Greatest concern was expressed concerning European patent and US patent that both are too expensive for Czech inventors.

In total of 60% of the interview partners found patent costs in **Finland** to be moderate, and 40% considered costs to be high. It was pointed out that the patent costs may be considered high relative to the market size, but companies in Finland anyhow rarely limit their patent protection only within Finnish market and apply for a patent protection also abroad (e.g. European patent). In general, costs may be of larger importance for universities that do not have enough resources for it. Prospective EU unitary patent was mentioned by many respondents as a necessary measure in Europe to reduce patenting costs.

In **Germany**, 50% of the respondents found that in Germany the patenting cost is high, rest found it to be moderate. Germany's patenting system may be disadvantageous for potential patentees, because it may keep innovators away from patenting firstly due to high filing fee, and secondly due to high renewal costs. Fee structure, where at least patent application fee is lower, may attract more patentees, including those that later are not interested in renewing their patents or do not have funds for it. Also the interview partner pointed out that high patenting cost in Germany is often reason why innovators refrain from patenting. Instead of patenting, many companies prefer to quickly develop their innovations, bring them to the market and profit from lead time.

Poland has considerably lower total patenting cost (approx. 3800 Euros) than other countries within the sample countries. This applies also to the initial fee (approx. 150 Euros) payable upon patent filing. The initial patenting fee is lower only in Portugal (approx. 100 Euros). This means that in comparison to the other target countries, Poland's inhabitants have price advantageous patenting system. Therefore it is interesting to point out that only 17% of the Polish interview partners considered patenting cost to be low. 50% of respondents considered cost to be moderate and the rest 33% to be high. The common opinion of many of the interview partners never-

theless was that if compared with obtaining patent protection abroad, then the patenting cost in Poland is low. For example European patent as well as US patent were mentioned to involve too high costs that cannot be easily borne by Polish companies and scientists. It was expressed the need for unitary EU patent in order to reduce patenting cost in Europe.

Portugal has a cost beneficial patenting system. Especially the initial filing fee in the country is very low, amounting only to approx. 100 Euros. The total patenting cost including renewal fees for 20 years is approx. 5600 Euros. Within the sample, the total cost of patenting is cheaper only in Romania, amounting to approx. 5300 Euros. In total of 75% of the respondents considered costs associated with patenting in Portugal to be moderate, the rest 25% found the costs to be high. The interviewees mentioned that due to small domestic market, companies as well as universities are first of all concerned about patenting their innovations in other countries, for example in US and larger European markets, such as Spain, Germany, France and UK. It was mentioned that 90% of production of domestic pharmaceutical and biotechnology companies is produced for foreign markets. Few of the respondents also pointed out that national patenting system is used only if inventor is not sure of the success of their patent or want to save costs on patenting. Thus, greater importance for Portuguese is the cost of European patents and US patents that are more often used for protection innovations than national patents.

The patenting cost in **Romania** amounts to approx. 5300 Euros, making Romania second most cost-beneficial patenting system, outperformed only by Poland (total cost approx. 3600 Euros). However, the initial patent application fee in Romania is considerably high (approx. 270 Euros), and resembles most to high patenting activity Austria where the fee is approx. 230 Euros. It has to be noted that in other low patenting countries, the initial fee is generally low (between 100 and 165 Euros), except in Croatia. Initial fee may support patenting better than low total cost because not all inventors keep their innovations valid for total 20 years. 80% of the respondents found patenting cost in Romania to be moderate, the rest found the costs to be low. The respondents mentioned that patenting abroad (European or US patent) may be too expensive for Croatian companies.

Conclusively, all the countries differ from each another in respect of the total patenting cost that innovator has to pay. Countries with higher patenting activity tend to have also higher patenting costs. Countries with lower patenting activity tend to have lower patenting costs. Nevertheless, categorization is not so clear when it comes to the patent fee structures. High patenting countries all charge different patent filing fee, whereas in Austria it is the highest. The fee structure varies similarly among countries with low patenting activity. Hence, further study is needed to survey the reasons and strategies that lead to the specific fee structures in each country. As already said, IP

policies in these countries do not offer here any explanation. It is important to point out that the interviewees in each country found patenting costs very rarely acceptable. Especially in the countries with high patenting activity (Germany, Finland, Austria), the respondents tend to see the patenting costs moderate or even high. Policy makers should take this into account upon adopting policies on patenting fees.

Table 6: Interviewees` assessment to the patenting costs in their countries

Country	Assessment to patenting costs (based on questionnaires and interviews with actors in each country)
Austria	High
Croatia	Moderate
Czech Republic	Moderate
Finland	Moderate
Germany	High/Moderate*
Poland	Moderate
Portugal	Moderate
Romania	Moderate

* No clear statement can be made, respondents` ratings were equally divided.

In the following section the findings from the study are concluded and some policy implications for the countries and for the EU are drawn.

4 Policy implications

First of all, the findings show the goals of the EC concerning single IPR regime in Europe and Industrial Property Strategy for Europe seem only to be partly supported by the EU member states. Besides setting common goals, the EC wants also achieve common understanding of the relevance of the IPR among all member states. The countries within the sample do not show similarities in approaching IPR as a policy topic neither they show high similarities concerning policy measures. Although each country recognizes the importance of IPR for their economic growth, the high political importance that is paid at the EU level to the IPR, is not visible at national level. At EU level one can see that the economic growth in Europe is set as the most important target, member states are expected to give their input to it by adopting suitable IP policy measures.

However, at the national level IP policies are driven by national interests and the common European perspective is very less or not at all reflected in national IP strategies. Hence, much work still has to be done by the EC to bring the “common European” thinking to the national governments and incentivize them to follow the multiple recommendations concerning IPR that has been given by the EC throughout the years.

In the following, short country profiles summarize the findings of the study and include suggestions for policy makers in each country. Table 7 illustrates the (mis)match between existing IP policies and problems that policy makers in the country should actually or in addition address in their IP policies.

Austria is characterized by strong patent protection. The greatest challenge for the country is to motivate its innovators to use the patenting system that is considered by all the interviewees too costly, especially for SMEs. Currently, large share of domestic innovations are owned by foreigners, tendency that is generally distinct to countries with less IP awareness and low entrepreneurial culture. Relatively high level of foreign owned innovations in Austria indicates that potential domestic patentees, including enterprises and research organizations, have to be offered more (financial) incentives to become adventuresome and patenting friendly. Austria’s IP policies seem to focus mostly on making patenting abroad more affordable so that companies could grasp new markets. Due to small domestic market, it is important that companies extend their activities across borders. Nevertheless, it is important to note that domestic patenting may be for many innovators the first attempt to bring innovation on the market, a fact that was pointed out by one of the interviewee. So besides focusing on IPR matters in foreign markets, Austria’s policy makers could focus more intensively for example on the high patenting costs at home that currently works as one impediment to patenting.

Croatia is on its way on establishing its IP system, including building up needed infrastructure and dividing IP related responsibilities between its public bodies. Great challenge for the country is how to raise IPR awareness among its population and how to make IPR attractive for enterprises from regions of the country that are not so advanced. Innovative activities and IPR awareness is centralized in the capital of the country. Hence, policy makers in Croatia should focus on raising IPR awareness of its residents. Also research-industry collaboration should be supported. With enhanced collaboration it can be expected that there will be also research output for which also patent protection is necessary.

The **Czech Republic** suffers from counterfeit and pirated goods on the market, which in turn indicates weak enforcement of IPR. This may keep many companies away from the patenting system. The country suffers from low collaboration of companies’ research organizations. In addition

to the need to increase research output, the knowledge about the commercial use of intellectual property has to be spread among the companies. Basic IPR awareness (e.g., what, where and how to protect) in the country is good, but there is a lack of commercialisation skills. Currently, domestic inventors are renouncing their ownership to innovations too easily (tendency that is also noted in Romania). These aspects should be paid more attention by policy makers. Currently, greatest attention is paid on law enforcement in the country.

Finland has strong patent protection, the legislative framework is well established and laws are efficiently executed by authorities. Strong protection of rights and high IP awareness are one of the reasons why persons patent their innovations actively. In the coming years, Finland is focusing on supporting research-industry collaboration and the management and exploitation of the IP resulting from such collaboration. Policy makers should pay more attention to the funding of public research organizations to undertake IP related activities.

Germany similarly to Finland provides strong patent protection. The country is on one hand supporting the use of patenting through various financial instruments, and on the other hand enforcing IP laws so efficiently that innovators do not hesitate whether the protection is worthwhile. The study showed that patenting cost in Germany is the highest in comparison to the other countries, and as mentioned by the interview partner, the cost may work as a deterrent for many German innovators that would otherwise use patents to protect their innovations. Policy makers should take the patent affordability problem into account, this may be especially crucial for SMEs and private innovators.

Poland suffers from low IP awareness. People tend to ignore IPR or are simply not acquainted with the topic. This drives the number of infringement cases to be high and holds patenting rates low. Within coming years Poland wants to increase IP awareness among its private persons and businesses, make law enforcement more efficient and improve industry-research collaboration. Policy makers should consider whether single or only few IPR strategies would help them to achieve these goals. The current situation is characterized by overlapping policy documents which may induce confusion among the market actors as well as among authorities responsible for enforcing the policies.

Portugal lacks efficient funding mechanisms for IP protection. Patenting is mostly carried out by research organizations and their spin-offs. There is less demand from industry for research and thus research sector alone is unable to drive patenting rates high. The country has invested in raising IPR awareness in the country as well as improving its research facilities. Now it is time for the policy makers to support research-industry collaboration and incentivize private sector to invest in IP protection. Then research output would be generated more quickly and the need for IP

protection would also rise. Considering the economic difficulties in the country, it is to be seen how actively Portugal is going to prioritize IPR in the coming years. More active involvement of the country in the IPR matters was wished by all the interviewees.

Romania suffers from low IPR awareness, which in turn drives the number of IPR infringement cases high. The two major goals for the country in the coming years should be on the hand to increase the IPR awareness of the residents (and not only in the capital of the country), and on the other hand make the law enforcement in the country so efficient that people would not ignore IPR. Within the sample countries, the goals are comparable with Poland and Croatia. In addition, low research output is another shortcoming in the country, both universities and companies should be encouraged to pursue collaboration. This in turn implies that state should offer more incentives for both parties. From the interviews it came clear that companies firstly need more financial support. All these aspects should be more strongly addressed by the policy makers in the country.

Table 7: Country profiles

Country	Patenting activity	Foreign ownership of inventions	Advantages/shortcomings of IPR protection	Challenges for policy makers	Policy goals drawn from national IP policies
Austria	High	Moderate	Efficient law enforcement, well trained and experienced enforcement authorities, highly qualified judiciary, low level of infringement cases	Moderate industry-research collaboration; patenting costs may be too high relative to market size and too high for SMEs	Strong IP system, domestic companies' competitiveness abroad, access of innovators to technology transfer and IP commercialisation
Croatia	Low	High	Inefficient law enforcement, less trained and experienced enforcement authorities	Low industry-research collaboration; low IPR awareness; low innovative culture; low entrepreneurship; patenting costs for SMEs may be too high, especially in less developed regions; concentration of funds and innovative activities into the capital of the country	Establishment of IP infrastructure and adoption of IP legislation, IP protection should be taken to the same level as in other EU member states
Czech Republic	Moderate	High	Inefficient law enforcement, less trained and experienced enforcement authorities, low availability of financial resources for law enforcement authorities, high workload of courts and shortage of judges	Low IPR awareness of companies; patenting costs may be high for SMEs; high piracy and counterfeit rates that reduce motivation to use patents; low industry-research collaboration	IP discussion is fragmented and unstructured. Goals generally difficult to determine, except the need to improve the IP enforcement
Finland	High	Low	High motivation of the country to enforce IPR, high level of training and experience of enforcement authorities, high availability of financial resources for enforcement authorities	Industry-research collaboration could be improved; patenting costs may be too high relative to market size and too high for research sector	Strong of IP system, domestic companies' competitiveness, research-industry collaboration, management and exploitation of IP, funding for public research organizations in IP related matters
Germany	High	Low	Efficient law enforcement, well trained enforcement authorities, rapid reaction to IPR infringements by the state's authorities	High patenting rates may include high number of patents that are commercially worthless; patenting costs may be too high for innovators	SMEs better access to IP protection and commercialisation of research results, higher collaboration between industry and research
Poland	Low	High	Inefficient law enforcement, low level of experience and training of law enforcement authorities	Low IPR awareness of companies; companies' lack funds to develop innovations; weak industry-research collaboration	IP discussion is fragmented and unstructured. Goals generally difficult to determine, except the need to improve the IP enforcement

Portugal	Moderate	High	Inefficient law enforcement, slow judicial proceedings	Low entrepreneurship; lack of funds to use IPR; private (risk) capital is less involved in industry-research collaboration; country is service-orientated	Better protection of IPR and increased commercialisation of IPR by companies
Romania	Low	Very high	Inefficient law enforcement, ignorance by the state's authorities towards IPR, judiciary lacks IPR competence	Low IPR awareness; low industry-research collaboration; concentration of innovative activities in the capital of the country; low financial support from the states for IPR commercialisation	Harmonisation of IP legislation with EU standards, efficient law enforcement, establishment of public administration for diverse IP issues, increased international collaboration, increased proficiency of domestic human pool dealing with IP

Note: Own assessments based on Figure 2 (patenting activity), on Figure 3 (foreign ownership of inventions), and on questionnaires and interviews (advantages/shortcomings of the IPR protection; challenges for policy makers).

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