

Final report for

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"Creating a financial market for IPR"

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1 Summary

1.1 Executive summary

A market for intellectual property rights (IPR)¹ increases innovation, technology transfer and economic value (e.g., gross domestic product and employment).

In the knowledge economy, knowledge has become an important economic good. Thus, IPR gain in importance. This raises the question of the optimal allocation of IPR, which increases the importance of the IPR Market.

From a geostrategic perspective, European firms and institutions may face increasing pressure in future, mainly arising from the US and Asia. The need for a critical analysis of the current IPR system is therefore gaining momentum.

Access to IPR is a serious issue for research organisations and firms wishing to further develop their products, to complement the technological state of the art, or to place new products on technology markets – marketplaces where IP can be sold and bought, which follow clear and transparent rules and open ways for innovators to access IPR.

The IPR Market comprises the IPR Asset Market and the IPR Financial Market. In order to be both successful and sustainable, an IPR Financial Market requires a properly functioning IPR Asset Market. Financial markets benefit from more developed markets for the underlying assets since this increases transparency.

Financial products or vehicles connect the IPR Financial Market with the IPR Asset Market. The characteristics of these products or vehicles influence the trade in assets, i.e. patents. There are private vehicles, public-private vehicles and commoditisation vehicles.

Policy recommendations address the IPR Market, the IPR Asset Market, as well as the IPR Financial Market and are grouped accordingly.

IPR Market

1. To reduce the flow of innovations out from the EU, to reduce fragmentation of the IPR Market, and to increase liquidity and transparency on the IPR Market, the EC should create a single IPR Asset Market in Europe.
2. To gain an overview of potential attempts to create such a market, the EC should launch a tender for private institutions to propose IPR Asset Market business models.

IPR Asset Market

3. To increase European research institutions' engagement in the IPR Asset Market, the EC should
 - foster the IPR awareness of European research institutions, and

¹ The focus of the study is on patents.

- foster the creation of research-field-specific IPR valorisation services for research institutions.
4. To increase the confidence of actors regarding the IPR Asset Market, the EC should ensure a common, high patent quality and its enforceability across Europe.
 5. To increase SMEs² participation in the IPR Asset Market, the EC should
 - foster European SMEs' IPR awareness, and
 - foster the creation of industry-specific IPR valorisation services for SMEs.
 6. To support the expansion of European companies to non-EU IPR Markets, the EC should foster the global harmonisation of IPR systems and foster efficient IPR enforcement outside the EU.
 7. To facilitate IP transactions on the IPR Asset Market, the EC should promote licensing as a preferred mode of IP transactions on the IPR Asset Market.
 8. To facilitate IP circulation in the IPR Asset Market, the EC should continue to foster the professionalism of technology transfer structures (e.g., TTOs) in the EU.
 9. To facilitate IP transactions and increase actors' certainty regarding patent valuation methods, the EC should foster the dissemination of information on existing patent valuation methods among the actors.

IPR Financial Market

10. The EC should not establish or support the IPR Financial Market before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of this underlying market are clear to the actors.
11. To globally observe and analyse new attempts to trade IPR, the EC should launch a network of excellence comprising European:
 - financial community experienced in IPR trading and financing innovation,
 - patent offices,
 - SMEs and large companies with different R&D capacities and industry sectors,
 - research institutions representing different research fields, and
 - researchers focusing on innovation and financial markets.
12. Three years after its launch, the EC should require the network of excellence to propose:
 - policy actions regarding the establishment of an IPR Financial Market (e.g., concerning the market types and products), and
 - policy actions to improve the functioning of the IPR Financial Market (e.g., by adjusting its regulatory framework, strengthening the benefits to SMEs and the research landscape) if it has already evolved.

² Small technology and science-orientated firms according to the EU SME definition in the industry groups defined as relevant for patenting in our study.

1.2 Objective of the study and relevance of the topic

This study outlines the challenges and opportunities that would arise if an IPR Financial Market, with the focus on patents, were created in Europe. Additionally, the study discusses how such a market could be designed and what policymakers could do to stimulate marketplace evolution. Furthermore, the study aims to define the concepts needed to establish an IPR Market in order to provide a common understanding of the situation.

An underlying assumption in the IPR Market investigation is the argument that quasi-monopolistic rents attract investment in R&D and innovation. Furthermore, it is assumed that a functioning IPR system creates economic value.

IPR transactions take place in a highly fragmented marketplace entailing the following challenges:

- Difficult acquirer identification,
- Long periods of negotiation,
- Extensive due diligence activities,
- Sellers and buyers have very differing price expectations.

Therefore, an organised IPR Market is expected to offer an improvement in the current situation marked by characteristics such as increased market transparency, efficient pricing mechanisms, and increased IPR transaction security due to more transparency.

IPR Market

The IPR Financial Market and the underlying IPR Asset Market are two basic components of the IPR Market. This structure is considered to be a new concept and serves to clarify the interdependencies between the markets (see Figure 1).

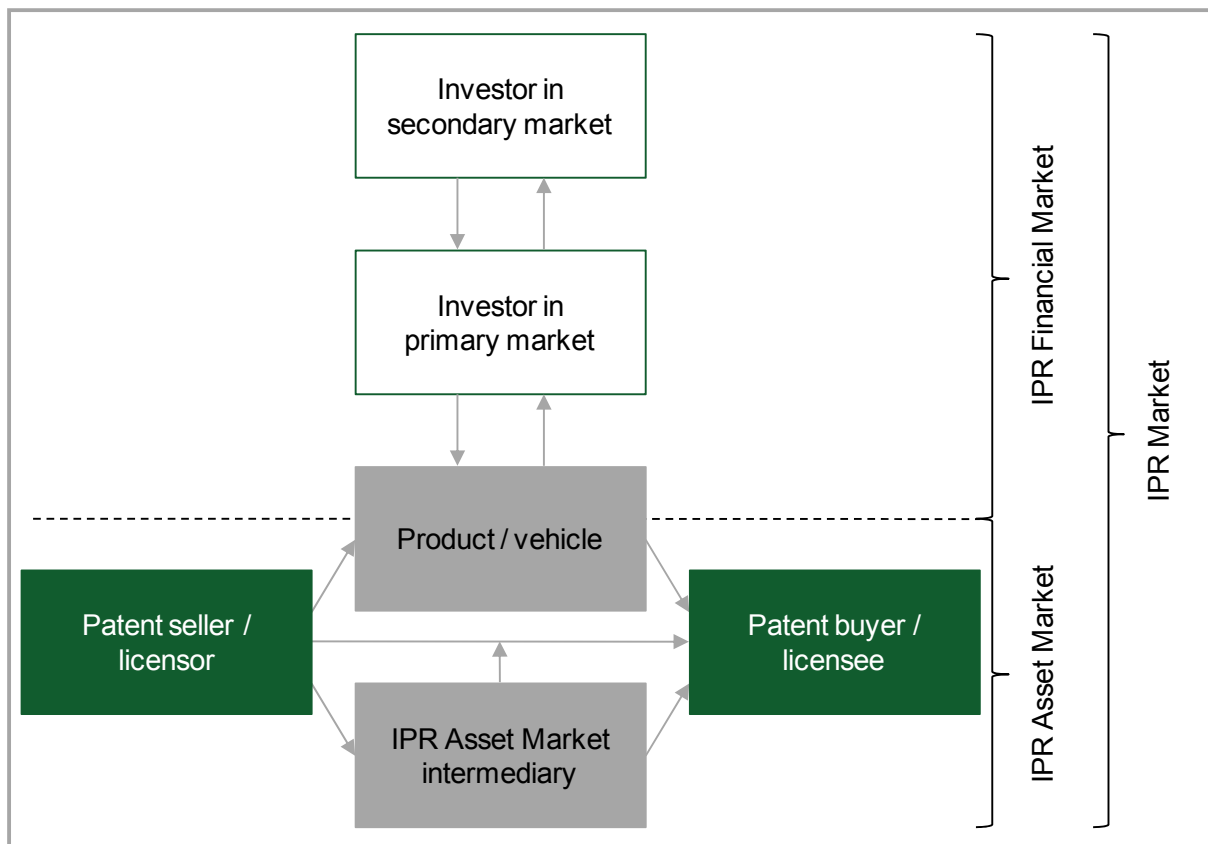
IPR Asset Market

Although the IPR Asset Market currently has shortcomings, it already exists. This IPR Asset Market concept is the basis for investigating the IPR Financial Market but may be enhanced, as will be shown in the course of this study. In the IPR Asset Market, patent sellers (e.g., original patent holders) transfer their IPR to patent buyers in exchange for monetary compensation. This may take place directly or through brokers, dealers and vehicles (e.g., funds, companies, SPVs, etc.).

IPR Financial Market

In the IPR Financial Market, the vehicles create financial products (shares, bonds, etc.) which investors can purchase. The primary market is created there when the product or vehicle issues shares, bonds, etc., whereas the secondary market arises as soon as these financial products can be traded between different investors.

Figure 1: Indicative market structure.



Source: Own illustration.

1.3 Methodology

Three main research steps have been applied to cover the study objectives.

Literature research

The desktop research was aimed at providing a substantial overview of the concepts involved in establishing an IPR Financial Market. The results of the literature research form the basis for the definition of the concepts involved in the study and for the conducted expert interviews.

Expert interviews

Interview guidelines were developed on the basis of the desktop research results. These interview guidelines were used to ascertain the interviewees' general view of an IPR Asset Market and an IPR Financial Market, as well as the concepts covered in the course of the study. Face-to-face or telephonic semi-structured interviews were conducted with experts in the field of intellectual property rights, technology transfer, markets for patents and technology, patents infringements, patent aggregation, and banking.

Empirical study

The empirical study was conducted in three main phases:

1. The concept development and survey design; developing and structuring the questionnaire; and identifying contact persons.
2. An online survey of the top 1000 patent applicants at the European Patent Office (EPO).
3. Analysing the online survey responses to obtain a better understanding of patent applicants' current and envisioned situation regarding the IPR Market.

1.4 Towards an IPR Market

The emergence of a European IPR Market should create value for the participating actors, but should also generate general economic and societal benefits. Given that the IPR Market will develop and the challenges will be overcome, the creation of the IPR Market will lead to economic growth driven by increased innovation activity in Europe. Economic growth correlates with increased wealth and therefore leads to societal benefits, for example, the maintenance of infrastructure. Economic growth is expected to arise especially in segments of the economy with high patent activity. Prior studies show that patent-active SMEs concentrate their operations in innovative niche markets (EIGE 2009). Growth in the innovative sectors of the economy could therefore also create beneficial dynamics for society as a whole.

Currently, a majority of actors describes the existing IPR Market as a "black box". Transforming this situation into an organised IPR Market is a pre-condition for increasing value. An organised and sufficiently large IPR market will be characterised by market

transparency, market depth and liquidity, reasonably low transaction costs, as well as adequate governance rules and, therefore, efficient asset pricing.

Figure 2: Drivers of market size.

1	<p>Characteristics of the asset</p> <ul style="list-style-type: none"> ▪ Physical character of the asset determines geographical reach, e.g., trading electricity ▪ IPR can be transferred globally at low costs
2	<p>Transparency</p> <ul style="list-style-type: none"> ▪ An organised market increases visibility beyond regional borders ▪ Visibility on the transaction level is increased (additional business opportunities)
3	<p>Market depth</p> <ul style="list-style-type: none"> ▪ For commercial success, a market needs to cover a substantial amount of the transactions ▪ A global / European market is a prerequisite for commercial attractiveness
4	<p>Asset pricing</p> <ul style="list-style-type: none"> ▪ Auctions offer transparent pricing mechanisms in organised markets ▪ Terms and conditions of transactions can be made available and reduce uncertainty for market actors
5	<p>Transaction costs</p> <ul style="list-style-type: none"> ▪ Traceability and comprehensibility reduce transaction costs ▪ Less time and effort required to find a transaction partner, determine price and negotiate conditions
6	<p>Regulation and governance</p> <ul style="list-style-type: none"> ▪ Allow access to, the type and scope of transactions ▪ Determine the type of asset and publication proceedings

Source: Own illustration.

A successful European IPR Market will stimulate innovation actors to turn their ideas into exchangeable and exploitable assets. It is likely to support the usage and acceptance of the patent system, as well as increased IP circulation and improved IP access.

Launching IPR assets on the global market will increase the visibility and the competitiveness of the participating actors. Furthermore, a functioning IPR Market will make new types of cooperation possible. It supports the transfer of ideas from inventors to institutions capable of and experienced in making a new product or a process a market success. If implemented fast, a European IPR Market could become a hub and a reference point for international technology trade.

The IPR market can be considered a tool with which to create economic value by allocating knowledge in a wealth-maximising way by offering an incentive to produce knowledge that is, in exchange for monetary benefit, broadly accessible to other economic actors. Currently, IPR producers will not benefit monetarily from opening their knowledge to other economic actors. Following this theory of markets' efficient allocation, it is also likely that knowledge can be distributed to those actors that can create the largest economic benefit since they are likely to have the highest willingness to pay. In many cases, knowledge is tacit, which means that it is bound to people or organisations. Detaching that knowledge in terms of formalisation can be costly. In fact, making knowledge explicit is a question of profitability.

The market could have a positive effect on the willingness to make knowledge explicit by offering monetary compensation.

As a negative side effect, increased competition could pressurize SMEs and research institutions to leave the market if they cannot adopt their costs and processes to the new environment. European nations with less globally competitive economies may be in favour of a national or strictly European solution rather than a global solution.

Figure 3: Benefits for innovation.

1	<p>Turning ideas into an asset</p> <ul style="list-style-type: none"> ▪ Patented technologies are simultaneously private and public goods ▪ Monetary value can be attached ▪ A new channel for the transfer of know-how
2	<p>Global competitiveness</p> <ul style="list-style-type: none"> ▪ Global visibility requires companies to improve their processes and products ▪ An easy access point to global technology markets provides an opportunity to capitalise on inventions
3	<p>New types of cooperation</p> <ul style="list-style-type: none"> ▪ Further separation of labour into inventive and commercial activities ▪ Focusing on core capabilities leads to productivity gain

Source: Own illustration.

The financial side of the IPR Market is likely to develop a range of new financial products aimed at funding innovations. Attracting more capital for innovation is expected to lead to increased researcher activity. In turn, this will incentivise research institutions and industry companies to engage in developing innovations. Specifically, this could narrow the funding gap between research and prototype developing.

Consequently, the private sector’s stronger integration into the production of innovations via the IPR Market may increase the efficiency and commercial orientation of research efforts in Europe.

Figure 4: Funding opportunities for innovation.

1	<p>Capital for innovation</p> <ul style="list-style-type: none"> ▪ Especially early stage technologies lack funding opportunities ▪ IPR finance instruments and IPR Intermediaries offer specialised services for early stage commercialisation
2	<p>Return on innovation</p> <ul style="list-style-type: none"> ▪ Private investors will be able to directly invest in innovation ▪ Especially economic sectors with growth potential will attract private money
3	<p>Alternative to R&D subsidies</p> <ul style="list-style-type: none"> ▪ Capitalising on innovation will increase funding opportunities for the state ▪ Introducing market principles in research will increase effectiveness and efficiency

Source: Own illustration.

Empirical findings: Motivations, barriers, regions and intermediaries

To identify company motivation and rationales for participating in the IPR Market, we conducted an empirical analysis of a survey of the top 1000 EPO applicants in 2010. The companies in the sample are concentrated in technology-intensive industrial areas like chemistry, electrical engineering or mechanical engineering. Industries differ in their use of patents and suitability for an IPR Financial Market. In respect of chemistry, for example, relatively few patents are used per product and expert opinions differ, but tend not to support the industry's suitability. On the other hand, experts were generally of the opinion that high-tech industries will develop a strong IPR Asset Market. In addition, these industries were perceived as suitable due to their high number of patents per product. The companies in the sample are currently engaging in IPR transactions with other corporations and SMEs and plan to intensify their transaction activity in future. European corporations and research organisations are important sources of IPR and the European market a preferred place for IPR transactions, while the Asian market is considered as becoming increasingly important.

The monetary value that owners assign to their IPR is highly skewed. Currently, most companies show low to mediocre levels of familiarity with patent transactions. The main barriers to engaging in IPR transactions are the evaluation of the economic IP value, difficulties with finding a transaction partner and evaluating the novelty of technologies. If companies engage in IPR transactions, they do so mainly to increase their revenues and transfer technology. Companies rely primarily on personal networks or patent attorneys as patent intermediaries. Intermediaries, like patent funds, patent pools and trading platforms, are less meaningful and regarded with scepticism. In terms of transactions, companies prefer licensing to ownership transfer. Compared to the transfer of ownership, the licensor retains the right to capitalise on the technology's future development and to simultaneously generate profit elsewhere than on the product market.

Single patents and bundles of patents from a certain technology area are preferred IP assets. The preference is determined by the product markets' structural aspects. To make use of an innovation in, for example, the electrical engineering field, requires access to a whole set of patents, while a single patent allows the utilisation of inventions in the mechanical engineering field. A second influencing factor is the demand and supply structure. In markets with dedicated technology, the need for an IPR Market may be less than in markets with mainstream technologies (Arora et al. 2007). There is a lower number of applications for dedicated technologies and the demand is therefore likely to be lower than for technologies with manyfold applications. Additionally, in fragmented product markets, the actors have a higher incentive to engage in the IPR market since the rights are easier to monitor and will not create competitors in the owners' product markets (Bresnahan, Gambardella 1998).

The complexity and maturity of the technology may also affect the type of asset demanded. Products' increasing complexity correlates to an increasing number of components in the

product, thus increasing the number of IPR necessary for producing products. Less complex products comprise fewer components, requiring access to fewer IPR.

Main findings on the motivation for an IPR Market

- Characteristics of IPR as an asset for a European IPR market with a global scale
- The size of the IPR market is determined by:
 - Market depth
 - Liquidity
 - Efficient asset prices
 - Transaction costs
 - Market regulation and governance
- As a hub for technology trade, an IPR market could improve collaboration between actors in the field of innovation and therefore contribute to the competitiveness of the European economic area:
 - ✓ Central reference point for technology trade
 - ✗ Increased competition could pressurise SMEs and research institutions
- The IPR market offers the opportunity to access finance for innovation initiatives at all stages of maturation. The funding gap between innovation research and prototype developing could especially be improved
- Stronger integration of the private sector via the IPR market into the production of innovations may increase the efficiency and goal orientation of research efforts in Europe in terms of commercial applicability:
 - ✓ More funds available for innovation and a stronger applicability of research
 - ✗ Fewer funds for fundamental research
- Characterising patent portfolios, transactions, supply and demand
 - The survey participants were the top 1000 patent EPO applicants in 2010. No SME was among the top applicants
 - Applications at the EPO are mainly developed and traded in Europe
 - Firms engaging in patent trade engage on a global scale
 - The value of patents is strongly skewed. Only a small fraction of the patents in the respondents' portfolio are considered to have a high monetary value
 - Europe is considered an attractive region for IPR transactions in the present and in future
 - Asia is attractive and will be more attractive for IPR transactions in future
 - We found scepticism regarding cooperation with patent intermediaries like patent funds, patent pools or trading platforms
 - Increasing the firm's revenue is the most important goal for firms engaging in trading patents
 - Most of the technologies in a firm's portfolio are currently developed inside the firm





1.5 IPR Market structure

The current state of the IPR Asset Market in Europe is marked by a relatively low level of homogeneity in patents arising from the tacit knowledge and context dependence. Every patent is unique and not interchangeable. In addition, the IPR Asset Market lacks a generally accepted patent valuation method. This is also underscored by the findings from the quantitative survey that there are uncertainties regarding patent value and quality, and that these factors influence the entire IPR Market negatively. Therefore, we can conclude that the following three main drawbacks or properties of the current IPR Asset Market are important when building an IPR Financial Market:

- Low liquidity,
- Low homogeneity,
- Value uncertainty.

Evaluation criteria to assess potential structures for an IPR Financial Market are derived from a financial market and financial product perspective. An overview of potential IPR Financial Market structures as well as the criteria to assess financial markets and their products is given in Table 1.

Table 1: Types of financial markets.

Market type	Examples	Market criteria	Product criteria
Auction <i>Determination of the transfer price through auction</i>		<ul style="list-style-type: none"> ▪ Liquidity ✓✓ ▪ Transaction costs ✓✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓✓
Intermediated <i>Quotation of the financial product's ask and bid prices through market makers</i>		<ul style="list-style-type: none"> ▪ Liquidity ✓ ▪ Transaction costs ✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓✓
Over-the-counter <i>Decentralised, electronically linked, competitive dealer market</i>	 	<ul style="list-style-type: none"> ▪ Liquidity ✓✓ ▪ Transaction costs ✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓

Source: Own illustration.

Based on the analysis above and today's financial markets, the different markets designs and examples' success factors are extracted, which should be identified when establishing an IPR Financial Market in Europe:

- Understandability of the product,
- Cash flow predictability,
- Electronic platform,
- Hybrid market design.

Main findings on market structure

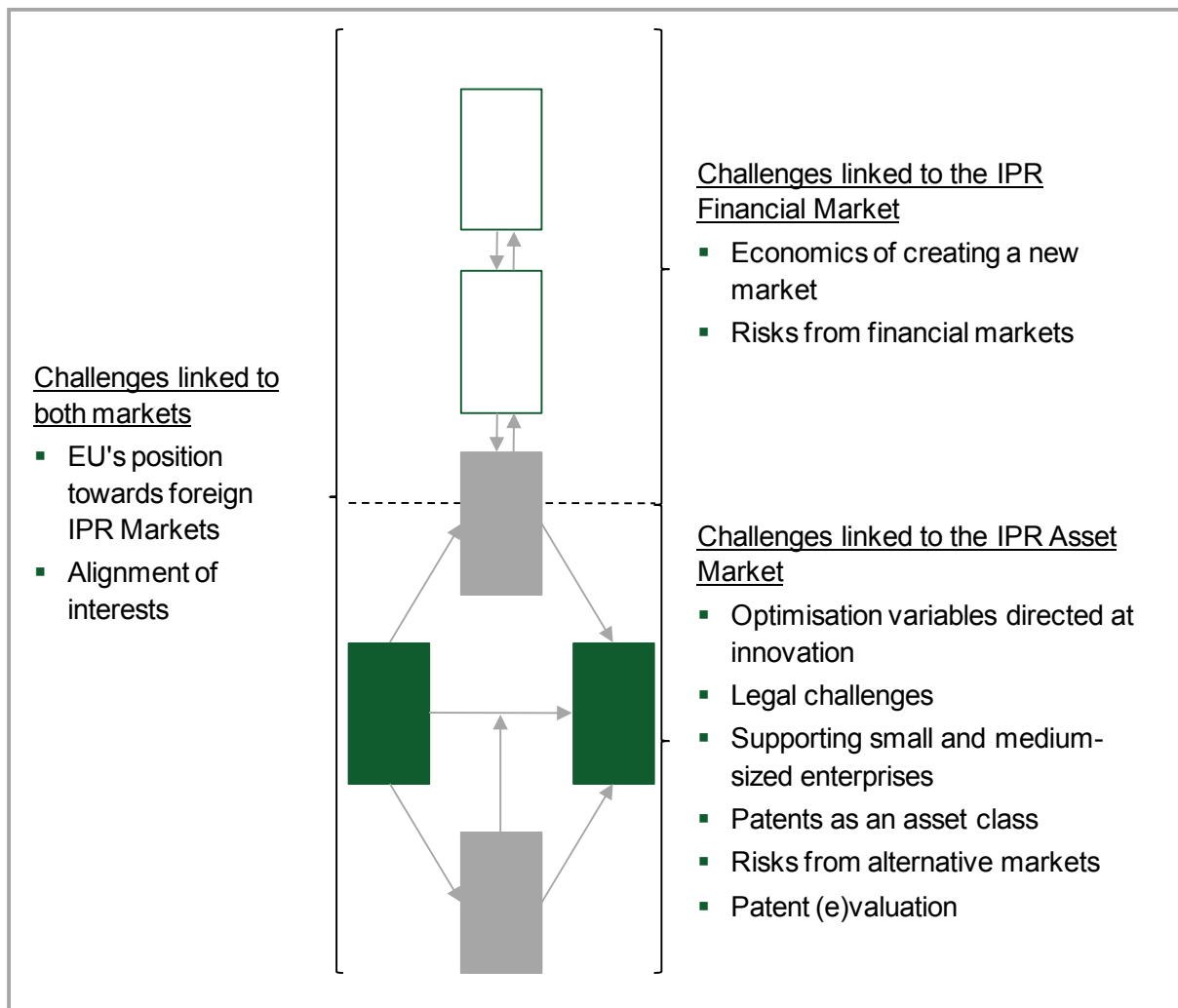
- A potential IPR Financial Market requires an underlying IPR Asset Market
- The **IPR Asset Market** currently has three major drawbacks which need to be taken into account when establishing an IPR Financial Market
 - Low liquidity
 - Low homogeneity
 - Value uncertainty
- Three **financial market types** for establishing an IPR Financial Market are considered. Two of them (auction market and intermediated market) are grouped in keeping with today's financial markets characteristics
 - **Auction market and intermediated market**
 - ✓ Central and transparent pricing as well as reduction of counter-party risk
 - ✗ High regulatory requirements and strong position of power for exchange institution
 - **Over-the-counter (OTC) market**
 - ✓ More individual trade and competition for financial product sellers, thus probably decreasing prices
 - ✗ Transparency and deal quality may be lower than in the auction / intermediated market

1.6 The challenges

Several challenges have to be overcome before an IPR Financial Market can be established and function properly, as the concept of an IPR Financial Market is an entirely new one. Although there have been some attempts to create financial products based on patents, this has taken place only quite recently. In addition, information on these products' performance is often not provided publicly, which has led to several interviewed experts doubting their performance.

We identified several challenges that could prevent the successful establishment of an IPR Market from the literature, the survey and the expert interviews. These challenges are present in multiple dimensions and arise from the entire IPR Market, the IPR Asset Market or the IPR Financial Market as shown in Figure 5.

Figure 5: Challenges in the indicative market structure.



Source: Own illustration

The challenges' main implications are described in section 1.10, where they are linked to respective policy recommendations.

Main findings on challenges

- Several challenges have to be overcome before an IPR Financial Market can be established and function properly
- Challenges arising from the EU's position towards foreign IPR Markets address the geostrategic perspective and global environment the EU faces
- Challenges linked to the alignment of interests include access to and funding of IPR, the location of the marketplace as well as taxation issues
- Challenges referring to optimisation variables in innovation are the trade-off between competition and innovation policy, the long-term objectives of the research system, the diffusion of innovations as well as the trade-off between private investor return and societal welfare
- Legal challenges comprise the observable increase in patenting, the current uncertainty and the complexity of patenting, patent quality as well as the potential non-constructive use of patents
- Since SMEs are perceived as important resources for innovation and employment in the EU, a further challenge lies in the accessibility of the IPR Market for these companies
- The acceptance and usability of patents as an asset class pose challenges in the form of the patent's properties (e.g., illiquidity and asymmetric information), the business model of asset market vehicles (e.g., the investment time horizon), the innovation paradigm adopted by companies, industry-specific characteristics and risks resulting from the patent's nature itself
- Economic challenges in market creation include set-up procedures, the reduction of transaction costs, attraction of liquidity, the establishment of institutions, ensuring investors' confidence and a properly working asset market for patents
- Risks from existing financial markets and comparable asset markets have to be borne in mind, for example, systemic, liquidity, credit, market and operational risks
- A further challenge lies in the differing valuation methods that are applied by different actors, leading to (sometimes substantially) diverging viewpoints on individual patent values
- The most important challenge extracted from the expert interviews lies therein that an IPR Financial Market requires a well functioning IPR Asset Market

1.7 Financial products related to IPR Markets

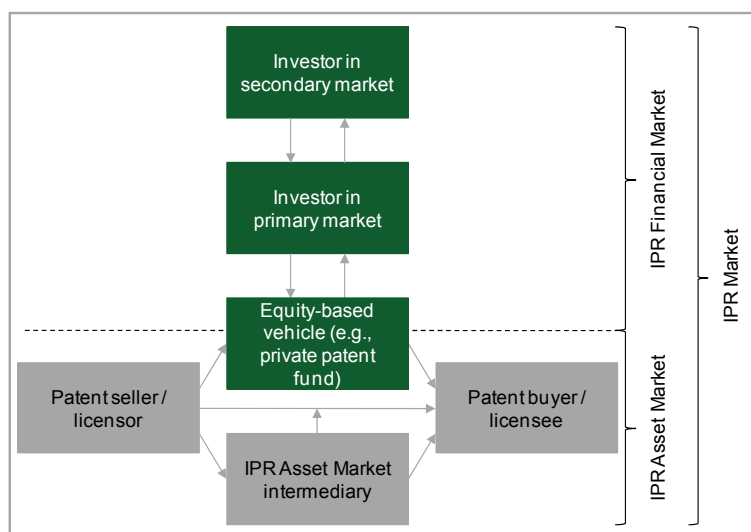
Financial products connect the IPR Financial Market with the IPR Asset Market. Furthermore, their characteristics influence the trade in assets, i.e. patents. As such, we can differentiate between private vehicles, public-private vehicles and commoditisation vehicles.

Private vehicles are financial instruments funded by investors from the private sector (as opposed to the public sector), and can be subdivided into two different instrument types. On the one hand, there are equity-based instruments (e.g., patent funds and their shares). On the other hand, there are debt-based instruments (e.g., IPR securitisation and related financial products).

Equity instruments represent a residual interest in the issuer's net asset. This can, for example, be an ordinary share of company common stock, or a claim on the assets of and the return from a fund. The equity-based vehicle in the indicative market structure is shown in Figure 6).

The green-shaded actors are directly involved in the equity-based vehicle. The vehicle is located at the crossroads of the IPR Financial Market and the IPR

Figure 6: Equity-based vehicle structure.



Source: Own illustration.

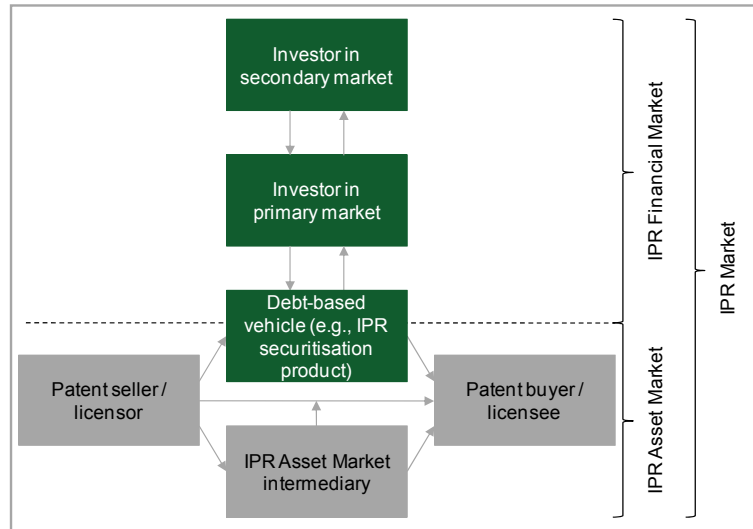
Asset Market, and thus assumes a connecting role: It connects the financially motivated investors with the patent market. During this process, the investors only interact with the vehicle itself, whereas the patent vehicle then buys, sells, licenses, etc. patents with the money provided by the investors with the goal of providing them with a promised return.

The equity-based vehicle may, for example, be structured as a company dealing with patents. This means, that investors hold common stock in that company. The value of the shares is then defined by the investors' expectations regarding the company performance. Investors can sell their shares to other investors on a secondary market.

Equity-based vehicles may invest in both early-stage and mature technologies, depending on the risk-return profile of the targeted investors

Debt-based instruments (or liability instruments) are financial instruments which have the possibility to require the issuer to deliver a financial asset to the owner of the instrument. Examples are products like bonds, or asset-backed securitisation. The debt-based vehicle in the indicative market structure is illustrated in Figure 7.

Figure 7: Debt-based vehicle structure.



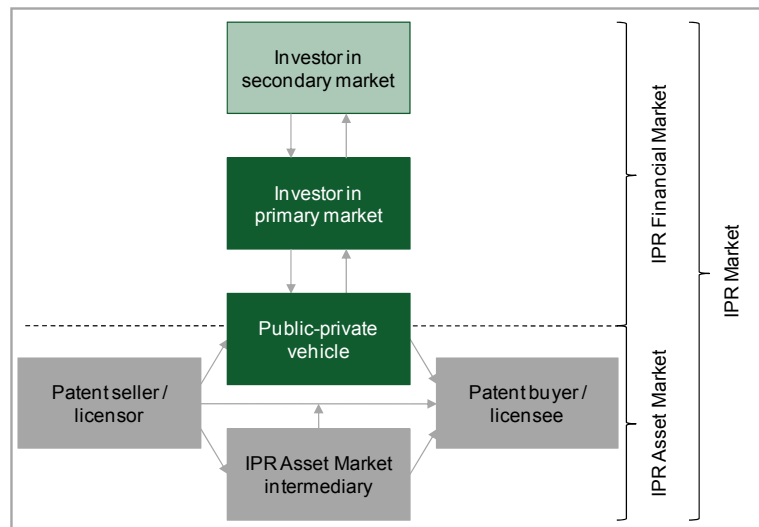
Source: Own illustration.

Similar to the equity-based vehicle structure, the green-shaded boxes represent actors involved in a debt-based vehicle. Investors invest in the debt-based vehicle, and receive a return for that investment. In contrast to equity-based vehicles, investors in debt-based vehicles do not own part (share) of the vehicle, but are rather a liability. On the IPR Asset Market, the debt-based vehicle interacts with the patent market participants, buying, selling, licensing, etc. patents in order to provide the investors with the revenue streams agreed upon at the beginning of the contract. An IPR securitisation product may be similar to a bond structure: Investors provide money, receive continuous payments to compensate for the risks taken and, in the end, receive their principal investment back.

Debt-based vehicles tend to be more appropriate for technologies which already generate stable revenues

Public-private vehicles are financial instruments fully or partially funded by public money. They may be structured as a financial product suitable for trading on an IPR Financial Market. However, current examples are still limited to initiatives predominantly financed through the public sector. Public-private vehicles can be displayed in the indicative market structure as shown in Figure 8.

Figure 8: Public-private vehicle structure.



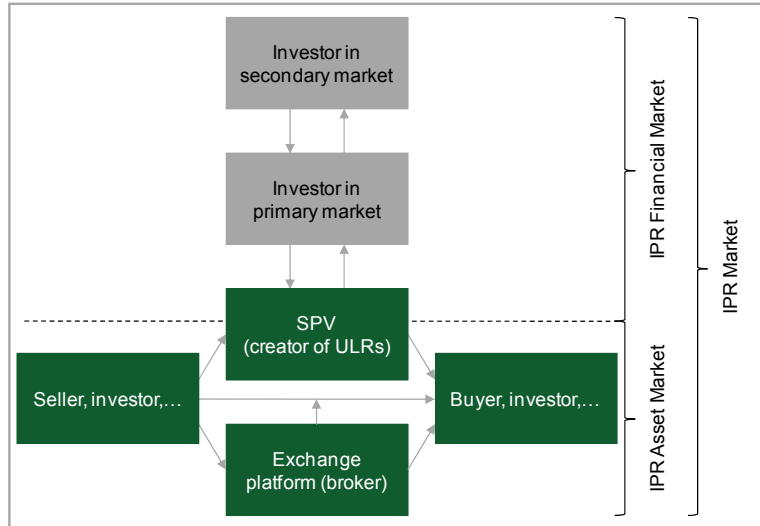
Although the aims pursued might Source: Own illustration.

be value adding (e.g., enabling national entities to exploit their patents effectively and provide advantages in terms of technology and knowledge), efficiency arguments have to be considered due to the funds' potential non-profit-orientated structure and public sector influence.

Public-private vehicles may be used as a tool to foster early-stage technologies

The **commoditisation vehicle** aims at the continuous trading of the asset and is therefore suitable for licence rights rather than patents, as the latter are unlikely to be traded continuously. The IPX International serves as a role model for commoditisation vehicles' continuous trading exchange model. The commoditisation vehicle in the indicative market structure is shown in Figure 9.

Figure 9: Commoditisation vehicle structure.



The commoditisation vehicle's main achievement is its potential to enhance liquidity in the IPR

Source: Own illustration.

Asset Market by making it similar to a financial market. Advantages associated with these characteristics include the attraction of a wider buyer and seller audience and the potential for more price transparency through continuous trading. However, a drawback associated with a more liquid IPR Asset Market is the potential for higher volatility since continuous trading is expected to set prices more often.

Main findings on financial products

- **Financial products (vehicles)** are analysed according to their characteristics and suitability for financial markets
 - **Private** vehicles are privately funded (as opposed to public sector funding)
 - Equity-based vehicles can be shares in the common stock of a company, open-end funds, closed-end funds or exchange traded funds (ETFs)
 - Equity-based vehicles may invest in both early-stage and mature technologies, depending on the risk-return profile of targeted investors
 - Debt-based vehicles include bonds, loans and asset-backed securities
 - Debt-based vehicles tend to be more appropriate for technologies which already generate stable revenues
 - **Public-private** vehicles are at least partly funded by public bodies and may be used as a tool to foster early-stage technologies
 - **Commoditisation** vehicles allow for an IPR Asset Market structure which is similar to financial markets
 - ✓ Higher liquidity and transparency for IPR Asset Market, lowering transaction costs
 - ✗ Higher volatility potential

1.8 Impact assessment

Although markets for technology are growing rapidly, IPR Market actors still face immanent transaction obstacles. Developing the IPR Market according to the measures previously outlined could impact its main actors significantly according to extensive discussions with IP experts:

SMEs

To date, SMEs do not focus on IPR as much as they should. It is uncommon for SMEs to trade IPR. Owing to their size, monetary and capacity constraints, SMEs lack the necessary resources to successfully engage in the IPR Market. Acquiring information on the possibilities of IPR trading and patenting is costly. By not selling IPR, SMEs are missing out on one of the opportunities to fund their technology development and product commercialisation.

Of all the IPR Market actors, SMEs would benefit most from the further developing of the IPR Market. Well-established IPR Markets would save them money and time that could be invested in promoting innovation. An established IPR Asset Market would reduce the costs they incur in acquiring information and screening the market. By gaining access to high-quality patents, SMEs would be enabled to more easily find solutions for their technological problems.

Research institutions

Most research institutions are primarily interested in producing publications and maintaining their networks. IPR are not considered the most important outcome of their work.

Research institutions, like SMEs, have limited resources for IPR monetisation. Patenting is considered costly. These institutions do not have a clear understanding of how to use their IPR to finance their research. At the moment, they rely mainly on their networks for IPR dissemination. Policies providing them with additional channels for IPR distribution and facilitating their fund-raising through IPR trading would foster innovation.

Intermediaries

IPR Market intermediaries have emerged to facilitate more efficient market transactions of technologies, technical knowledge, intellectual property and, particularly, patents by developing new models (e.g., IPR auctions and patent portfolio funds). The current role of market intermediaries will change if IPR Markets face substantial changes. However, the overall effect cannot be clearly estimated in respect of all the intermediaries. The impact of an improved IPR Market on specific intermediaries will depend on their respective business strategies.

Industry

Industry might be impacted negatively by the creation of a single European IPR Market due to the increased transparency and openness. Transparency in IPR trading would have a positive impact on facilitating IPR transactions and IPR circulation in general, but could allow competitors to discover confidential business strategies. Anonymous trades and other mechanisms protecting confidential information should therefore be provided for industry. IPR trading systems should take all the market actors' needs into account in order to benefit innovation.

Financial institutions

Investors generally focus on fact-based, reliable, and comprehensible information. In particular, cash flows, key performance indicators derived from companies' balance sheets, and past management team successes are used to evaluate if and to what extent an investment could be profitable. The most trusted piece of information in IPR financing is the IPR developer's reputation. IPR value is mostly derived from future expectations which are, in turn, based on many sources of know-how and information (commercial, financial and technological feasibility), thus making value speculations challenging. Having clear, established valuation methods for IPR would therefore have a particularly positive impact on financial institutions.

Main findings on impact assessment

- **IPR Market structure and products** of the proposed IPR Market were discussed with experts from TTOs, Universities, Industry, SME associations and financial institutions. Identification, selection and evaluation of factors that have a strong influence on the development of IPR Markets by market actors was made
- **The IPR Asset Market** is the underlying for the IPR Financial Market and all associated products and structures
 - The IPR Asset Market needs to be well developed and organised
 - IPR Asset Market liquidity needs to be assured in order to avoid the risks associated with IPR valorisation
- **Establishment of an IPR Asset Market** that combines the existing European initiatives is recommended. **SMEs** will benefit the most from a well developed IPR Asset Market
- **Dominance of market design** - appropriate design has a strong impact on the rationale of the market
 - Proper design is in line with organisational missions of all the market actors
 - Appropriate design gives access to technology and/or creates monetary value
- **Specialised knowhow** – shared market intelligence is necessary for successful IPR trading. IPR trading could be motivated by information gathering and/or monetary reasons
- **Investment decisions** – IPR investments are ambiguous and involve risks. Investors focus on fact based comprehensible information when making investment decisions. All market actors would benefit from central and transparent market metrics and valuation systems because it will make investing into IPR more feasible

1.9 Alternatives to an IPR Market

Besides the IPR Market, there is a broad variety of other options to increase the IPR circulation in the EU. The goal of improved IPR circulation is an increased innovation value by using the existing science and research system to create economic value. This value becomes visible, for example, in technology transfer, gross domestic product (GDP), and employment figures.

The alternative options outlined below complement the IPR Market and support paving the way towards a more organised IPR Asset Market in Europe.

Approaches for increased IPR circulation by strengthening the **supply side** are: increasing patent literacy, adjusting R&D funding mechanisms, reducing the total costs of patent ownership, professionalisation of TTOs at universities and research organisations, innovative licensing mechanisms, stimulating IPR import from abroad, and fostering open innovation and co-invention.

Approaches for increased IPR circulation by strengthening the **intermediaries** are: stimulating innovative business models for TTOs, fostering intermediary networks, patent auctions, added value services like IPR rating agencies and innovative electronic platforms.

Approaches for increased IPR circulation by strengthening the **demand side** are: IP-related educational programmes, stimulating innovative start-ups, adjusting taxation schemes, and subsidies for IPR acquisitions.

Our analysis showed that the vast majority of instruments strengthen the supply side and the intermediaries. However, only a limited number of instruments have been identified as directly stimulating the demand side. Consequently, the invention and implementation of innovative and advanced instruments to directly stimulate the IPR demand are required.

Summarised, the first matrix in Figure 10 shows all the instruments for increasing IPR circulation in the EU. These instruments should be implemented through policy actions at a national or regional level. The second matrix in Figure 11 depicts all instruments for increasing IPR circulation in the EU. These instruments should be implemented through policy actions at the European level.

All the instruments are categorised according their political feasibility as a riskless star, budget race, political benefit, or political venture. Riskless stars are instruments which can mainly be implemented within existing regulations and only require affordable financial support. Policymakers could initiate or support these instruments through modest and riskless engagement. On the other hand, political ventures are instruments which need substantial adjustments to regulations and significant budgets. Policymakers have to significantly engage in agenda setting and budget negotiations and, hence, face several risks. Budget races and political benefits are inbetween, with the budget race needing the mobilisation of significant financial resource, and political benefits forcing policymakers to engage significantly in agenda setting and regulation adjustment.

Figure 10 Instruments which should be implemented through policy actions at national or regional levels

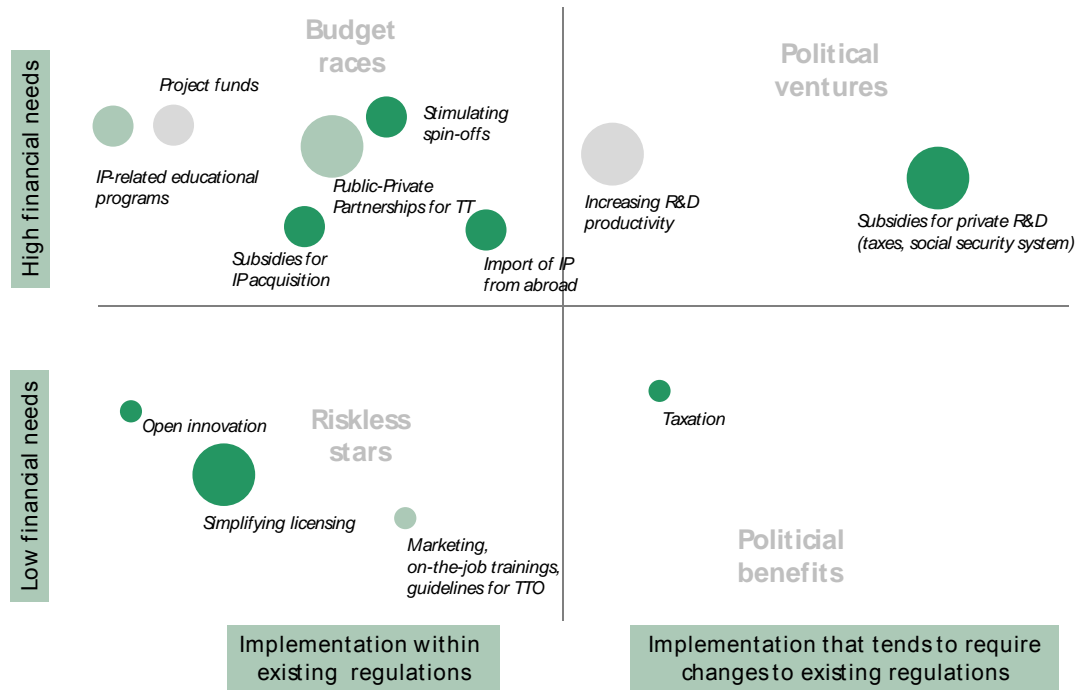
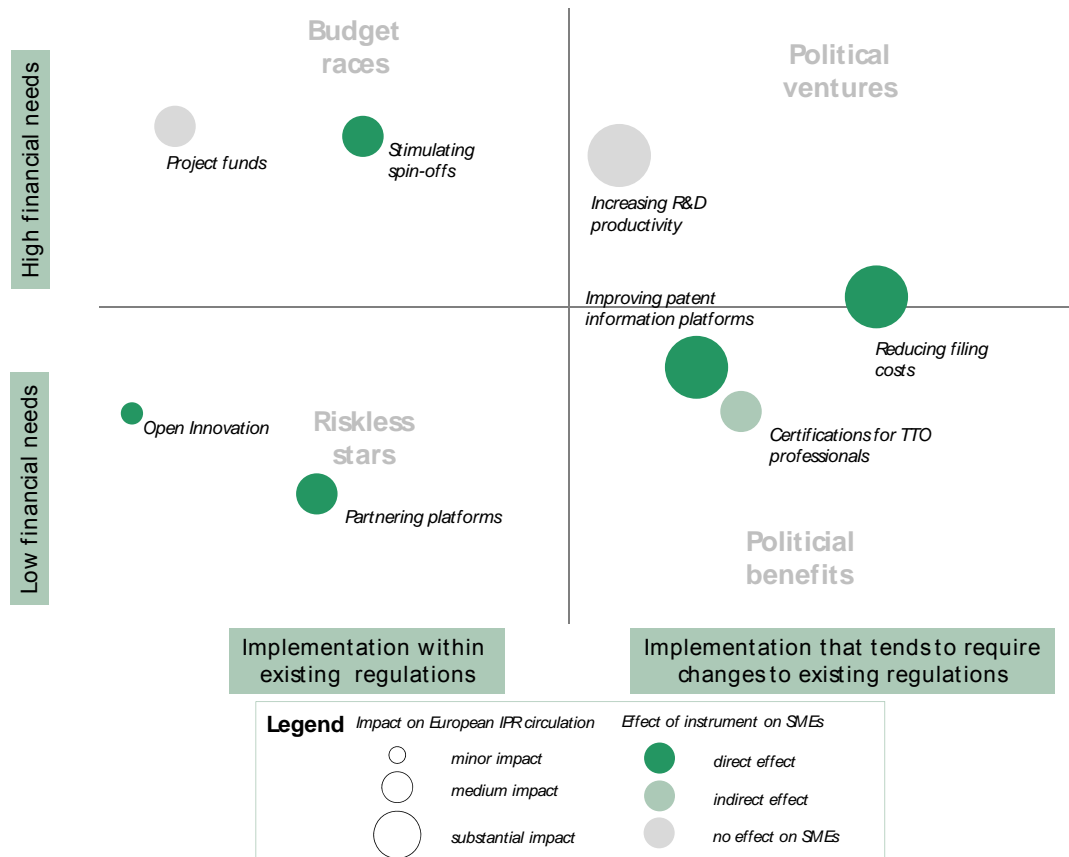


Figure 11 Instruments which should be implemented through policy actions at European level



Sources: Own illustrations.

Main findings on alternatives to an IPR Market

- The instruments discussed in this work package are appropriate means to pave the way towards a more structured IP asset circulation in Europe. Their implementation is a precondition for a liquid and vital IPR Market in Europe
- The discussed instruments **complement** and **support** efforts with regard to creating an organised IPR Market
- The instruments have been categorised according to whether they strengthen the **supply, the intermediary, or demand sides of the IPR Market**
- As a decision support for policymakers, all instruments have been assessed according to an **evaluation framework** with the following dimensions:
 - the instrument is implementable within the existing regulation or tends to require changes to existing regulation,
 - the instrument requires little or substantial financial means (directly sourced from the public sector or indirectly stimulated through the public sector),
 - the instrument has a minor, medium or substantial impact on IPR circulation,
 - the instrument has direct, indirect or no effect on SMEs
- Consequently, the instruments have been categorised as **riskless stars, budget races, political benefits, or political ventures** that structure the engagement and risks that policymakers can anticipate by setting up the instrument
- For certain instruments, the implementation of policy actions at the **European level**, but not at a regional or national level, seems to have the highest priority
- The assessment shows that there are various instruments on the supply and intermediary sides. Most of these instruments also indirectly stimulate IPR demand
- Only a limited number of instruments have been identified that will help to stimulate the demand side directly. The invention and **implementation of innovative and advanced instruments to stimulate the IPR demand** directly, are required

1.10 Outlook – conclusions and recommendations

Policy recommendations are derived from the previous analysis and directed at challenges associated with creating an IPR Market in Europe. Therefore, the recommendations address the IPR Market, the IPR Asset Market, as well as the IPR Financial Market and are grouped accordingly.

IPR Market

The US has a large IPR-orientated private sector that invests in new innovations and distributes new technologies across the world. Asian countries do not yet have a strong R&D capacity, or a large IPR-orientated private sector, but these countries are taking active steps to change the situation. Both the US and Asia are aggregating patents through private enterprises or state-driven companies respectively. By providing companies and research institutions with better opportunities to transfer technology and trade, IPR will generate revenues for both actors and allow higher investments in R&D. European companies and research institutions are less successful in exploiting their innovations due to the lack of a common functioning patent system and IPR trading mechanisms, and are therefore an easy target for foreign patent aggregators. The EU may lose its most valuable innovations to other regions of the world, which then collect revenues from these innovations. To hinder the flow of innovations abroad, actors within the EU should have clear and simple mechanisms and frameworks to transfer technologies and trade with IPR. From our study, we have seen that these challenges cannot be resolved on the EU member states level. Hence, a single IPR Asset Market should be created in Europe.

In Europe, there is no single unified IPR Market due to the missing alignment of interests between the EU member states. Each member state wants to protect its own national interests. Furthermore, the initiation of a unified market place would have external effects, for example, the creation of jobs, an increase in tax income and, as a bottom line effect, economic growth. This can be seen as a challenge when deciding if, in which form, and where to create such a European IPR market place. The consequence is that the growth of innovation in Europe as a whole will suffer, because a fragmented IPR market does not provide the same opportunities for companies and research institutions to transfer technology, exploit innovation and conduct trade as a unified market place like that in the US does. The EC should improve this situation by providing incentives for private organisation. The incentives should aim at creating a more unified IPR market place. For example, this can be done by calling for different proposals that include a solution for this challenge, and by subsequently providing an initial funding for a selected applicant. Through this mechanism, the EC will be able to consider different approaches and choose the one that best fits the situation.

Policy recommendation (1): To reduce the flow of innovations out from the EU, to reduce fragmentation of the IPR Market, and to increase liquidity and transparency on the IPR Market, the EC should create a single IPR Asset Market in Europe.

Policy recommendation (2): To gain an overview of potential attempts to create such a market, the EC should launch a tender for private institutions to propose IPR Asset Market business models.

In the following, policy recommendations aimed at tackling problems evolving from challenges related to the IPR asset market are discussed.

IPR Asset Market

There are several challenges: the awareness of IPR among research institutions, legal challenges, the awareness of IPR among SMEs and their mind-set of regarding IPR as an asset class, SMEs' difficulties in foreign IPR Markets, and patent valuation.

Owing to their lack of IPR awareness, research institutions often greatly underrate the value of their IPR and disclose valuable technical information without considering the royalties the information could generate if patented. Even if research institutions are interested in exploiting their research results, they find the process complicated. Only a small number of universities obtain value from patent sale and licensing. A great deal of work is still to be done to secure tradable assets throughout Europe. Research institutions must understand the value of the IPR they create. A single IPR Asset Market would benefit from research institutions' common high IPR awareness and from the shared active commercialisation of research output.

Policy recommendation (3): To increase European research institutions' engagement in the IPR Asset Market, the EC should

- ***foster the IPR awareness of European research institutions, and***
- ***foster the creation of research-field-specific IPR valorisation services for research institutions.***

A single IPR Asset Market requires high quality tradable patents. However, market actors in Europe have to cope with variations in patents' legal quality. Variations are subject to the patent examination standards of the office granting the patent. Market actors also have to cope with the variations in patent litigation outcomes. These variations depend on the laws and court practices in the European country solving a patent dispute. Europe lacks a homogenous patent litigation system. The complexity of patenting and patent enforcement in Europe causes uncertainty among the IPR Market actors. Investors will invest in a high-quality patent which is not (easily) revocable. The diversity of patent systems in Europe makes the predictability of patent quality and its enforceability very difficult. Our interview partners expressed the view that a properly functioning single IPR Asset Market in Europe would not be feasible until a solution is found for the fragmentation of the patent system in Europe.

Policy recommendation (4): To increase the confidence of actors regarding the IPR Asset Market, the EC should ensure a common, high patent quality and its enforceability across Europe.

Similar to research institutions, European SMEs also lack both basic and more sophisticated IPR awareness. SMEs generally also have no strategy regarding their intangible assets. Patents are not yet a fully understood and accepted asset class. SMEs have difficulties with understanding the complex IPR system in Europe. This hampers firms' entry into innovative markets. Furthermore, considering that understating patents as an investment opportunity is also a prerequisite for a functioning IPR Financial Market, it is especially important that SMEs' knowledge of IPR as a valuable business asset is increased. The EC should foster the creation of IPR valorisation services for SMEs. The services could include, for example, advice on how to integrate IPR into corporate strategies, advice on modes of IPR exploitation (sale vs. licensing), and advice on market and industry know-how. Given SMEs' different sizes and industry sectors, the IPR valorisation services for SMEs should be industry specific.

Policy recommendation (5): To increase SMEs' participation in the IPR Asset Market, the EC should

- ***foster European SMEs' IPR awareness, and***
- ***foster the creation of industry-specific IPR valorisation services for SMEs.***

The EU should also assist its enterprises to overcome the difficulties in other IPR Markets resulting from the differences in IPR systems across the world. European businesses endeavour to offer their IPR for sale in the new, developing IPR Markets. These markets are bigger and offer better returns on R&D investments than the smaller, fragmented European market does. Although European businesses are willing to trade their IPR in foreign IPR Markets, they are discouraged by the differences in patent laws and law enforcement, especially in Asia. The lack of transparency in foreign operations may force many European businesses to abandon their plans to expand to foreign markets. To support European businesses, the EC should continue to support the harmonisation of IPR systems (e.g., regarding patentable subject matter), and foster the development of state systems and procedures allowing efficient law enforcement.

Policy recommendation (6): To support the expansion of European companies to non-EU IPR Markets, the EC should foster the global harmonisation of IPR systems and foster efficient IPR enforcement outside the EU.

Industries and innovators' shared understanding of patents as an underlying asset class is challenged by diverse patents properties, including the type of patent exploitation. Patents may be exploited in different ways, and the difference between carrot licensing and stick licensing is a major topic. Generally, the strong trend towards active technology licensing observed in recent years follows the general trend of open innovation. Licensing, exchanging and sharing technologies are becoming increasingly important. Licensing is difficult to

conduct in closed innovation processes if companies have not opened their innovation process to include other companies and allow a certain information flow or information spill-over. Trade requiring the transfer of patent ownership requires more extensive due diligence activities than licensing deals and may, thus, prevent many actors from entering the IPR Asset Market. The transfer of patent ownership could create monopolies if the monopolistic rights inherent to patent are accumulated. Licensing could increase trading with IPR and minimise monopolies on the IPR Asset Market. Promoting the transfer of research achievements through licensing to SMEs and large companies could activate R&D in research institutions, create new technologies and bring new goods and services on the market.

Policy recommendation (7): To facilitate IP transactions on the IPR Asset Market, the EC should promote licensing as a preferred mode of IP transactions on the IPR Asset Market.

Information asymmetry associated with patent transactions could be addressed by increasing the professionalism of technology transfer structures in Europe. Technology transfer structures' higher professionalism would facilitate the IPR market's liquidity as they would mitigate the information asymmetry by allowing the transaction parties to obtain clear pricing signals. Owing to the central position that technology transfer offices (TTOs) currently have in university structures and strategies, but also on political agendas, TTOs' productivity seems to be critical for increasing the IPR supply from universities and research organisations. Increasing productivity is especially important, as most of our interview partners (from industry) explicitly questioned TTOs' current capabilities in Europe. A higher professional level can be achieved by introducing industry-proven TTO management software systems, on-the-job training, guidelines and the certification of TTO professionals, as well as innovative and more profit-orientated business models for the technology transfer business. The number of technology transfer structures in Europe need not be increased, but the professional level and the profit-orientation of the existing structures need to be improved continuously. Therefore, the EC should continue to foster the professionalism of technology transfer structures in Europe.

Policy recommendation (8): To facilitate IP circulation in the IPR Asset Market, the EC should continue to foster the professionalism of technology transfer structures (e.g., TTOs) in the EU.

Patent pre-selection needs to filter patents with a higher potential without consuming too many resources. Our quantitative survey showed that, currently, the market actors consider the problem of evaluating patent as the greatest barrier to IP transactions. The lack of commonly accepted valuation methods has adverse effects on buyers and investors' confidence, because the value of the asset is highly uncertain. A liquid market is driven by the actors' confidence. Furthermore, experts find the applicability of patent valuation methods highly debatable. Furthermore, the experts do not have a common viewpoint on the standardisation of patent valuation. Some argue that common standards should be set, while

others do not believe that the standardisation of valuation methods is feasible. To facilitate IP transactions and actors' certainty regarding patent valuation methods, the information on existing patent valuation methods should be disseminated among the IPR Market actors.

Policy recommendation (9): To facilitate IP transactions and increase actors' certainty regarding patent valuation methods, the EC should foster the dissemination of information on existing patent valuation methods among the actors.

IPR Financial Market

In the following, policy recommendations aimed at tackling problems evolving from challenges related to the IPR financial market are presented. There are two different challenges: The economics of creating a new market and the avoidance of known risks already existent in financial markets.

An IPR Financial Market can only work if there is a properly functioning underlying IPR Asset Market. A functioning IPR Asset Market would lower IP transaction costs in Europe, which are currently high due to a lack of transparency and insufficient market breath. The development of an IPR Financial Market is challenged by the need to form new entities and, possibly, new authorities on the IPR Financial Market. Currently, Europe lacks appropriate regulatory regimes and individuals to put a developing IPR Financial Market on a track that ensures stability and efficiency and has a positive impact on European SMEs and the European research landscape. A functioning IPR Financial Market in Europe would also need large numbers of participants and a high trading frequency to be liquid. Furthermore, generally, the market participants regard the idea of an IPR Financial Market in Europe as immature and are highly sceptic of the feasibility. The IPR Financial Market should not be established or supported by the EC before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of the underlying market are clear to the actors.

Besides improving the IPR Asset Market, the EC should launch a network of excellence to observe and analyse new attempts to trade IPR. It is not yet clear which of the multiple IPR trading models available in the world would function and would be successful. A network of excellence could be an appropriate instrument to globally observe and analyse new attempts to trade IPR and to integrate expertise on the IPR Market. This network could be a learning process for the EC. Initiatives, for example, those launched by the financial community and aimed at establishing an IPR Financial Market in Europe could even emerge from the network of excellence. The network of excellence should include the European financial community experienced in IPR trading and financing innovation, patent offices, European SMEs and large companies with different R&D capacities and industry sectors, research institutions representing different research fields and researchers focusing on innovation and financial markets.

Policy recommendation (10): The EC should not establish or support the IPR Financial Market before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of this underlying market are clear to the actors.

Policy recommendation (11): To globally observe and analyse new attempts to trade IPR, the EC should launch a network of excellence comprising European:

- **financial community experienced in IPR trading and financing innovation,**
- **patent offices,**
- **SMEs and large companies with different R&D capacities and industry sectors,**
- **research institutions representing different research fields, and**
- **researchers focussing on innovation and financial markets.**

Establishing the IPR Financial Market could be associated with a variety of risks known from financial markets. Most fundamentally, liquidity has to be achieved for the underlying (patent) on the IPR Asset Market before the IPR Financial Market, where financial products based on patents are traded, is established. The IPR Financial Market may be affected by a systemic risk manifesting itself as an excessive volatility or even a breakdown in the functioning of financial markets for traded assets. A collapse or malfunction of an institution in a financial market for patents, or the whole market for patents, would endanger technology transfer and reduce the speed of innovation. Credit risk can also be relevant to the IPR Financial Market, especially with regard to licensing agreements and royalty purchase agreements. The risks to society and European research (e.g., social benefits vs. financial returns and the risk of high variance in the financial inflows into the European research landscape) should also be taken into account in the process of developing an IPR Financial Market in Europe. A short-term-driven IPR Financial Market may contradict the EU's long-term research policies, which are driven by the wish to maximise social benefits. IPR function as an incentive for R&D investments. If certain industry patents were to attract investments, this could direct research institutions to conduct research into this direction. This would jeopardise Europe's position as a provider of research in multiple fields of science.

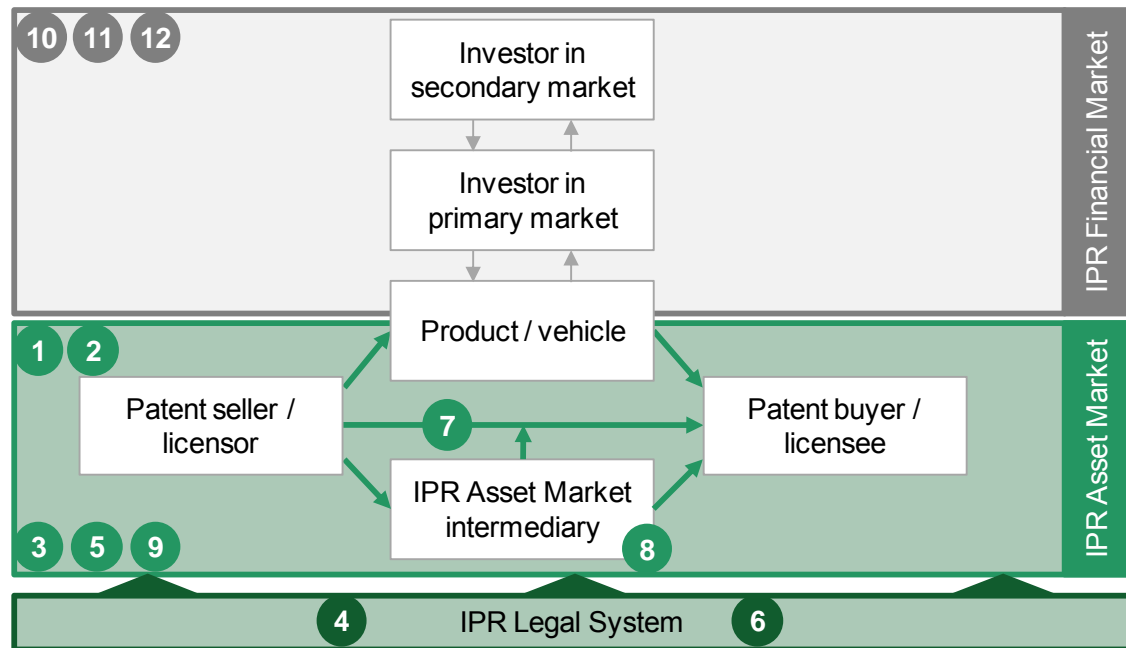
The proposed network of excellence should focus on evaluating and striving to minimise all these risks. Within three years after its launch, the network of excellence should propose policy actions to the EC, for example, with regard to the IPR Financial Market types, actors and financial products. If the IPR Financial Market has already evolved, the network of excellence should then propose policy actions to improve the functioning of the market (e.g., in respect of the regulatory framework, strengthening the benefits to SMEs and the research landscape).

Policy recommendation (12): Three years after its launch, the EC should require the network of excellence to propose:

- **policy actions regarding the establishment of an IPR Financial Market (e.g., concerning the market types and products), and**

- **policy actions to improve the functioning of the IPR Financial Market (e.g., by adjusting its regulatory framework, strengthening the benefits to SMEs and the research landscape) if it has already evolved.**

Overview of policy recommendations



- 1 Create a single IPR Asset Market in Europe
- 2 Launch a tender for private institutions to propose IPR Asset Market business models
- 3 Increase the engagement of European research institutions in the IPR Asset Market
- 4 Ensure a high patent quality and enforcement in Europe
- 5 Increase SMEs' participation in the IPR Asset Market
- 6 Support global harmonisation of IPR systems and efficient IPR enforcement outside EU
- 7 Promote licensing on the IPR Asset Market
- 8 Increase professionalism of technology transfer structures
- 9 Disseminate information on patent valuation methods
- 10 Establish or support the IPR Financial Market only after the IPR Asset Market has been substantially improved
- 11 Launch a network of excellence to globally observe and analyse IPR trade
- 12 Policy actions regarding IPR Financial Market types, products or functioning

2 Introduction

2.1 Background of the study

2.1.1 Basic assumptions

An underlying assumption in the investigation of the IPR Market is the argument that quasi-monopolistic rents attract investment in R&D and innovation. Furthermore, it is assumed that a functioning IPR system creates economic value.

Currently, the IPR Market is characterised by several parameters hindering the efficient execution of transactions, such as:

- Difficult acquirer identification,
- Long periods of negotiation,
- Extensive due diligence activities,
- Sellers and buyers' highly differing price expectations.

Therefore, an organised IPR Market is expected to improve the current situation. It should therefore be characterised by increased market transparency, efficient pricing mechanisms, and increased IPR transaction security.

2.1.2 Increasing relevance of patenting

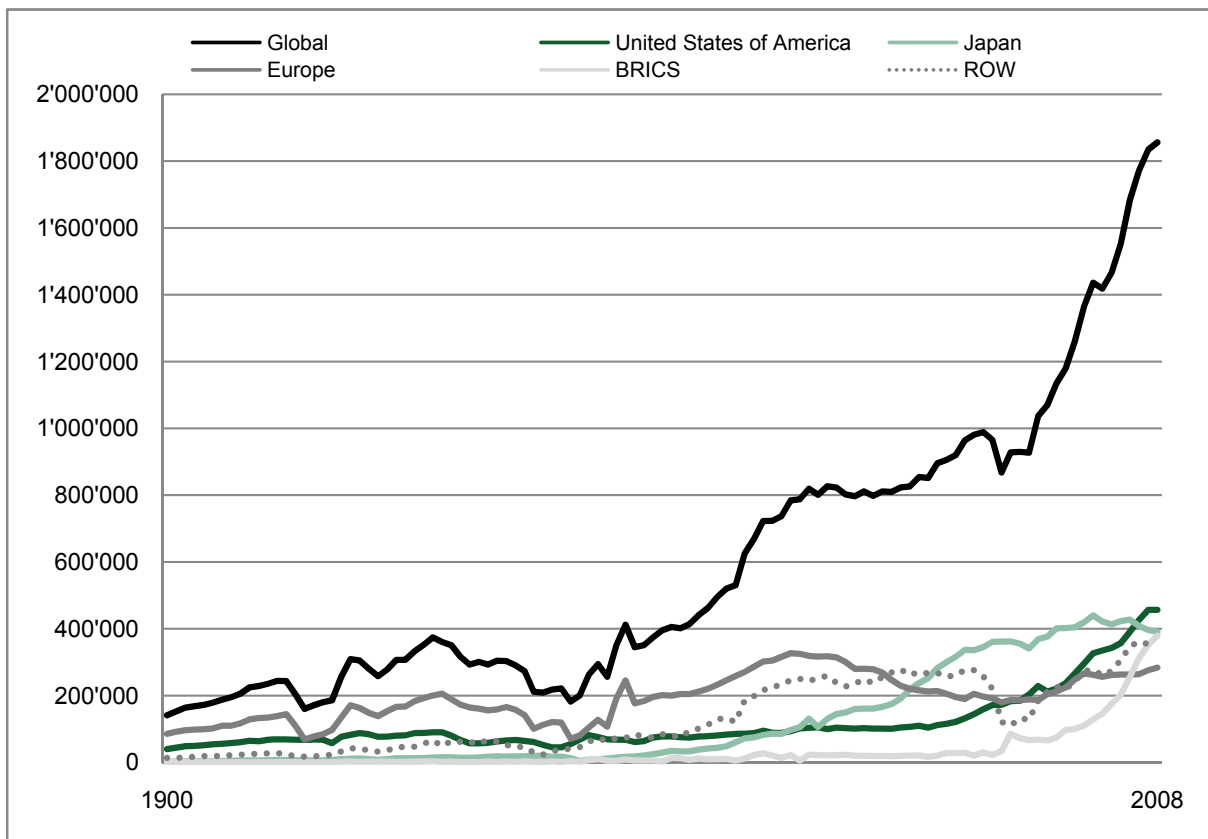
2.1.2.1 Global patent activities by region

Over the last 5 decades, patent office's total number of global patent applications has increased from 180 000 in 1900 to 1 850 000 in 2008. Figure 12 shows this positive global trend in patenting per region from 1900 until 2008. The highest number of patents is filed in the United States of America, followed by Japan, the BRICS countries and Europe.

Over the last few years, the BRICS group of countries has shown the highest growth rate in patent filings. With a growth rate in patent filings of more than 16% from 2007 to 2008, China has specifically been the driver of the positive trend in patent activities within the BRICS countries. However, the emerging countries have a short history of patent activities compared to the established economies. The high patent activity growth rates therefore do not necessarily reflect high innovation activity or ground-breaking innovations.

The United States leads worldwide with the highest volume of patent filings. Almost half of these patents were filed outside the US. This is a sign of patent-active American companies' high level of internationalisation.

Figure 12: Number of patent applications by region.



Source: Own illustration based on WIPO Statistics Database, June 2010.

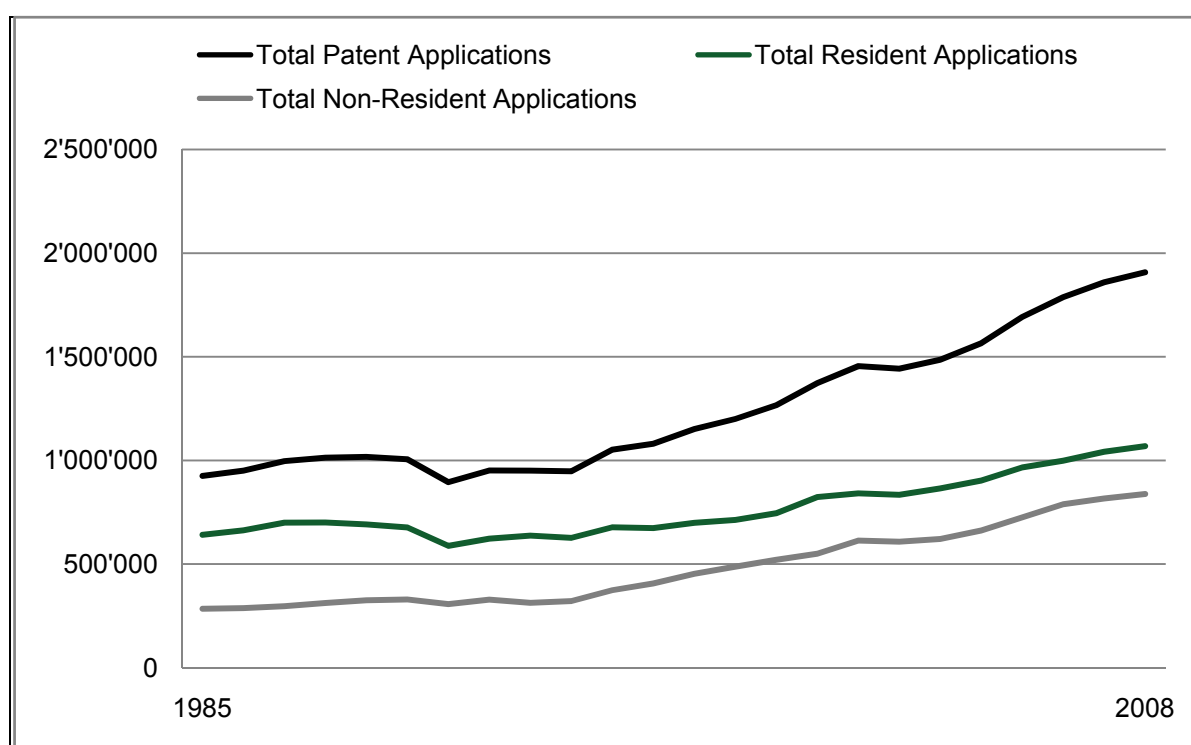
Note: Europe includes patent applications by patent offices within the EU-27 states and by the European Patent Office.
 BRICS = Patent applications by the patent offices of Brazil, Russia, India, China and South Africa.
 ROW = Rest of the world.
 Global = Total amount of patent applications worldwide.
 The figure is based on PCT international applications

2.1.2.2 Resident vs. non-resident applications

The growth in patenting is associated with a growth in non-resident patent applications. In 1985, the share of non-resident patent applications came to 31% of the total amount of patent applications worldwide (see Figure 13). In 2008, the share of non-resident patent applications growth equalled 43% of the total amount of worldwide patent applications.

The non-resident applications demonstrate the process of globalisation. Patents are typically used to protect an invention from unauthorised commercialisation in a certain market. The trend in non-resident applications is therefore a sign of global markets' stronger integration. Customer preferences have become similar, which not only allows companies easier entrance to foreign markets, but also increases competition between companies.

Figure 13: Number of patent applications worldwide.



Source: Own illustration based on WIPO Statistics Database 2010.

Unless otherwise stated, statistics on the number of resident and non-resident patent applications include those filed via the PCT system as PCT national/regional phase entries. The figure is based on PCT international applications.

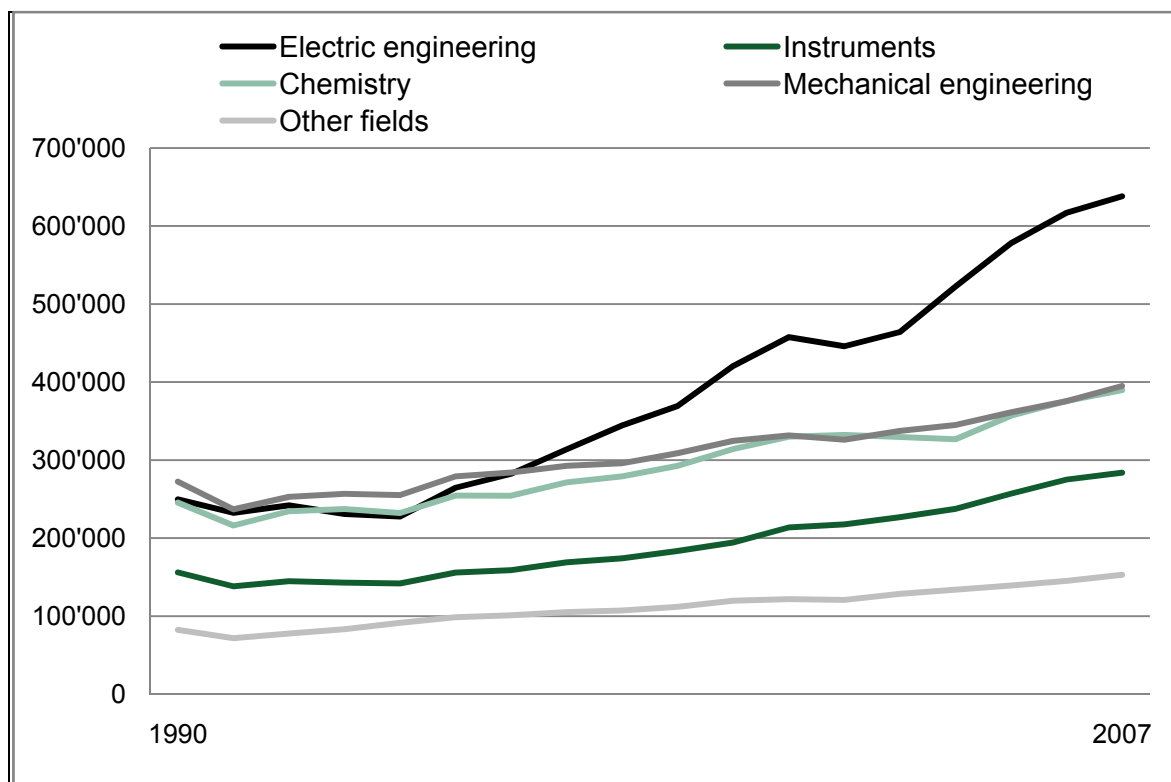
2.1.2.3 Global patent activities by industrial area

Patent applications are concentrated in certain industrial areas. Technologies applied in large-scale manufacturing segments seem to be specifically attractive regarding patenting. According to the International Patent Classification (IPC), these industrial areas can be summarised in five main groups as shown in Figure 14.

Over the past two decades, the highest growth rate in patent applications has been in the field of electrical engineering. In 2003-2007, the applications in this field were driven by computer technology, which had an average growth rate in patent applications of +11%, followed by IT methods for management (+10.5%) and digital communications (+9.6%).

Besides electric engineering, mechanical engineering, chemistry and instruments were areas with a strong patent activity.

Figure 14: Number of global patent applications by industrial area.



Source: Own illustration by WIPO Statistics Database, September 2010.

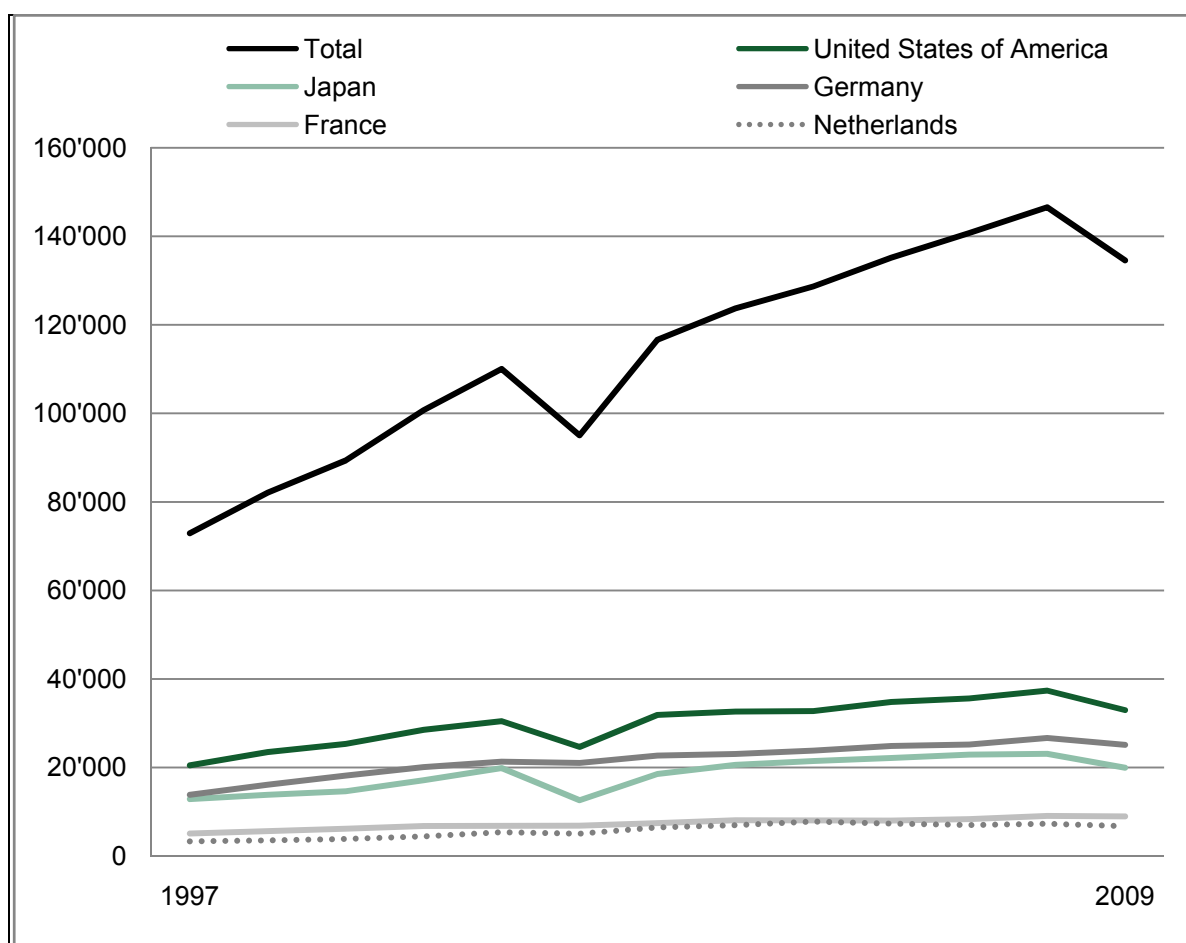
Note: The IPC technology concordance table was used to convert IPC symbols into 5 corresponding groups of technology fields. The figure is based on PCT international applications.

2.1.2.4 European patent activities by country

Figure 15 provides a closer look at the European patent applications between 1997 and 2009. The chart illustrates the top European patent applicants by country. The country with the highest number of European patent applications is the United States, followed by Germany and Japan. 60% of the total European patent applications were from these countries. France has the fourth highest country share of European patent applications

European patent applications by BRICS countries have increased within the last few years. Nevertheless, their share of the total amount of European patent filings is still small, but will probably play a more important role in European patent activities in future.

Figure 15: EPO patent applications by country.



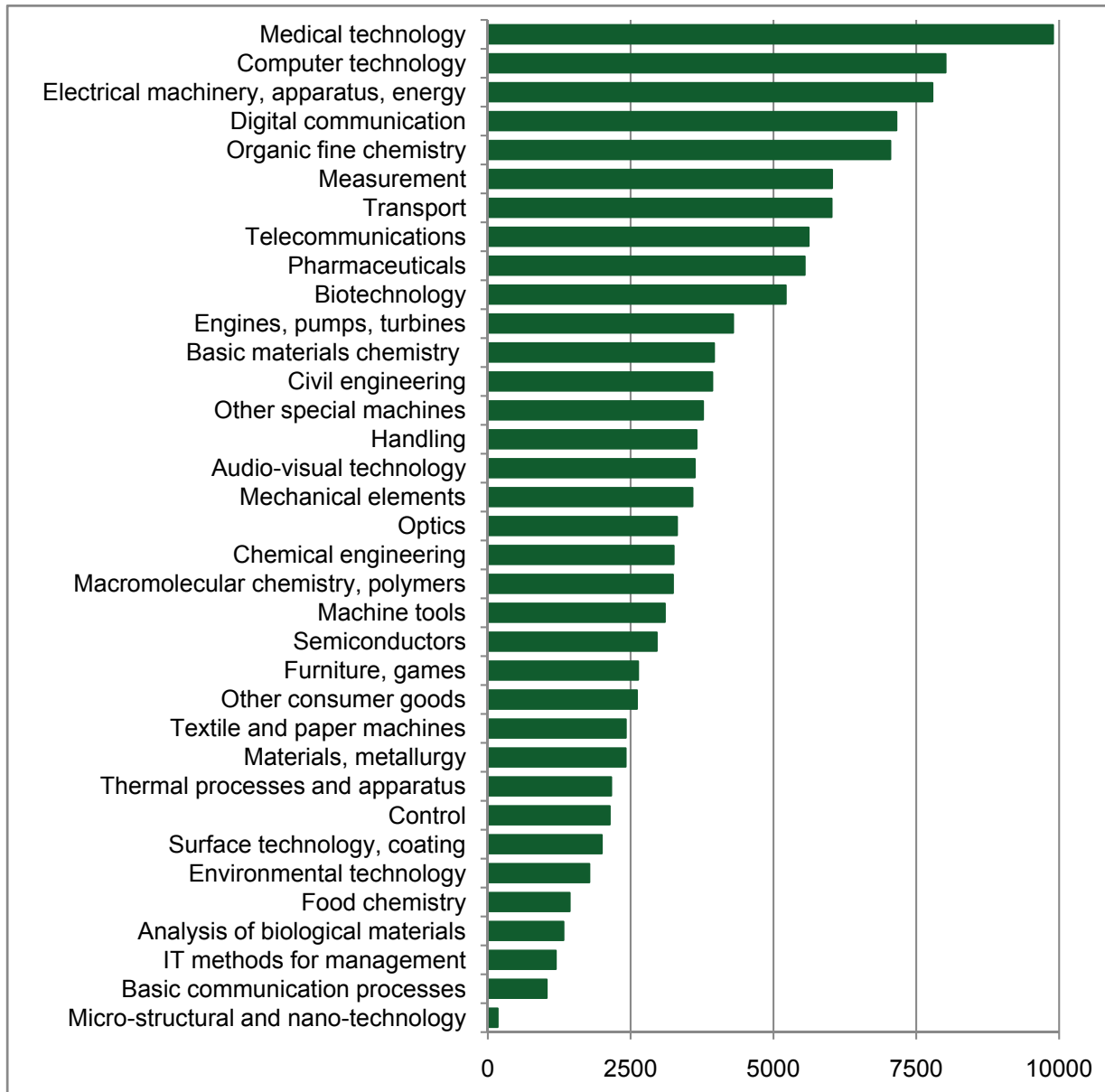
Source: Own illustration with data from EPO Statistics Database, September 2010.

The figure is based on EPC for European direct applications and PCT for international applications.

2.1.3 European patent activities by technology fields

Figure 16 provides an overview of the applications at the EPO by technology fields. In 2009, most European patents were filed in Chemistry 26.8%, followed by Electrical Engineering 27.8% and Instruments 16.9%. The share of organisations (EPO) member states of total filings is at 51%³. The strongest applicant country in 2009 with 25% of total applications was USA, followed by Germany 19% and Japan with 15% of total. The French share was about 7%.

Figure 16: EPO patent applications by technology.



Source: Own illustration with data from the European Patent Office database 2009.

The figure is based on EPC for European direct applications and PCT for international applications.

³ 68°197(EPO Memberstates) of 134°256 (total applications)

2.1.4 Patent Quality

In this study, the term patent quality refers to both legal quality and economic quality of a patent. It is separately indicated in the study whenever the term within a certain context refers to only legal quality or economic quality.

According to the ISO, quality can be determined by comparing a set of inherent characteristics with a set of requirements. If these inherent characteristics meet all the requirements, high or excellent quality is achieved. Accordingly, if all the requirements are not met, the quality can be considered poor or low.

Following this concept, quality is a relative concept, therefore characteristics and requirements differ according to a specific viewpoint. The viewpoint of the beholder is subject to the structure and dynamics of the relevant product markets, while, on the legal side, fulfilment of judiciary statutory criteria rather than commercial application is the key requirement. With respect to patents as economic goods on IP markets, both criteria correlate in terms of affecting an investor's return (Malackowski, Barney 2008).

Building on Burke and Reitzig (2007), patent quality can be determined along two major dimensions:

- Legal quality
- Economic value

Legal quality

Legal quality is determined by compliance with current jurisdiction and the enforceability of patent rights. In order to be compliant with current jurisdiction and enforceable, the invention needs to fulfil patentability criteria like novelty, inventive step and industrial applicability⁴. From this perspective, a central requirement is that patent claims' validity and scope should be upheld in a court.

The institutions influencing the legal quality are politics, jurisdiction (courts) and patent offices. Politics defines the legal framework and the overall goal for the IP system. The courts decide whether an infringement or litigation case is valid in a particular case based on conditions in the IP system. The patent offices determine the validity and scope of patent claims based on higher court decision and on the overall IP system.

Therefore, legal quality is primarily a function of the granting authorities' (e.g., the patent office's) requirements, particularly in the examination process. Important aspects are: ensuring a speedy, cost-effective examination process and a thorough evaluation of the invention; and the period for which a patent is granted. Balancing these aspects is subject to controversial discussions because they affect the relationship between competition and innovation policy.

⁴See: [http://documents.epo.org/projects/babylon/eponet.nsf/0/8266ED0366190630C12575E10051F40E/\\$File/guide_for_applicants_part1_05_10_en.pdf](http://documents.epo.org/projects/babylon/eponet.nsf/0/8266ED0366190630C12575E10051F40E/$File/guide_for_applicants_part1_05_10_en.pdf).retrieved on 25.11.11 from www.epo.org.

These aspects are considered to affect patent breadth, which is considered a major quality criterion since it ensures a higher degree of market power. In other words, the broader the patent claims, the higher the value of the underlying technology.

Firms' viewpoints on the right balance depend strongly on their industry specifics. For example, owing to the low success rate of pharmaceutical products' development, these firms rely on strong patent protection for a lower number of total patents. Conversely, in the field of ICT, it is important to raise barriers to granting patents and to simplify the processes to challenge existing patents. The high volume of patents (high product complexity) in this industry field may hinder the market dynamics.

Economic value:

Patents of high legal quality may have no real commercial value⁵. The economic value of a patent is, influenced by more factors than just legal aspects.

Organisations develop technologies in order to exploit them commercially in a product market. These organisations aim at increasing their revenues, achieving better pricing for their products and services, increasing market share and at benefitting from licensing income. The patent has value for these organisations if they recover the costs of, for example, inventing, patenting, as well as of maintenance and advice. Market actors who are solely interested in trading IPR, also build their investment thesis on patents' economic potential since they depend on supply and demand in the market.

The economic value of patents can be compared to the concept of investor's expected return on an investment. The commercial value of patents can be measured by their:

Maintenance rate:

The maintenance rate of a patent is a strong indicator of its economic value, since maintenance is costly. Consequently, only patents with a commercial value will be maintained (Barney 2002). The average patent duration in Europe was found to be 8.1 years. Furthermore, between 1980 and 1984 just 14.1% of patents have been maintained to the end of their statutory term (Zeebroeck, 2007). WIPO too documents the minor maintenance rates of granted patents⁶.

Commercialisation rate:

A patented invention's rate of commercialisation can also serve as an estimator of its economic value. The underlying assumption is that due to the associated costs and risks, only inventions with a high chance of commercial success are commercialised.

⁵ US Patent No. US4233942. A device for protecting the ears of a long-haired dog from becoming soiled by food while it is eating.

⁶ http://www.wipo.int/ipstats/en/statistics/patents/wipo_pub_931.html. retrieved on 25.11.11 from www.wipo.int.

Using a European dataset of Swedish patents, a commercialisation rate of 61% was found in comparison with US industrial patents' commercialisation rate of 49%. Furthermore, the rate for inventors in the education sector was 34% (Svensson, 2006).

Litigation rate:

High levels of litigation rates can be interpreted as a sign of strategically important segments on product markets with high levels of competition and can therefore be used as a sign of economically valuable patents. Engaging in litigation processes is costly and time-consuming; litigation is therefore only undertaken in respect of valuable patents.

According to a 2006 European Commission report on patent litigation risks, the approximately 1 428 m. patents in force in 2004 occurred litigation costs of 306 394 m. EUR (European Commission, 2006). Additionally, a total of 11 m. EUR damages were incurred. That gives an average litigation cost of 222 EUR per patent. In Germany alone, the number of patent nullity proceedings increased by 85% between 1985 and 2003.

Revenue from licensing:

The revenues generated from licensing agreements, but also the number of licensing agreements can be used as a sign of economically valuable patents (Arora et al. 2004). Certain patents' high revenues or number of agreements reveal the commercial attractiveness of a given technology. The global volume of licensing increased dramatically over the last decades.

Patent citation analysis:

Analysing the citation links between patents and to scientific literature is a measure for their economic value. The basic thought behind this assumption is that frequently cited patents protect technological concepts or ideas that are a useful basis for future inventions.

Bargaining power:

Patents allowing for an improved bargaining position with competitors are of economic value to the holder even if they are not exploited on the product market (Monk, 2009).

Complementary and complex technologies lead to a competitive environment in which firms frequently need to access their competitors' technologies. In order to engage in this field, it is important to bring the own technology into negotiations. If this is not done, cooperation will be refused or will be costly.

2.2 Objective of the study

This study elaborates on a specific approach to improve the current situation, namely by establishing an IPR Financial Market with a focus on patents. Therefore, the main objective of the study is to present the challenges and opportunities that could arise if an IPR Financial Market were created in Europe. Additionally, the study will discuss how such an IPR Financial Market could be designed and what policymakers can do to stimulate the

evolution of the marketplace. Furthermore, the study aims to define the concepts needed to establish an IPR Financial Market in order to provide a common understanding of the situation.

2.3 The need for an IPR Market

Considering the financial crisis and the challenges driven by increasing global competitive pressure, innovation is becoming an increasingly important driver of economic growth in Europe. Providing the necessary liquidity for innovation and building an innovation-friendly ecosystem will be major challenges for the future of the European Union. The European Union has set a target of investing 3% of its GDP in R&D by 2020 and plans to spend up to 85% of its 2014-2020 budget on sustainable, smart and inclusive growth.

Technological progress is the mainspring of innovation and the reason for IP's increasing importance. The market for IPR can be considered a key element in the innovation ecosystem. By assigning a monetary value to IP and having the possibility to trade IP like a commodity, innovation will be given the place in the economic system that it deserves.

Products are becoming increasingly complex. Smartphones, for example, include hundreds of different patents. Access to IP is a substantial barrier for research organisations and firms wishing to further develop their products, to complement the technological state of the art, or to place new products on present and future technology markets. A market place where IP can be sold and bought on demand, which follows clear and transparent rules, opens ways for innovators to access IP.

Innovation cycles have become shorter. Fast development of new products is the key if firms wish to remain competitive and fulfil their customers' fast changing needs. Given the dynamics in global competition, research institutions too have to increase their innovation dynamics. The IPR Market will speed up firms and research institutions' innovation cycles since they no longer have to develop innovations completely internally; they can simply purchase the necessary IP for their operations, or a license for it, on the market.

On the other hand, the IP Market will increase the utilisation of IP. Research institutions and firms possess patents they do not use themselves. At the same time, they have difficulties with finding an appropriate buyer or licensee. Unutilised IP is a waste of potential business opportunities and an annihilation of capital. A central reference point for IP suppliers will reduce the underutilisation of IP and increase research efforts' productivity.

A market place for IPR is a chance for European firms and research institutions to stay competitive on global markets. Competitors from emerging markets, which have long been considered imitators, are on the verge of becoming innovators. In many of these countries, IP organisations have been developed, thus facilitating the utilisation of IP in their national interest. In fact, the European economy is increasingly challenged in one of its key areas. The IP Market could thus be a powerful instrument to counterbalance these developments.

Furthermore, the market for IPR would be one of the first visible footprints of the knowledge economy. The commoditisation of knowledge and IP allows new types of separation of labour into specialised developing institutions, manufacturing and distribution units throughout the value chain.

2.4 Definition of an IPR Market

In order to investigate the idea of an IPR Financial Market, its structure needs to be defined. Figure 17 serves as a basic concept for the creation of an IPR Financial Market. This structure is considered to be a new concept and serves to clarify the interdependencies between the markets.

The IPR Financial Market and the underlying IPR Asset Market are two basic components of the IPR Market.

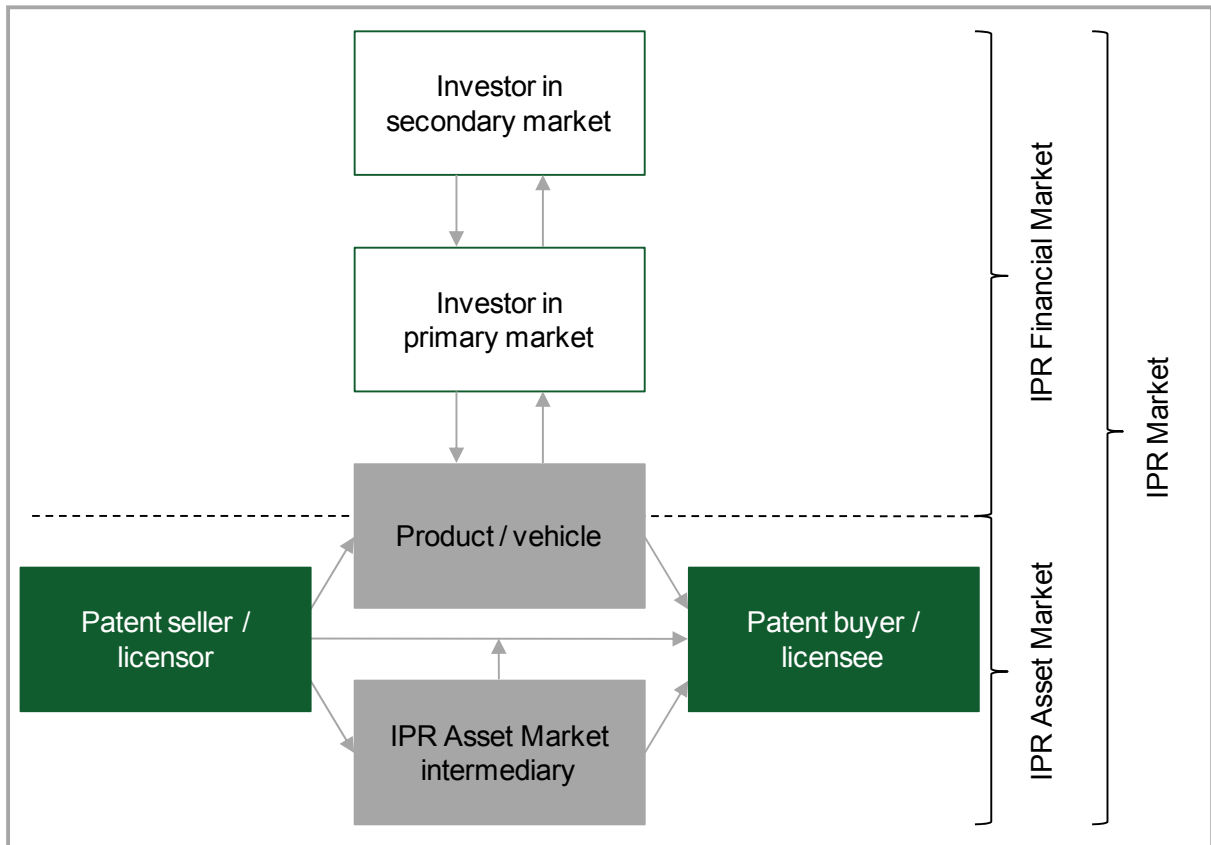
IPR Asset Market

Although the IPR Asset Market currently has shortcomings, it already exists. This IPR Asset Market concept is the basis for investigating the IPR Financial Market but may be enhanced, as will be shown in the course of this study. In the IPR Asset Market, patent sellers (e.g., original patent holders) transfer their IPR to patent buyers in exchange for monetary compensation. This may take place directly or through brokers, dealers and "vehicles" (e.g., funds, companies, SPVs, etc.).

IPR Financial Market

In the IPR Financial Market, the vehicles create financial products (shares, bonds, etc.) which investors can purchase. The primary market is created when the product / vehicle issues shares, bonds, etc., whereas the secondary market arises as soon as these financial products can be traded between different investors (see Figure 17).

Figure 17: Indicative market structure.



Source: Own illustration.

3 Methodology

To cover the objectives of the study, various research steps have been applied, which are described in the following.

3.1 Literature research

The desktop research aimed to provide a substantial overview of the concepts involved in establishing an IPR Financial Market. Therefore, an Internet-based literature research was conducted, as well as a literature research via databases (e.g., Ebsco Host), the University of St.Gallen's library system and Fraunhofer publications database. The investigated literature streams included the legal properties of patents, the current state of the IPR Asset Market, the linking of innovation and patent systems, the linking of competition, innovation and patenting activities, the functioning of financial markets, and the history of financial markets.

The results of the literature research form the basis of the definition of the relevant study concepts and of the conducted expert interviews.

3.2 Expert interviews

Interview guidelines were developed on the basis of the desktop research results. These interview guidelines were aimed at determining the interviewees' general view of an IPR Market, the IPR Asset Market and an IPR Financial Market, as well as of the concepts covered in the course of the study. The questionnaires are located in the appendix. Face-to-face or telephonic semi-structured interviews ranging from 15 to 60 minutes were conducted with experts in the field of intellectual property rights, technology transfer, the markets for patents and technology, patents infringements, patent aggregation, and banking. The interviews were conducted from February until September 2011. The appendix provides an overview of the interviewed experts. All the interviews were taped and transcribed verbatim. To ensure consistency, the same semi-structured interview guides were used for all interviews on the respective topic areas. Whenever possible, the interview guides were sent to the interviewee beforehand.

3.3 Empirical study

In 2011, we conducted an empirical study on the utilisation of patent portfolios and the motivation for participating in an IPR Market among the top 1000 EPO applicants of the year 2010. We provided them with an online questionnaire realised with the open source software Lime Survey. The time frame of our online survey evaluation started on 22 March 2011 and ended on 29 April 2011.

To achieve empirically sound survey results, the sample was aimed at covering a major part of the total population of EPO applicants. The EPO therefore provided us with a dataset (1555 entries) that includes the applications it published (Euro direct) and the international

applications published by the World Intellectual Property Organization (WIPO) and filed under the Patent Cooperation Treaty (PCT). Each entry contains the applicant's name, the registered business address, the domestic residence and the number of patent applications in 2010. After correcting the dataset with respect to spelling and excluding duplicate entries, we had a final dataset of 1 156 EPO applicants (see Table 2). The selected peer group accounts for 41%⁷ of the total 235 029 applications in 2010.

The empirical study obtained a final response rate of 17% (191 responses out of 1156 questionnaires). Since participation in the present study was not obligatory, we had to anticipate a higher non-response rate. The survey should therefore be considered a non-random sample. Using a random sample has no methodological advantage

Table 2: Raw data of top 1000 patent applicants.

Region	Patent Applicants	Patent Applications	Average applications per applicant
Europe	482	35 118	73
Asia	297	35 549	120
North America	358	24 197	68
Rest of the world	19	557	29
Σ Total	1 ^o 156	95 421	289

Source: Own illustration / European Patent Office database 2011.

Owing to the 17% response rate, a qualitative evaluation was conducted of the results' representativeness. The similarity of the population's key covariate distribution and that of the sample was used as indication of the results' representativeness. The patent applicants' country of origin and the field of technology were used as comparative features.⁸ The population's distribution by country of origin does not differ substantially from the one in the sample. It is noteworthy that German and Swiss patent applicants are overrepresented, whereas US applicants are underrepresented compared to the population.

Table 3: Distribution of patent applications and/or applicants by country of origin 2010 – shares in %

	CH	CN	DE	FR	GB	IT	JP	KOR	NL	US	Rest
Total/ aggregate EPO patent applications (N= 235,029)	3.4	5.4	14.1	5.0	3.0	2.1	17.8	5.3	3.0	25.8	15.1
Patent applications	2.8	4.4	15.6	6.1	1.3	0.4	28.0	4.4	3.7	24.4	10.8

⁷ That is, equal to 95 421 of 235 029 patents.

⁸ It was impossible to use the preferred examination in respect of the distribution similarity as well as in respect of other attributes like the characteristics of the entity (size, branch) due to a lack of comparable information concerning population and sample. The countries shown contribute at least 2% of the total applications.

EPO top 1156 (n=95,421)												
<i>Patent applicants</i> within the sample (n=160)	10.0	0.6	28.8	3.8	1.9	0.6	17.5	2.5	1.9	15.0	17.4	

Source: Own calculations and EPO statistics. Figures highlighted in green possess a strong variation compared to the reference figure.

We find a strong similarity when comparing the population with the sample distribution in respect of the field of technology (see Table 4) Therefore, our sample can also be considered representative in respect of this feature.

Table 4: Field of technology 2010.

	All	Sample
Chemistry	28.5	25.8
Electrical engineering	28.0	28.1
Instruments	16.6	16.4
Mechanical engineering	20.3	28.1
Other fields	6.6	1.6

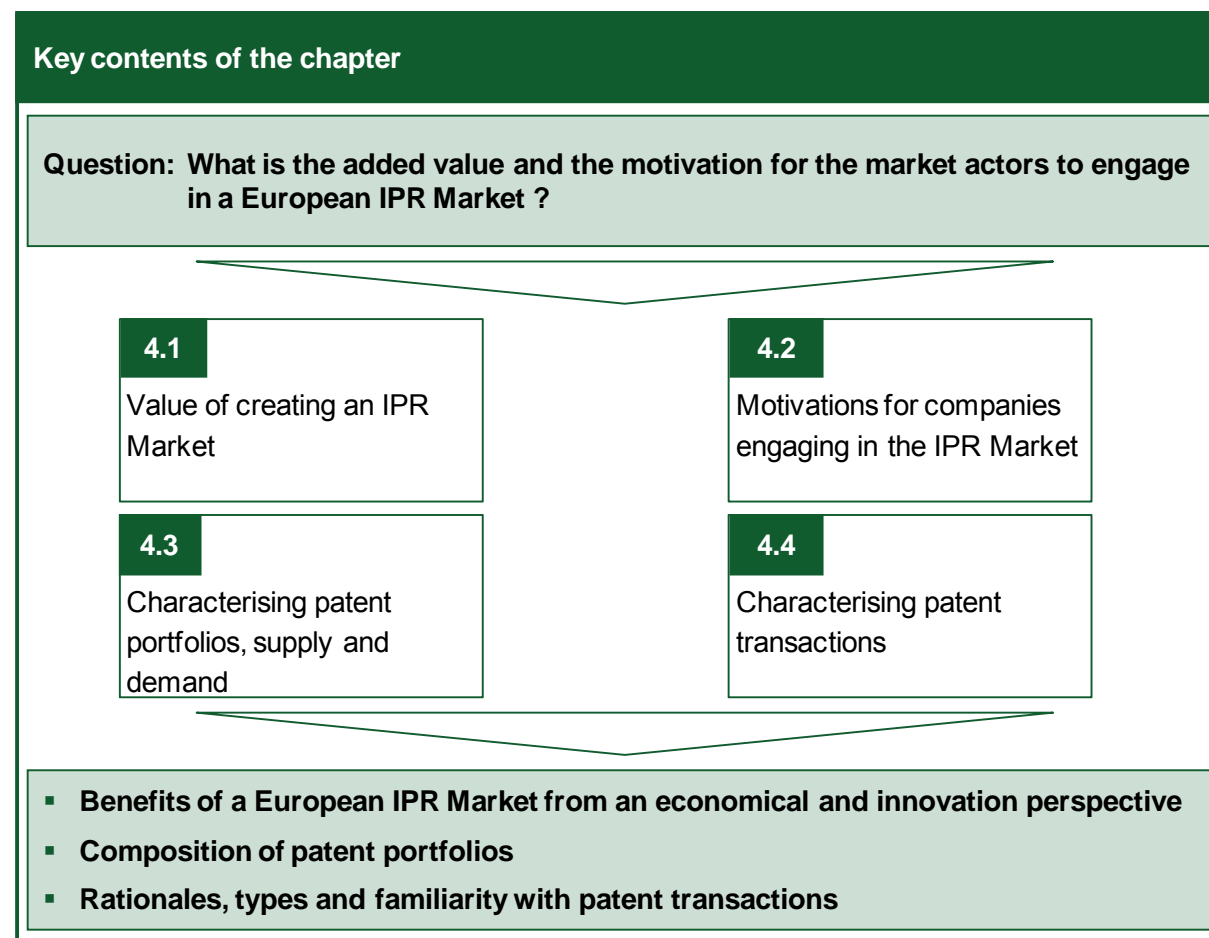
Source: Own calculations and EPO statistics. Figures highlighted in green possess a strong variation compared to the reference figure.

The empirical study was conducted following three main phases:

1. Concept development and survey design; developing and structuring of the questionnaire; and identifying the contact persons at the patent applicant company or institution.
2. Conducting an online survey of the top 1000 patent applicants at the European Patent Office (EPO).
3. Analysing the online survey responses to obtain a better understanding of the patent applicants' current and envisioned situation in an IPR Market.

The questionnaire is structured into three parts. The first part of the questionnaire aims at characterising the survey participants by size, turnover and type of institution. The second part discusses questions related to patent portfolios and engagement in patent transactions. In the third part of the survey, we shed light on the envisioned situation, for example, we identify possible patent-based financial products and important features of the market structure.

4 From patenting towards an IPR Market



This chapter discusses the value of creating a European IPR Market. We discuss factors influencing the market size, which are important for the geographical scope of the IPR Market, as well as the benefits of innovation activity in Europe.

Furthermore, we analyse the motivation for creating an IPR Market. The results are obtained from an online survey of the top 1000 patent applicants in Europe and expert interviews.

4.1 The value of creating an IPR Market

Ideally, successful financial markets are borderless and, consequently, global. Organised markets create transparency and save sellers and buyers transaction costs. They produce more realistic information on asset prices than unorganised markets, which often make the reason for price variations difficult to understand. In addition, knowledge markets facilitate the production of innovation and the sale or licensing of certain technologies (Ashby, et.al. 2009).

Most of our interview partners regard the current markets for technology as rather unorganised and decentralised. The idea of a financial market for intellectual property is new to most of them. Some even described the current IPR Asset Market as a “black box”.

4.1.1 Determinants of market size

The size, scope, success and acceptance of a financial market are strongly determined by the type of assets traded, the market depth and liquidity, efficient asset pricing and the transaction costs. Each of these criteria is individually a necessary prerequisite for a successful IPR Market (see, e.g., Comerton & Rydge, 2006; Alan, 2006; Benink & Schmidt, 2004; Bieling, 2001 and others).

Figure 18: Drivers of the market size.

1	Characteristics of the asset <ul style="list-style-type: none"> ▪ Physical character of the asset determines geographical reach, e.g., trading electricity ▪ IPR can be transferred globally at low costs
2	Transparency <ul style="list-style-type: none"> ▪ An organised market increases visibility beyond regional borders ▪ Visibility on the transaction level is increased (additional business opportunities)
3	Market depth <ul style="list-style-type: none"> ▪ For commercial success, a market needs to cover a substantial amount of the transactions ▪ A global / European market is a prerequisite for commercial attractiveness
4	Asset pricing <ul style="list-style-type: none"> ▪ Auctions offer transparent pricing mechanisms in organised markets ▪ Terms and conditions of transactions can be made available and reduce uncertainty for market actors
5	Transaction costs <ul style="list-style-type: none"> ▪ Traceability and comprehensibility reduce transaction costs ▪ Less time and effort required to find a transaction partner, determine price and negotiate conditions
6	Regulation and governance <ul style="list-style-type: none"> ▪ Allow access to, the type and scope of transactions ▪ Determine the type of asset and publication proceedings

Source: Own illustration based on quantitative survey.

4.1.1.1 Characteristics of traded assets

The nature of a commodity asset and, therefore, the limitations in trade resulting from the physical characteristic are determining factors for a market's geographical reach (Martin and Rey, 2004).

Technology markets are global markets. Research and development follow these trends. If limitation were to be imposed on a strictly national market for technology, this would surely lead to missed business opportunities for European firms. Moreover, a European market should be open to international supply and demand, which most of the interview partners mentioned. New, large technology markets are emerging – not just in Europe and North America. Firms in Brazil, India, China and Russia specifically show an increasing demand for technology. As suppliers and as purchasers of technology, European firms are becoming increasingly interested in these new markets.

On examining existing exchange models, we find a correlation between an exchange's geographical scope and the underlying asset of the financial products offered. The European

Energy Exchange (EEX) offers a good example of how the characteristics of the traded asset determine the size and scope of the exchange on which it is traded. Electricity from Europe cannot be transported over the Atlantic to, for example, the US because there is simply no connection in the electricity net. In fact, the market for the physical distribution of energy is limited to Europe. Consequently, the EEX focuses on a Pan-European commodities trade. Other commodity exchanges that trade goods that can be used all over the globe, such as steel and copper, are also not limited to a certain region.

Transferring this idea from existing exchanges to the IPR Market provides an argument for not limiting the European market geographically. Given the quotations from our expert interviews, most firms utilise their IPR in large global product markets. In fact, technology trades should be possible at national, European and global levels, depending primarily on the demand for and supply of technologies.

The interview partners further suggest that the IPR Market should be one part of a network of similar technology financial markets in the different economic centres around the world. Global capital markets are good examples of how different market centres interact successfully. Regional stock exchanges represent the aggregated supply of and demand for capital in a given region and are one part of a network of exchanges (Kim, 2001; Olivares and Kokkoris, 2007; Ravindran, 2011). Simultaneously, these regional markets respect national differences.

For the IPR Financial Market, the need for a global IPR Market is obvious. Capital is globally mobile and does not heed borders. For example, on the London Stock exchange, just 61% of the listed companies have their main operations in the UK.⁹ Likewise, other financial products – products based on intellectual property assets – will be traded on a global level.

4.1.1.2 Asset market transparency

Owing to globalisation in the markets for technologies, there is a need for actors – especially in the IPR Asset Market – to engage in technology trades beyond national markets borders. This will, however, further complicate finding a suitable transaction partner. The fragmentation of the current IPR Market will amplify this situation.

According to most of the interview partners, increased market transparency generated by the IPR Asset Market will counterbalance these developments and therefore add value for the market participants. Asset Market transparency influences the number of participants active on the market and, consequently, the market size and the impact on economic growth.

Furthermore, transparency reduces transaction costs by making more technologies and transaction partners available and visible.

In respect of IPR finance, increased IPR Asset Market transparency has a positive effect on liquidity and access to information. Transparency on the asset market makes it easier to sell and buy patents. Therefore, investments in IPR gain liquidity.

⁹ <http://www.londonstockexchange.com/statistics/companies-and-issuers/companies-and-issuers.htm>

Additionally, transparency increases the available information and thus reduces the uncertainty of IPR financing. The reduced uncertainty will allow financiers interested in financing innovation to engage in IPR Markets more easily. IPR could become tradable on an on-going basis, which will facilitate investments and exits into technologies.

4.1.1.3 Market depth and liquidity

Market depth and liquidity are necessary prerequisites for any market wishing to attract a high number of actors and for ensuring that transactions are completed smoothly. Without sufficient market depth, the range of potential trading partners, asset types and available prices decreases. A lack of market depth also runs the danger of opportunistic behaviour like hold-up strategies or certain market actors' unjustified high bargaining power. The market liquidity determines the possibility of buying and selling assets on an on-going basis.

The IPR Market is likely to cover a substantial amount of the IPR transactions in Europe. The market participants will have low transaction costs and will be able to signal their willingness to sell or license as well as the favoured volume and conditions. Finding a wide range of transactions partners and price ranges for IPR assets would ensure a high number of market participants and, therefore, efficiency (Roth, 2008). The options to capitalise on innovation will be increased.

The demand for and supply of IPR are not homogenous across the various global regions and among industries. By ensuring the depth and liquidity of as many technologies as possible, a global IPR Market would increase business opportunities.

4.1.1.4 Efficient asset pricing

Engaging in non-transparent and unorganised markets always bears the danger of having to pay an unjustified high price, or of obtaining an unjustified low price due to information asymmetries and the market participants' opportunistic behaviour.

Organised market places reduce this danger by offering market depth and liquidity, but also by making market and price information accessible to the market actors. The availability of fair and reasonable prices on the IPR Asset Market increases financial side actors' ability to evaluate the monetary potential of an IPR transaction.

The likelihood that market participants will capitalise on informational advantages decreases, which increases their security. Market security determines the number of actors willing to participate in the market and, therefore, the market size.

4.1.1.5 Transaction costs

Engaging in the current markets for intellectual property is associated with high transaction costs. Examples are screening costs to find certain technologies, contracting costs to negotiate the details of the transaction, or information costs to evaluate a given technology's potential application.

These costs are substantially higher if there is no organised market. As a central reference point for trading and investing in IPR, the IPR Market would substantially reduce transaction costs.

Lower transaction costs will attract more market actors and, therefore, affect the market size.

4.1.1.6 Market regulation and governance

Regulatory rules and market governance determine the character of the IPR Market. These rules regulate access to the marketplace and limit the scope, mechanisms and intensity of IPR trades.

Most of the financial markets are regulated by national governmental authorities. These authorities may influence the marketplace according to their national interests. According to most of our interview partners, the IPR Market regulation needs to be free of national biases.

Our interview partners confirm that restricting the market participants' access due to their geographical origin would undermine the basic idea of a free market, which would not succeed.

From an economic point of view, access to the marketplace should not be restricted by differentiating between European and non-European actors. A majority of the interviewees are of the opinion that only a global scope can ensure sufficient promising technology and investment opportunities. Not pursuing a global scope would be associated with missed opportunities.

4.1.2 Benefits of a European IPR Market for innovation

The role of the patent system is to establish an incentive for individuals, institutions and companies to develop, introduce and commercialise new technologies by granting a transitory monopoly that could allow them to recover the inventing costs. Without patent protection, inventions could be simply duplicated and commercialised without compensating inventors for their efforts. Therefore, the patent system is an incentive to invent and a catalyst for the diffusion of inventions.

A successful IPR Market is likely to support the value of the patent system. Given that the market develops as assumed and the challenges presented in this study are resolved, the creation of the IPR market will lead to economic growth driven by increased innovation activity in Europe. Economic growth correlates with increased wealth and therefore, per se, leads to social benefits, for example, the maintenance of infrastructure. This growth will especially occur in segments of the economy with high patent activity. Prior studies show that patent-active SMEs concentrate their operations on innovative niche markets (EIGE 2009). Growth in innovative sectors of the economy could therefore also create beneficial dynamics induced by these industries for society.

In fact, increased circulation of IPR and access to them might have a positive effect on innovation activity. The following section discusses these positive effects with respect to a European IPR Market solution.

Figure 19: Benefits for innovation.

1	<p>Turning ideas into an asset</p> <ul style="list-style-type: none"> ▪ Patented technologies are simultaneously private and public goods ▪ Monetary value can be attached ▪ A new channel for the transfer of know-how
2	<p>Global competitiveness</p> <ul style="list-style-type: none"> ▪ Global visibility requires companies to improve their processes and products ▪ An easy access point to global technology markets provides an opportunity to capitalise on inventions
3	<p>New types of cooperation</p> <ul style="list-style-type: none"> ▪ Further separation of labour into inventive and commercial activities ▪ Focusing on core capabilities leads to productivity gain

Source: Own illustration based on expert interviews.

4.1.2.1 Turning ideas into an asset

The basis of any innovation or invention is an idea. An idea typically evolves from an individual or an institution's knowledge. If knowledge is the basis of ideas that can be turned into commercially exploitable innovations, knowledge has an economic value. As an economic good, knowledge has special characteristics (Guellec, et al., 2007):

- Knowledge is a non-rival good, which means that two parties can use certain knowledge simultaneously without it suffering a loss of quality.
- Knowledge can be used without crowding out other users, or at different places.
- Knowledge can be either transferred or shared, or both.
- Knowledge is simultaneously a public good and a private good.

Through the exclusivity granted by the patent system, the legal system gives knowledge the characteristics of a private good. The owner of the patent can either exploit the patent exclusively, or transfer the right to exploit it to another institution. At this point, knowledge is associated with monetary value, if it is codifiable, explicitly and exclusively assignable to a single individual or institution. It becomes an economic good for which others are willing to pay. Like any tangible good, a price can be assigned to knowledge and it can be exchanged between two bargaining parties.

Intellectual property assets must (be) (Gans and Stern, 2010):

- complement existing or other technologies: Single ideas are seldom of value in isolation. Owing to technological standards and complexity, many innovations need to adapt to existing systems in order to be of value for the customers. A market offering assets that cannot be adapted to or do not complement other products therefore does not have any value.

- rival in value: Knowledge usually has a non-rival character. This means it can be used simultaneously by two independent parties and for the same purpose without losing quality. It is obvious that if the intellectual property assets traded on a financial market were non-rival, no one would be willing to pay a price greater than zero. Consequently, a mechanism to ensure willingness to pay the market price would be a very important characteristic of such a market.
- difficult to reproduce: If intellectual property assets that are easy to reproduce are traded, this bears the danger of "free riding". For example, a software code offered on the market could be purchased and sold for less than the original market price.

The ability to attach a monetary value to knowledge and trade it like a typical economic good also raises the question of the transfer channels (Andersen, Konzelmann, 2004):

- IPR assets can simply be purchased, for example, on an IPR Market, or by buying a machine or any good that includes the knowledge.
- For personalised knowledge, the individual needs to be contractually bound to the acquiring firm in order to transfer the knowledge.
- Organisational knowledge, like a production process, may be transferred via a mergers and acquisitions transaction.
- A mixture of the above three ways.

The IPR Market is per se a channel and helps to develop standards with regard to transferring knowledge. Thus, the IPR Market is likely to increase the efficiency and frequency of IPR transfer. It is likely that if an IPR Market were to be established, it would complement the already existing channels. The way they might be used in future may also change, for example, if a company is interested in buying single IPR it does not have to purchase an entire machine.

4.1.2.2 Global competitiveness

A liquid and organised IPR Market is likely to support Europe in enforcing a predominant position as a worldwide IPR marketplace. National solutions would probably be too small to compete efficiently with large markets. According to Jarboe (2008), the Federal Reserve Bank of Philadelphia estimates that the United States invests 1 trillion USD each year in the creation of intangible assets. The majority of the interview partners and the empirical study also suggest that the IPR Market is mainly US dominated.

The Chicago-based Ocean Tomo argues that we are facing a time of economic inversion from tangible to intangible assets. In 1975, only 16.8% of the value of companies included in the S&P 500 Stock Index consisted of intangible assets, but this proportion rose to 79.7% in 2005. A large, integrated European IPR market could be a way to participate in the "intangible economy".

Furthermore, such a market would help to bring global visibility to local entities. Universities, SMEs and research institutions not taken into consideration by investors or interested buyers

will suddenly become interesting. It is, in fact, a chance to leverage hidden or underutilised potential.

Through their global visibility, these regional actors may then be confronted with stronger competition than in their domestic markets. Increased visibility will lead to business opportunities for the regional actors in the field of IP transactions and, therefore, to additional income. In fact, actors' IP awareness will increase, which could perhaps give the creation and management of IP a more prominent position in their strategy. To remain competitive, companies and institutions need to increase the efficiency of their production processes and lower their operating costs, thereby increasing their competitiveness and that of the European economic area. As a result, the utilisation of the creative potential inside these institutions will increase, which is likely to increase the number of globally competitive institutions.

It is also true that stronger competition could push companies out of the market if they cannot adapt their costs and processes to the new environment. European nations with less globally competitive economies may be in favour of a national or strictly European solution rather than a global solution.

4.1.2.3 New types of cooperation

A European solution's added value would be that it would make new types of cooperation possible. The IPR Market can be considered a tool to create economic value by allocating knowledge in a wealth maximising way by offering an incentive to make knowledge broadly accessible to other economic actors, in exchange for monetary benefits.

Currently, IPR producers will not benefit monetarily from opening their knowledge to other economic actors. Following the theory of market allocating efficiently, it is also likely that knowledge is distributed to the actors that create the biggest economic benefit since they are likely to be the most willing to pay.

In many cases, knowledge is tacit, which means that it is bound to people or organisations. Detaching such knowledge in terms of formalisation can be costly. In fact, making knowledge explicit is a question of profitability. The market could have a positive effect on the willingness to make knowledge explicit by offering monetary compensation.

The IPR Asset Market supports the transfer of ideas from inventors to institutions capable of and experienced in making a new product or processes a market success. Producing knowledge and commercialising it have become distinct activities.

The increasing division of labour is due to trends fostering the need to transfer knowledge. Knowledge used to be implemented where it was invented. Owing to the emergence of the knowledge economy and products' increasing complexity, this behaviour has changed.

Having access to existing knowledge or building on existing knowledge is essential for the production of innovation. There are also manifold incentives for suppliers and purchasers to participate to produce innovation. Suppliers of knowledge receive a monetary reward from

interested buyers or licensees on the market. In addition, suppliers gain access to information on other market participants, their technologies, market trends or specific information. Reputation can be built by signalling technological know-how or certain business skills. New types of cooperation may also be in the interest of purchasers, as they could make use of a certain technology that will be accessible at a lower costs. Purchasing parties can gain access to technology or relevant industry groups that they could not access otherwise.

The management of knowledge has become key regarding being productive and successful in the product market (see, e.g., Bader, 2007a). In the light of shorter product lifecycles and limited resources, the transfer of knowledge and the concentration on core competencies have become more central. Companies and institutions that contributed major building blocks to the development of a certain technology will no longer necessarily be the ones to commercialise this technology. Companies with great manufacturing or distribution abilities may not have the necessary R&D skills and vice versa.

Furthermore, collaboration is also an effective tool to manage the financial burdens of R&D and the associated risks (Enkel, Gassmann & Chesbrough, 2009; Bader, 2007b). Increasing specialisation and the fading of boundaries between scientific fields and technologies also drive the need for increased knowledge transfer. According to Boldrin and Levin (2002), the winners of the competitive race in knowledge markets will be those that implement first and not the ones that invent first. Arora, Ceccagnoli and Cohen (2007) highlight that the incentive to invest in R&D depends on the ability to capitalise on investments, and the ability to recover the R&D costs when marketing new products and processes. Scenarios become realistic where the difference between competition and cooperation fade.

Some research efforts may not fit corporate strategy in the long run and will therefore not be commercialised. Nevertheless, the costs of inventing have been incurred. Knowledge markets offer the opportunity to recover these costs. In addition, they ensure a more effective use of resources from a social point of view. If the invention were not used, the resources spent would be sunk costs and society would not be able to use the new technology even if this were considered desirable.

It is known that major building blocks for innovations and new technologies have their roots in the academic sector, namely universities and research institutions. In many cases, however, an appropriate link or organisational structure that makes an efficient transfer to industry and other interested parties possible is missing. In recent years, specialised Technology Transfer Offices have emerged at research institutions but frequently lack the skills for a successful commercialisation of research efforts (Andersen, 2010; Mathieu, Meyer, van Pottlesberghe 2007).

The IPR Asset Market could also help research institutions to increase their reputation and build long-lasting relationships with industry. Contacts with industry are specifically important for research institutions to allow them to integrate external and – often – practical views into their research.

Our interview partners also found that the discoveries made by research institutions and universities are only visible at the local level. Through a developed market, public research institutions would become visible on a global and European level. Smaller universities and research institutions whose reputation is not well-known will specifically benefit from such a financial market.

In fact this is a major added value of a European solution compared to that of national efforts. The IPR Market can support European companies' future demands better. These beneficial effects are likely to be smaller for individual countries engaging in IPR Markets.

An IPR Asset Market serves the aims described above by facilitating IPR transactions for small and large companies so that a quicker commercialisation of ideas can take place. By exchanging ideas on a European and global basis, the speed of innovations and the innovation dynamics are perhaps increased. Furthermore, efficiency gains will become possible by dividing labour according to individuals' specific skill or according to research & development organisations and manufacturing and distribution organisations. Universities and research institutions will have the opportunity to access additional sources of liquidity by selling technologies and licences on the newly established market.

Supporting the connections between industries and companies in Europe helps to facilitate cross-border cooperation and the matching of IPR buyers and sellers.

4.1.3 Funding opportunities for innovation

4.1.3.1 Capital for innovation

The IPR Financial Market could increase corporations, SMEs, universities and research institutions, patent intermediaries and even governments' access to innovation capital. When created, a range of new financial products aimed at funding innovation is likely to be developed. The range could be from equity-based to debt-based financial products, all tailored to IPR as a security (Zink, 2009).

Attracting private investors to finance technology developments is challenging. Private capital is usually allocated to innovation with technology's increasing maturation since this reduces uncertainty. Investments in innovation are first and foremost associated with high uncertainty. The immaturity and uncertainty of early stage technologies complicate the evaluation of a given technology's commercial potential for buyers and sellers. Since investors want to be compensated for the risk capital available for financing, innovation becomes too expensive or is simply not available.

The IPR Financial Market offers an opportunity to access finance for early stage technologies besides the classic sources of capital. The funding gap between research and developing prototypes of innovations could be specifically improved. Our interview partners share the opinion that the high uncertainty associated with IPR assets and investors' demand for risk-adjusted returns favour investments in large-scale projects rather than single investments in

companies or individuals. Nevertheless, they think investing in IPR is likely to remain a high-risk investment.

Innovative IPR-based financial instruments could be used to attract investors to finance emerging technologies. Such instruments could be designed in keeping with IPR characteristics. Established investment banks like Deutsch Bank, Lloyd TSB or JP Morgan are actively engaged in financing intellectual property by engaging in technology financing via patent indices, patent funds or debt products.

The Massachusetts Institute of Technology offered a 750 million USD bond with a (rare) hundred-year maturity and a coupon, or nominal interest rate, of 5.6% to yield 5.623% to maturity. A further good example of a debt financing engagement is Sears' 1.8 bn. USD financing based solely on intellectual property assets (Jarboe & Ellis, 2010). Intangibles can be established as standard collateral or as the underlying in structured finance or bond placements.

The IPR Market could attract more capital to innovation. By having more capital available to develop IPR, more researchers, research institutions and industry companies are likely to engage in developing new innovations. Increased research activity could therefore increase the total number and speed of innovations.

Figure 20: Funding opportunities for innovation.

1	<p>Capital for innovation</p> <ul style="list-style-type: none"> ▪ Especially early stage technologies lack funding opportunities ▪ IPR finance instruments and IPR Intermediaries offer specialised services for early stage commercialisation
2	<p>Return on innovation</p> <ul style="list-style-type: none"> ▪ Private investors will be able to directly invest in innovation ▪ Especially economic sectors with growth potential will attract private money
3	<p>Alternative to R&D subsidies</p> <ul style="list-style-type: none"> ▪ Capitalising on innovation will increase funding opportunities for the state ▪ Introducing market principles in research will increase effectiveness and efficiency

Source: Own illustration based on expert interviews.

4.1.3.2 Return on innovation

Patent premium is the return that lies above the marginal cost of inventing that an investor receives from commercialising an innovation via the patent system (Moser, 2005). By promising the inventor a higher premium, patenting is generally likely to have a positive effect on R&D spending. An increased patent premium substantially increases the propensity to patent and the total amount of patents, as well as the R&D activity.

Areas with high average patent premiums are: electronics, mechanical engineering, the chemical industry and pharmacy. The patent premium affects the distribution of profits between different industries and has an effect on the allocation of investments to certain industries.

The IPR Market will have the potential to attract more private capital to areas with a high patent premium. Areas offering a high patent premium are often congruent with the areas with high innovation activity and, therefore, growth potential.

The increased number of investments will lead to a higher resource input and more research projects. More research projects and resources will increase the likelihood of creating successful new products and processes. Therefore, the IPR Market is likely to have a positive impact on employment, economic growth and the innovation dynamics in the European Union by effectively utilising private investors' patent premium.

In terms of the patent premium, a European solution will also have advantages not found in a national solution. An engagement in the IPR Financial Market will be more likely if investors have a big pool of projects in which to participate via the IPR Market. Not all of the sectors in an economy offer the same return on innovations. A strictly national market would decrease opportunities in terms of the innovations' earnings potential.

4.1.3.3 Complementing subsidies to finance R&D

Currently, the most common way of funding research is via subsidies. The funds used for fostering research, development and innovation funded by public bodies, usually come from tax revenues. Governments face the challenge of evaluating whether funds are allocated to the right research efforts. To identify these fields, they continuously exchange information with scholars, research institutions and industry. Governments typically develop a research and technology policy in order to determine the fields of research that should specifically be funded.

To determine the eligibility for and volume of funding, governments are dependent on the information and the quality of information communicated by the respective experts. This is the main weakness of this type of funding. The degree and quality of information available to decision-makers can be limited or biased in favour of the beneficiary. The consequence is that promising projects may be disregarded in favour of less promising projects or that the funds granted are too much and may not adequately take the costs and benefits into consideration.

With regard to this point, the IPR Financial Market has a clear advantage over the subsidy type of funding, as it uses market mechanisms to select, control and commercialise research projects (Boldrin et al. 2009). The market mechanism ensures that the price paid for a certain research effort is fully determined by the value that the market associates with a given innovation. The issues arising from information asymmetries are still there, but affect the price less.

Increasing private spending on innovation is also associated with innovations' increasing efficiency. In the EU-15 countries, there is a positive and significant relationship between investments in intangible capital and the economy's overall labour productivity growth and, consequently, also economic growth. Innovation's positive influence on economic growth has been the subject of an extensive amount of literature and is well documented (see, e.g., Roth

and Thum, 2010; Cameron, 1998; Greenhalgh and Rogers, 2005; or Erickson and Rothberg, 2009). Romer (1990) contributed substantially to the modern understanding of economic growth by concluding that "long-run growth is driven primarily by accumulation and transmission of knowledge". Economic growth can be stimulated through a competitive market environment. With regard to strengthened IPR systems, liberalised markets seem to especially have a positive effect on economic growth and seem to have a positive effect on physical investments and R&D spending.

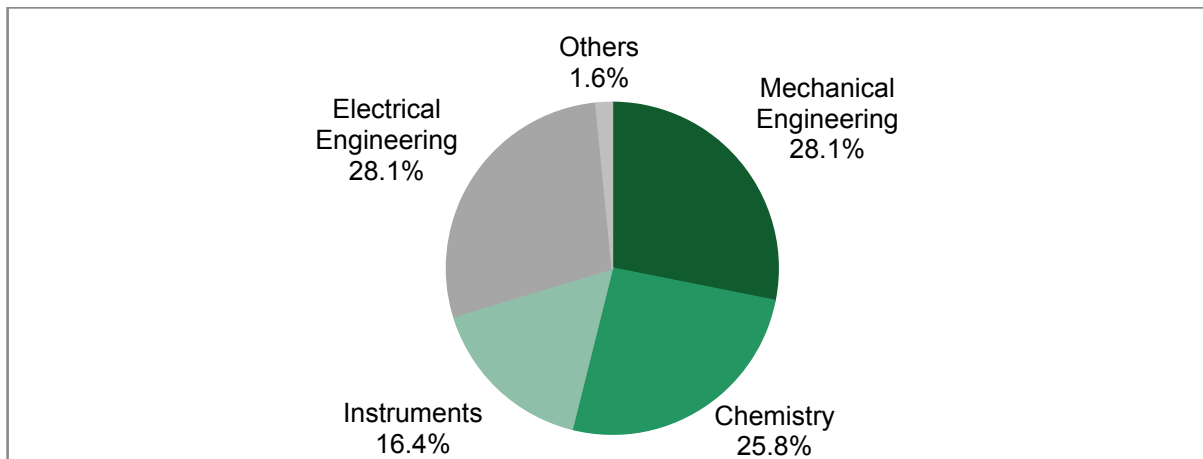
Therefore, investments in R&D and in the patent system are beneficial for the overall wealth since they have a positive influence on economic growth. The IPR Financial Market is likely to support these investments. Cameron (1998), but also Dalmarco, Dewes, Zawislak and Padula (2010), argues that the spill-over effects from government-funded research are weaker than the spill-over effect between industries and companies. Thus, a stronger integration of the private sector into the process of research production via the IPR Market may increase the efficiency and commercial orientation of research efforts in Europe.

4.2 Motivations for companies engaging in the IPR Market

In order to characterise the added value of participating in the IPR Market for private companies, we conducted an empirical study on the utilisation of patent portfolios and the motivation for participating in an IPR Market among the top 1000 EPO applicants in 2010.

We used the International Patent Classification (IPC) scheme to categorise actors and technologies. Depending on their answers, each participant was grouped into one of the five major industrial areas: Mechanical Engineering, Chemistry, Instruments, Electrical Engineering, and Others. The distribution in our sample (see Figure 21) is similar to that of the EPO applicants in 2010, with a slight overrepresentation of Mechanical Engineering (plus 8% points) and an underrepresentation of Others (minus 5% points).

Figure 21: Allocation of industrial areas covered by the technologies in respondents' patent portfolio (n=128), in %

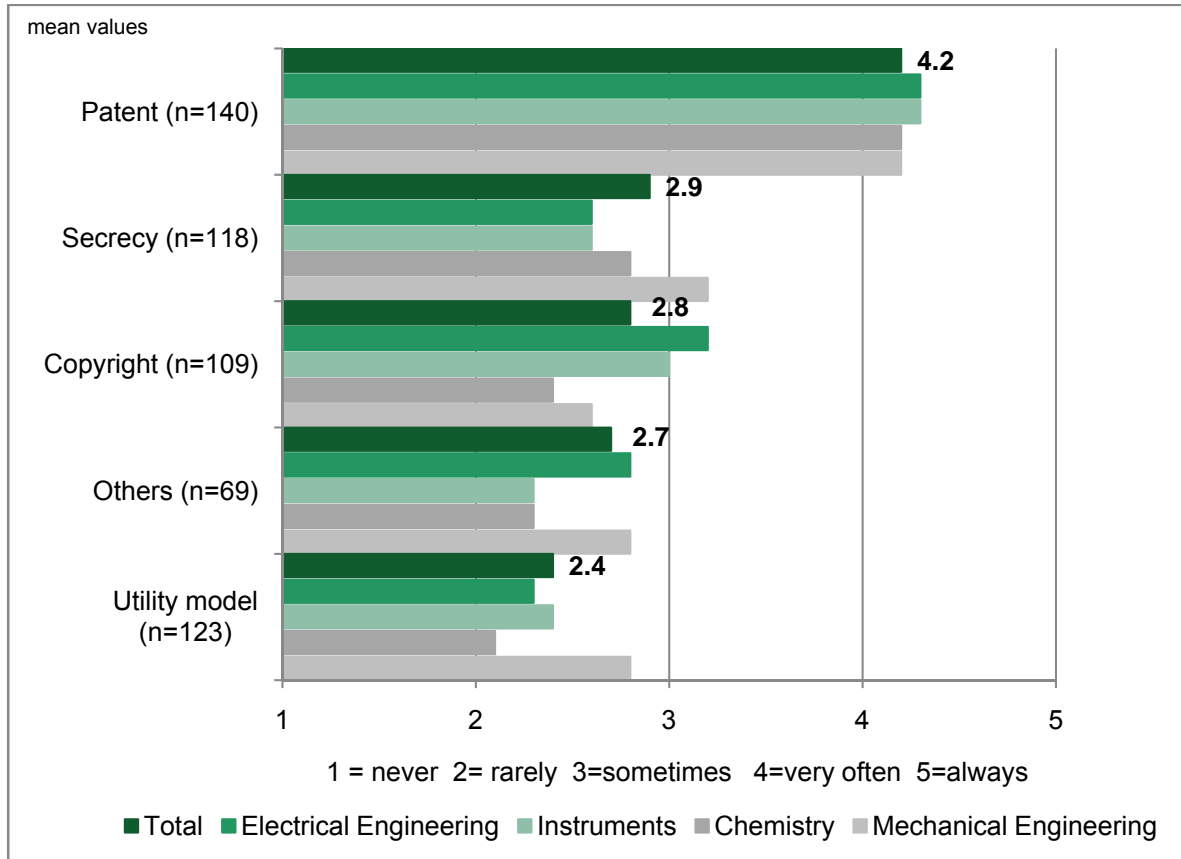


Source: Own illustration based on the quantitative survey.

Q12: Please specify the main industrial areas covered by the technologies in your patent portfolio.

To understand the importance of the patent system for the survey participants and the benefits they reap from participating in the IPR Market, we inquired about the importance of patents in protecting inventions. Our survey shows that, compared to other measures, patents dominate as the preferred type of technical invention protection (see Figure 22). Patent applicants' preferences regarding types of protection are similar across most industry areas (see Figure 23). The only remarkable deviation applies to the Mechanical Engineering field. Compared to other groups, we find a strong preference for secrecy and utility models here.

Figure 22: Preference regarding types of protection for technical inventions.

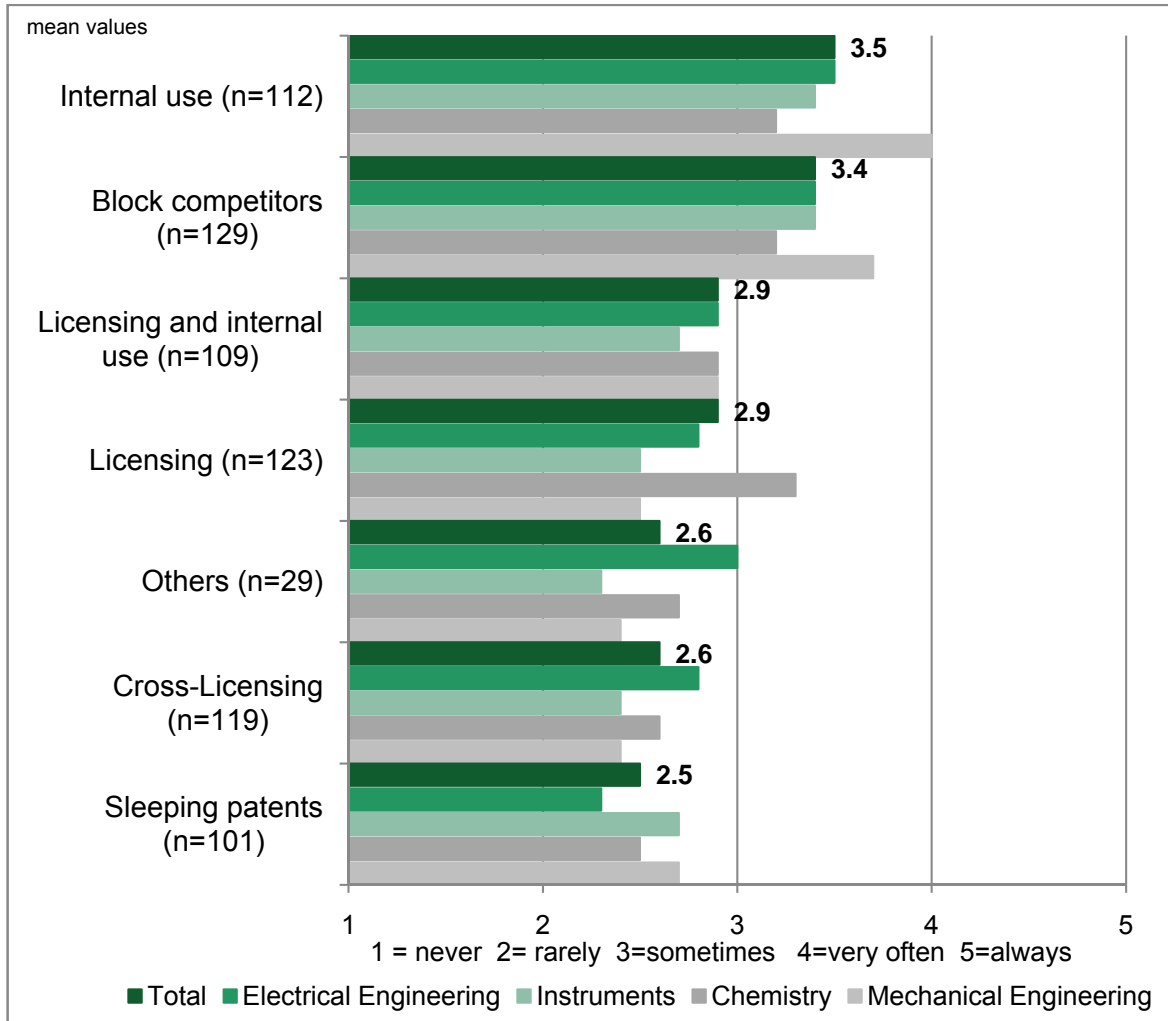


Source: Own illustration based on the quantitative survey.

Q8: What type of protection are you using in order to protect technical inventions from duplication?

We subsequently asked the participants about their patent protection objectives. The internal use of patented technologies and the blocking of competitors were found to be the main objectives (see Figure 23). Retaining the freedom to exploit technology commercially seems to be respondents' primary reason for using patent protection. The importance of blocking competitors points to a strategic use of patents. Patents may be used to hinder competitors from entering the market and to protect patents against imitation. This may be interpreted as a sign of intense competition in product markets.

Figure 23: Assessment of objectives for patent protection.



Source: Own illustration based on the quantitative survey.
 Q9: Please characterise your objectives for using patent protection.

On analysing the industrial areas, we find deviations in Mechanical Engineering and in Chemistry. Internal use and the blocking of competitors were most often mentioned by the survey participants patenting in the field of Mechanical Engineering. In turn, actors in the chemical technology field showed a remarkably high interest in licensing agreements. This may be explained by the chemical industry’s historically strong experience of utilising their inventions on the IPR Market.

An interesting finding is the desire of firms to use patents in order to engage in licensing deals. By means of licensing agreements, firms are able to capitalise on their inventions without producing or distributing them. Licensing agreements are therefore ways to utilise technologies as if they are a financial asset.

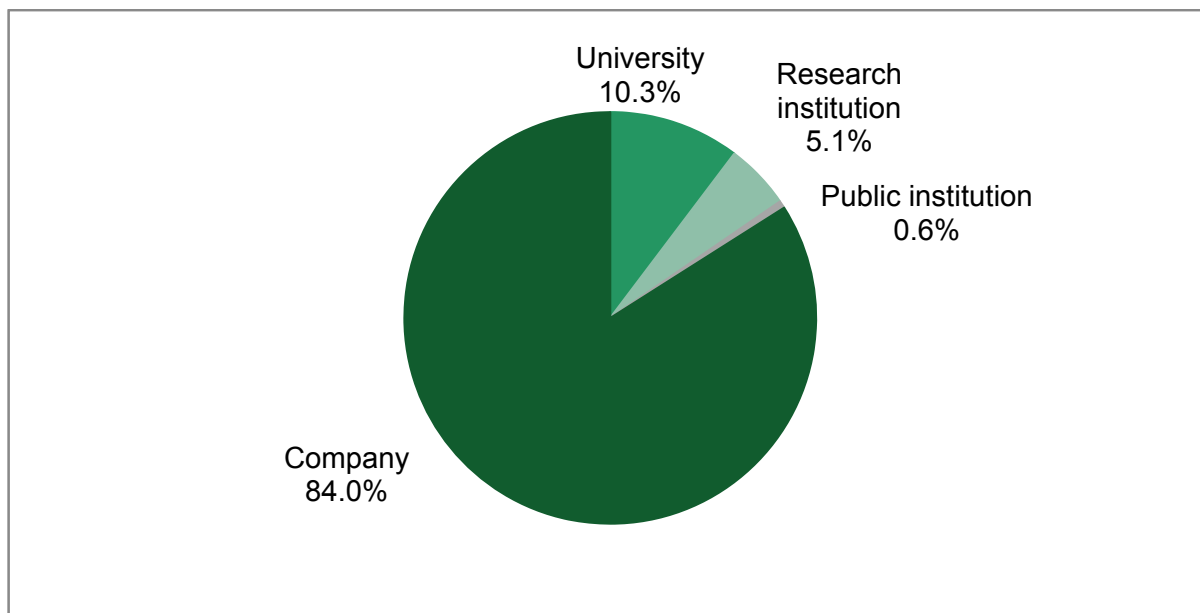
The licensing fee obtained is comparable to interest obtained by granting credit, or to an innovation’s interest rate. A vital licensing market can therefore be considered an indicator of a vital IPR Market.

4.3 Characterising patent portfolios, supply and demand

4.3.1 Key characteristics of respondents

The majority of the 191 participants in the empirical study are private companies (see Figure 24).

Figure 24: Organisational structure of respondents (n=175).



Source: Own illustration based on the quantitative survey.
Q1: Please specify the character of your organisation.

60.6% of the respondents are headquartered in Europe, 21.3% in Asia, 15.6% in North America and 2.5% in the rest of the world (see Table 5). More than one-third of the respondents are thus non-European. These figures demonstrate the internationality of the survey participants.

The applicants of the countries included in the survey account for nearly 95% of the total EPO applications in 2010. In our survey, we observe an overrepresentation of Germany and Switzerland in terms of all the EPO patent applications, but an underrepresentation of the United States, China, and the Republic of Korea. These deviations may be explained by the survey participants' more or less pronounced identification with and interest in European innovation policies.

Table 5: Structure of nationality within the survey (n=160) and within EPO applications.

Survey Countries	Share in survey	Share in EPO applications (2010)	Difference
Austria	1.88%	0.94%	0.93%
Belgium	1.25%	1.00%	0.25%
Canada	0.63%	1.77%	-1.14%
Denmark	3.75%	0.92%	2.83%
Finland	1.25%	1.10%	0.15%
France	3.75%	4.97%	-1.22%
Germany	28.75%	14.10%	14.65%
Israel	0.63%	0.77%	-0.15%
Italy	0.63%	2.11%	-1.48%
Japan	17.50%	17.83%	-0.33%
Liechtenstein	1.88%	0.09%	1.79%
Netherlands	1.88%	3.03%	-1.15%
Norway	0.63%	0.36%	0.26%
P.R. China	0.63%	5.40%	-4.78%
R. Korea	2.50%	5.25%	-2.75%
Spain	0.63%	1.05%	-0.42%
Sweden	2.50%	1.82%	0.68%
Switzerland	10.00%	3.35%	6.65%
Taiwan	0.63%	na	0.00%
Turkey	1.88%	0.26%	1.61%
United Kingdom	1.88%	3.04%	-1.17%
United States	15.00%	25.78%	-10.78%

Source: Own illustration based on the quantitative survey.

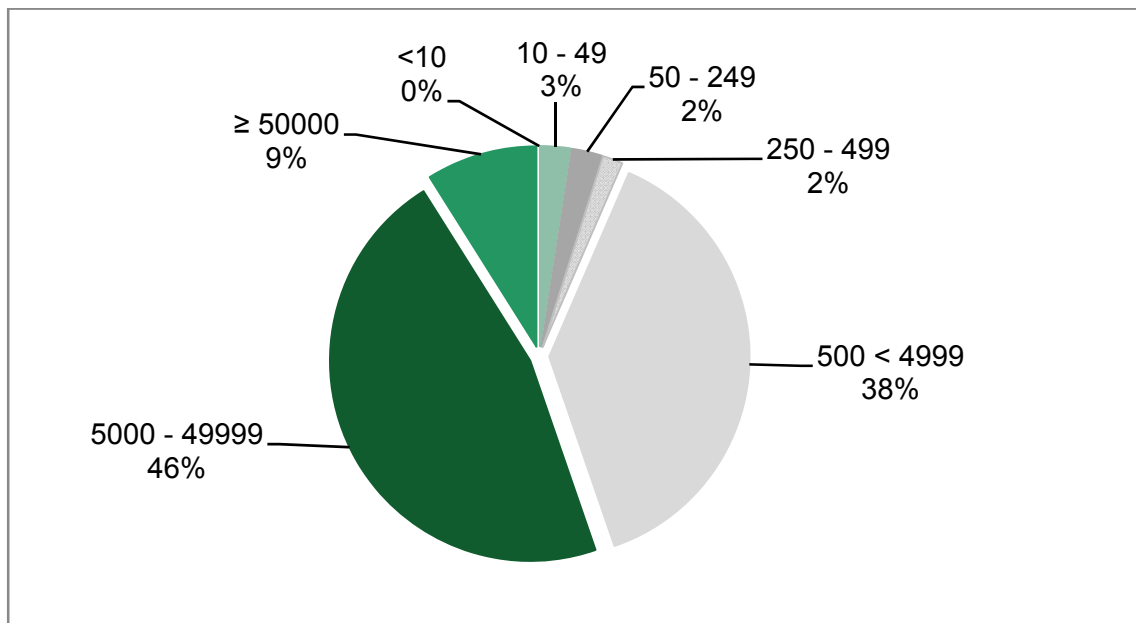
Q2: Please state the country where your institution has its headquarter.

The companies in the sample are only large corporations. Using the European Union SME definition¹⁰ in our dataset, we find no medium-sized, small or micro-businesses.

When asked to characterise their business structure, 55% of the participating companies indicated that they have more than 5000 employees (see Figure 25). 80% of the respondents' annual turnover is more than 500 m. EUR (see Figure 26).

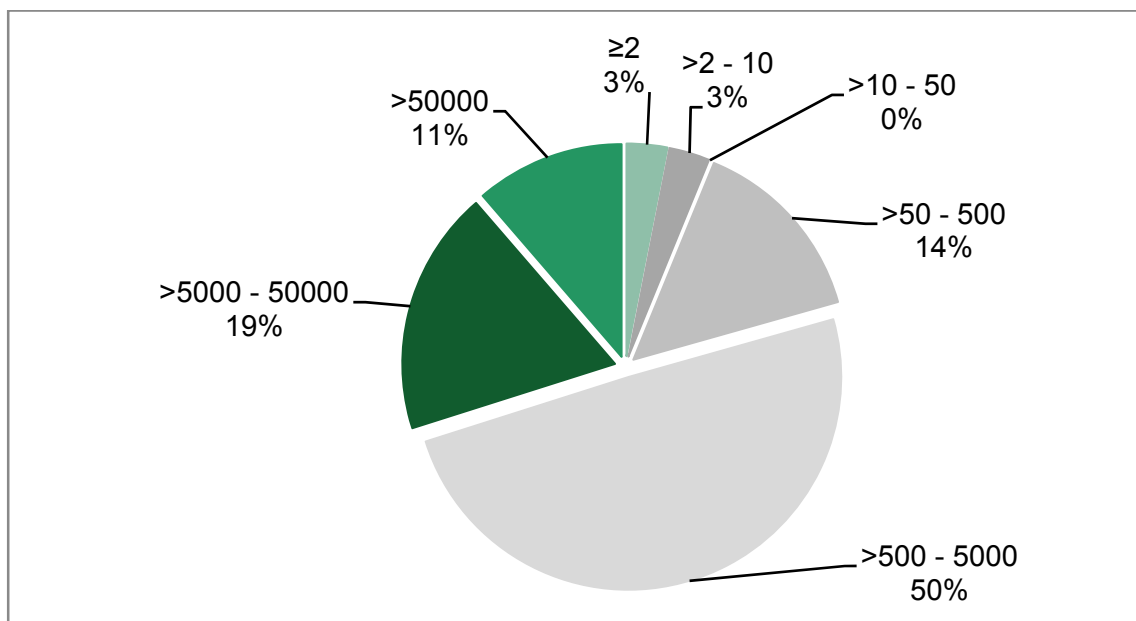
¹⁰ See definition: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

Figure 25: Structure of numbers of employees, in % (n=123).



Source: Own illustration based on the quantitative survey. Q5: Number of employees in 2010?

Figure 26: Structure of annual turnover (m€), in % (n=97).

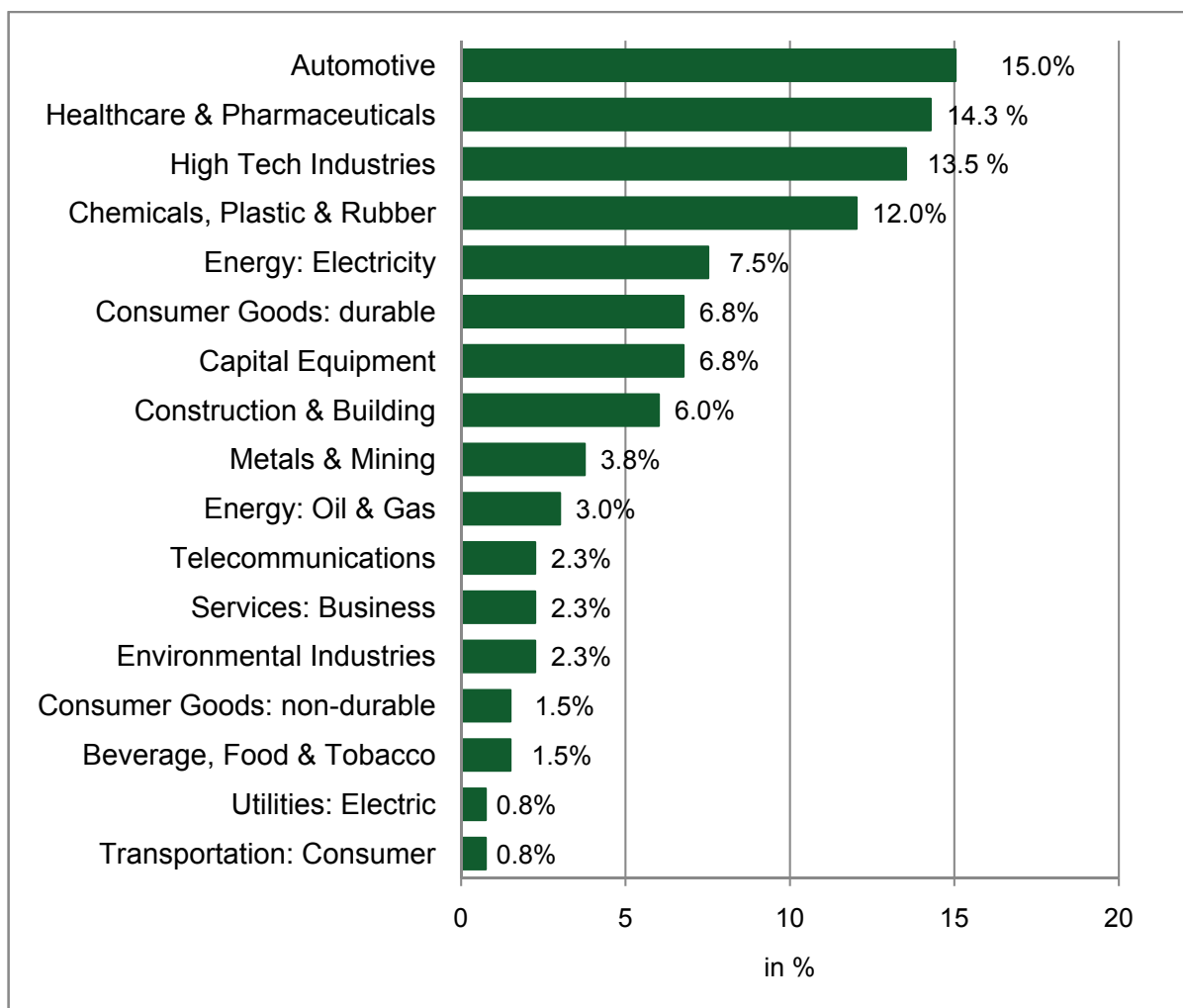


Source: Own illustration based on the quantitative survey. Q6: Annual turnover in 2010?

Most of the participating companies are from the Automotive Industry, Healthcare & Pharmaceuticals Industry, High Tech Industries, and the Chemicals, Plastics & Rubber and Electricity industries (see Figure 27). The smallest proportions of the companies in the survey are from Transportation, Utilities, Beverages, and Food. Patenting seems to be less relevant for these industries than for the others. This supports findings from other studies that

high patent activity is limited to certain industries and fields of technology (Monk, 2009). 65% of the respondents indicated that they are manufacturing businesses.

Figure 27: Industry* allocation of respondents (n=133).



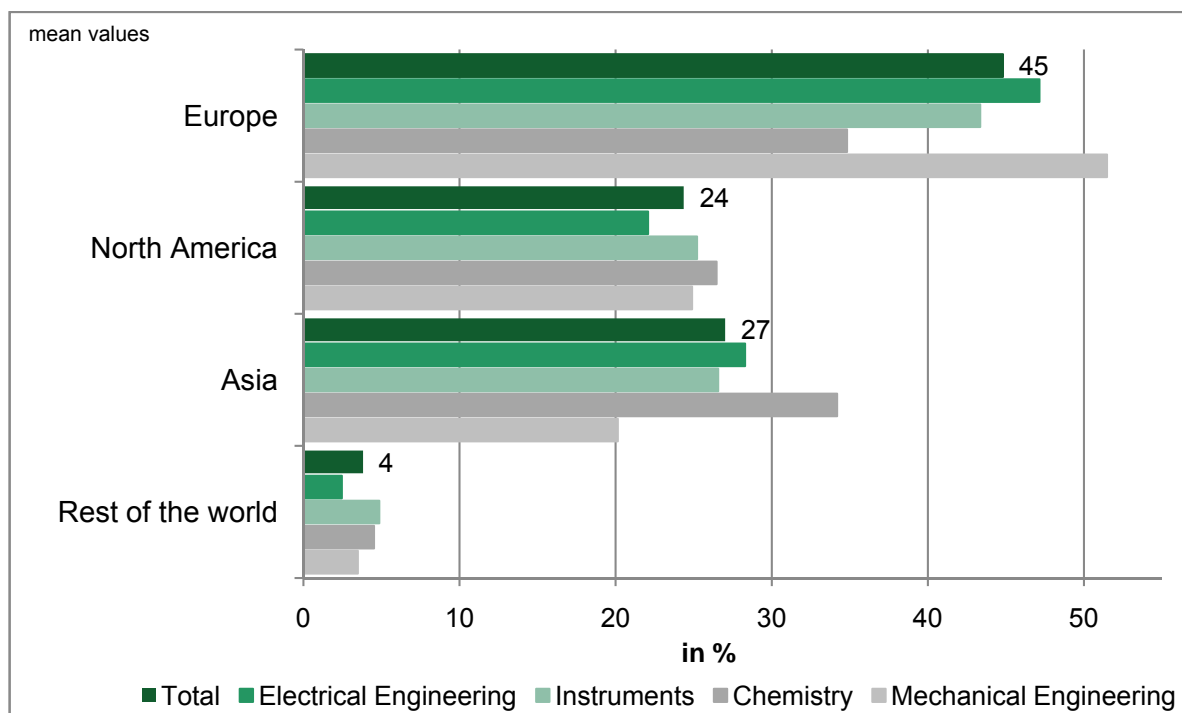
Source: Own illustration based on the quantitative survey. * Industry definition refers to Moodys35 classification. Q3: Which type of industry is your institution most active in?

4.3.2 Key characteristics of patent portfolios

Private businesses tend to register their patents in countries where they are planning to purchase, sell or license their products and processes.

The regions for registering patents identified in the survey are congruent with the established strong economic areas in Europe, North America, and Asia, including Japan (see Figure 28). However, this picture is likely to change if it were not limited to the top EPO applicants. Overall, there is a higher registration level in Europe than in Asia. Mechanical Engineering companies show a strong preference to register patents in Europe.

Figure 28: Structure of location of registration in respondents' patent portfolio (n=100), in%.



Source: Own illustration based on quantitative survey.

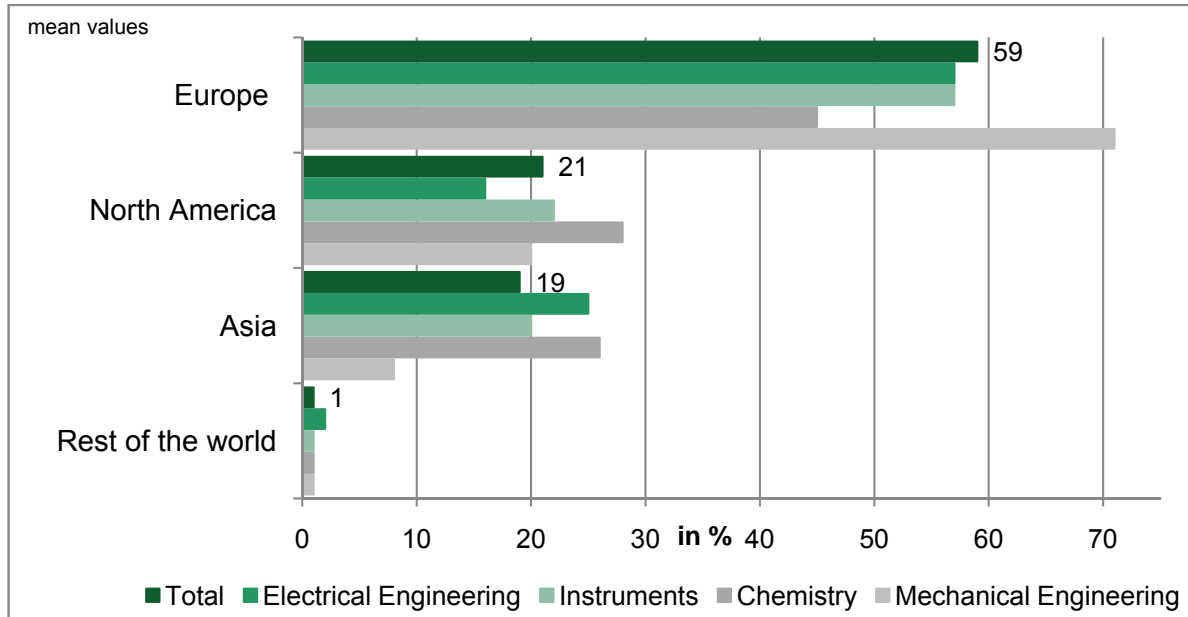
Q11: Please specify your patent portfolio by location of registration.

An important IPR Market success criterion will be the supply of and demand for patents. We assume that high numbers of technical developments are an indicator of the potential supply of and demand for IPR assets within a specific region. Therefore, it is important to understand where, how and by whom patented technologies are developed.

The regions of development correspond to the regions preferred for registration and to the distribution of the companies' headquarters. 59% of the technologies in our respondents' portfolios are developed in Europe (see Figure 29).

With respect to specific industry areas, we found that the survey participants deviate strongly in the fields of Mechanical Engineering and Chemistry. The mechanical engineers have a stronger research focus near their home markets. In turn, the chemical industry develops new knowledge worldwide. This is in line with the findings above, showing that Chemistry has a more balanced regional patent portfolio.

Figure 29: Regional distribution of patent developments (n=118), in %.

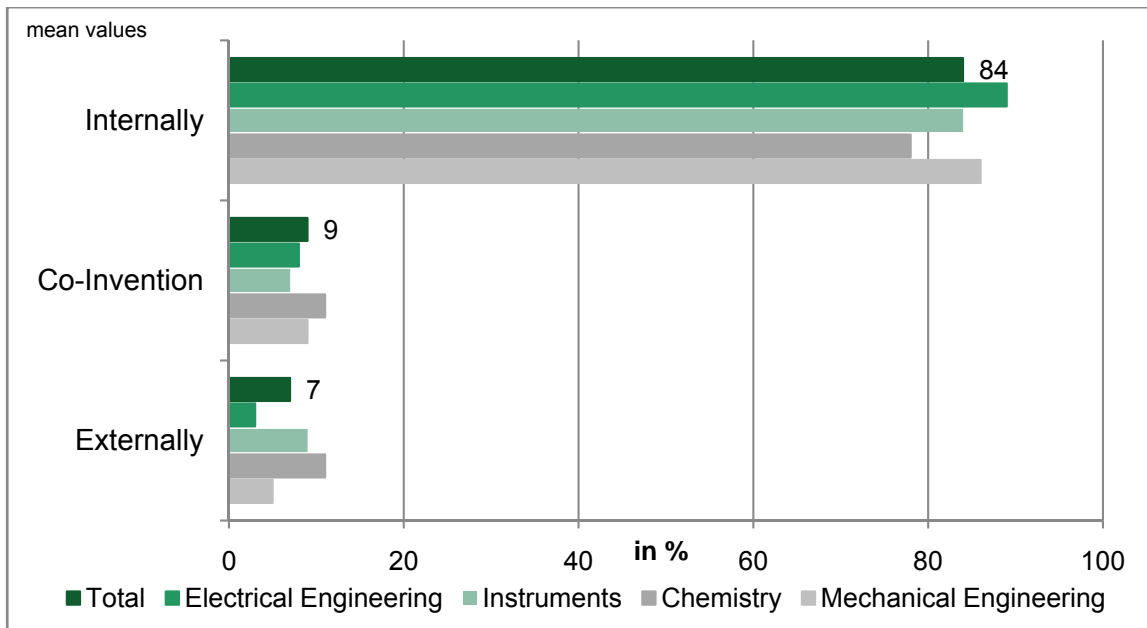


Source: Own illustration based on the quantitative survey.

Q14: Please specify the region where the technologies in your patent portfolio were developed.

We also inquired into the nature of the companies' knowledge creation processes, asking whether they develop their technologies only internally, or whether they cooperate with others, or only attain their technologies from outside knowledge. The largest share of the technologies in the sample is developed internally (see Figure 30). In turn, co-inventions and external developments seem to be less important in our respondents' technology-developing process.

Figure 30: Origin of knowledge-generating process (n=118).

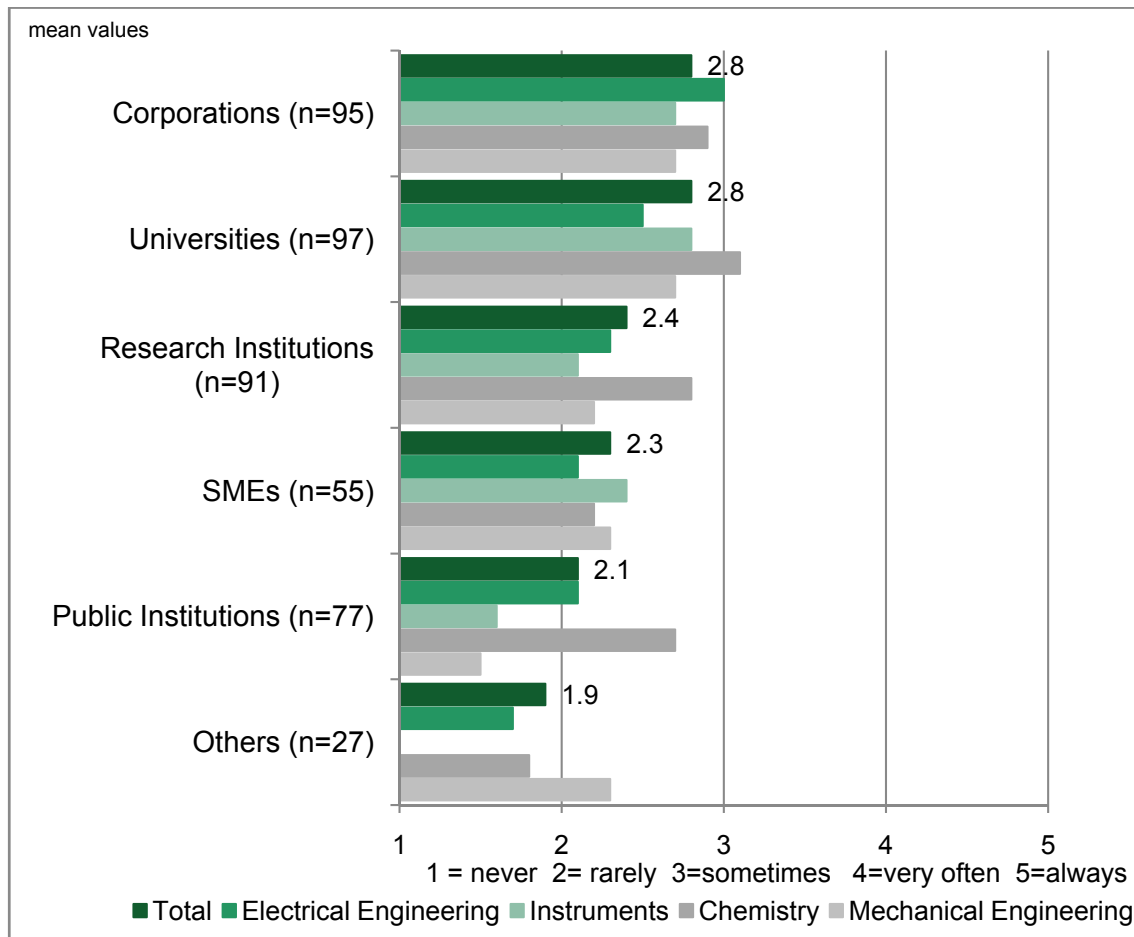


Source: Own illustration based on the quantitative survey.

Q15: Please indicate if the technologies in your patent portfolio were developed internally or externally.

Where technologies are not developed internally, corporations and universities are the preferred external sources (see Figure 31). We found that, in this respect, the research sector (e.g., universities, research institutions) and public institutions play a more important role for Chemistry than for other industrial areas.

Figure 31: Institutional preferences regarding technology development.



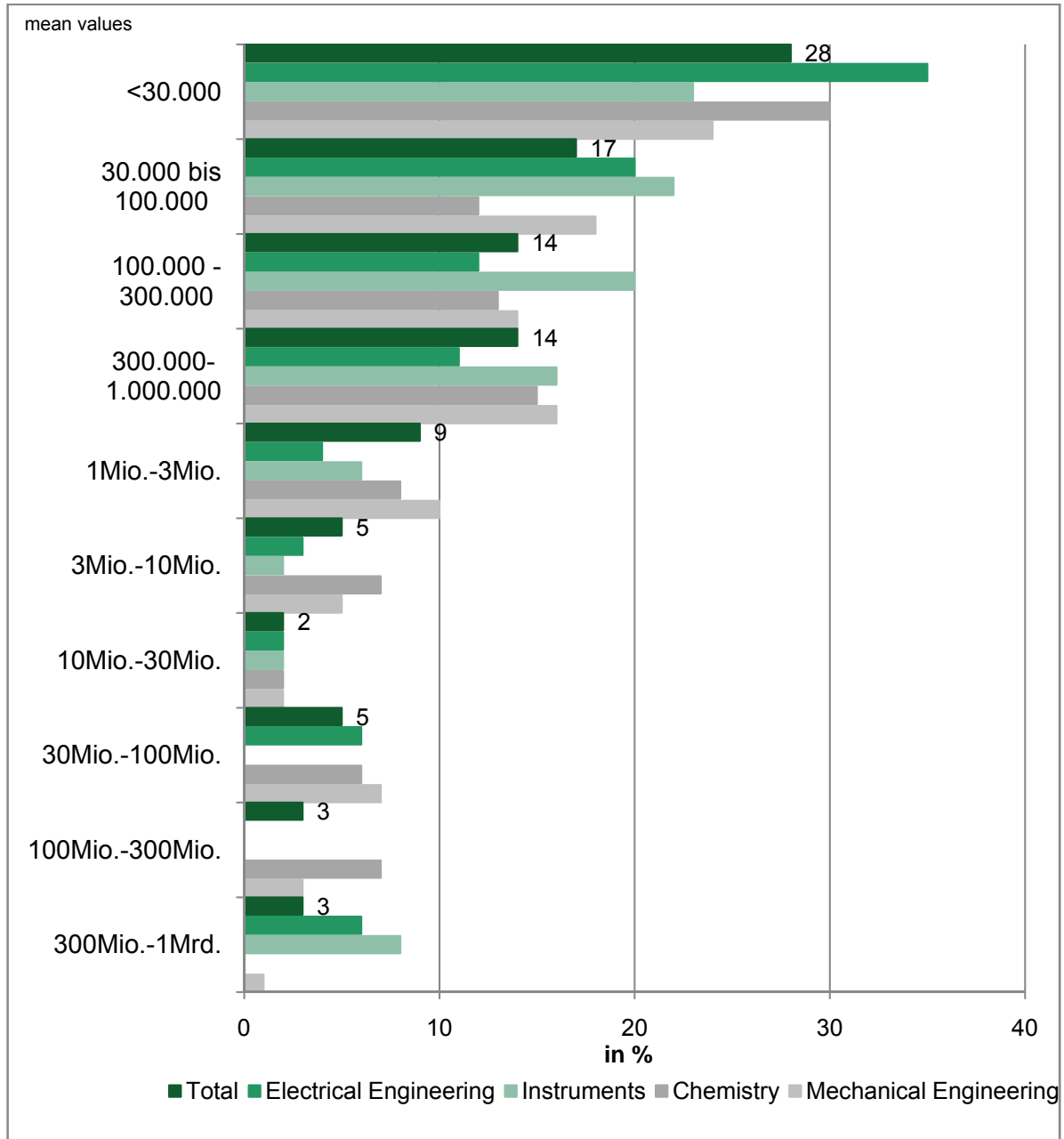
Source: Own illustration based on the quantitative survey.

Q16: Please specify which institutions developed the technologies in your patent portfolio if they were not developed internally.

In order to obtain an understanding of the value of an average patent portfolio, we asked the participants to indicate what proportion of their portfolio falls into the different value groups. The average portfolio shows a strong variation in the value of patents. Only 18% of the patents included in the average portfolio have a monetary value greater than 3 m. EUR (see Figure 32). Most of the patents are worth less than 30 000 EUR. This skewness was also detected by Gambardella et al. (2007).

In terms of industrial areas, we also find deviations worth mentioning. More than 30% of the Electrical Engineering patent portfolio is considered to have a value of less than 30 000 EUR. Mechanical Engineering and Chemistry also indicate that a larger proportion of their portfolio is worth between 30 000 EUR and 1 m. EUR. Instruments and Electrical Engineering are the industrial areas with the largest percentage of highly valuable IPR in their portfolio.

Figure 32: Value composition of respondents' mean patent portfolio (n=69).

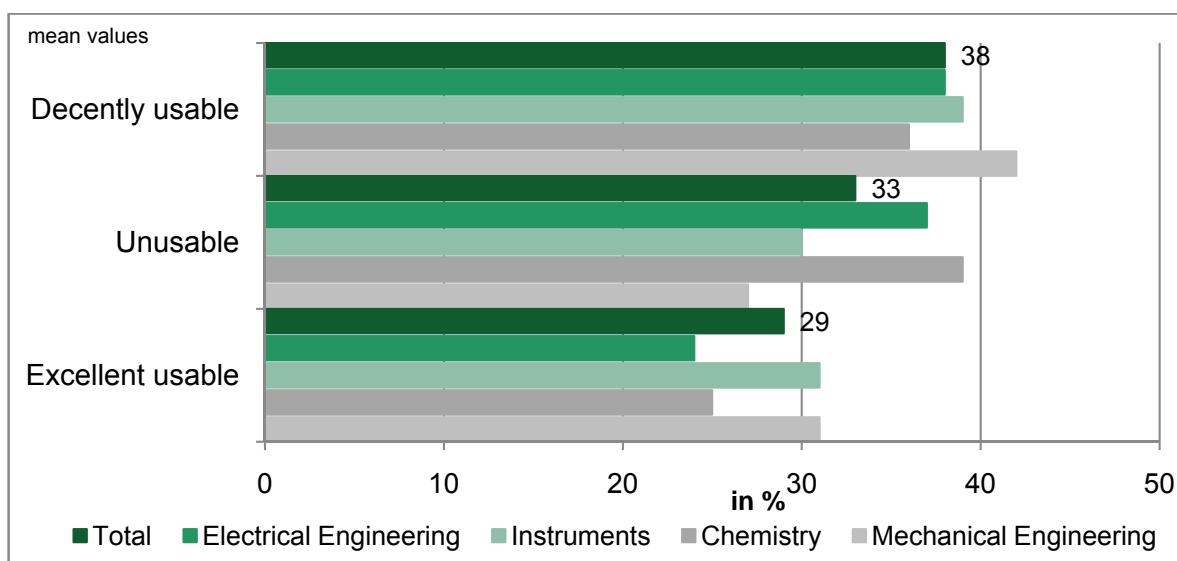


Source: Own illustration based on the quantitative survey.
 Q13: Please estimate the value composition of your patent portfolio.

Despite the strong variation in value, an average of 29% of the patents in our participants' portfolios is considered to be particularly commercially usable and an additional 38% to be reasonably usable. Only 33% is considered completely unusable (see Figure 33).

In terms of industrial areas, Electrical Engineering and Chemistry consider a higher fraction of their patent portfolio to be commercially unusable.

Figure 33: Composition of the commercial usability of respondents' patent portfolio (n=114).



Source: Own illustration based on the quantitative survey.

Q10: To what degree would you consider the patents in your portfolio as commercially usable?

4.3.3 Characterising supply and demand on an IPR Market

In the following we provide an estimate of the size of an IPR Market based on our empirical findings. To characterise the market potential, it must be assumed that the number of applications is not equal to the number of potentially tradable patents (see Table 6). In our calculation, the total number of applications is multiplied by the average granting ratio at the EPO between 2006 and 2010 and the ratio of the commercially usable patents (67%). We assume that the patent value is distributed equally among the industries. The number of patents available is divided into intervals. Intervals are created by the percentage identified by the average patent portfolio's distributed value. The monetary value of each interval is determined by the midpoint of the group. The last interval has no upper limit. We set the value of one patent within this interval at 300 m. EUR.

By multiplying the midpoint of each interval with the number of patents within this interval, the potential per-year volume of the IPR Market is estimated as 600 bn. EUR.

In order to determine the demand on the IPR Market, we multiply the market potential by the percentage of patents that our respondents indicated is purchased externally. Based on this estimation, we find an average per year demand on the IPR Market of 96 bn. EUR.

Nevertheless, our work offers a static picture of a possible market potential. The picture is likely to change in a dynamic market. Furthermore, it should be kept in mind that the market potential we calculated is an estimation of the top European applicants only. Integrating other regions, industries and company size categories is very likely to have an effect on the presented numbers.

Benchmark studies on the value of patents are rather rare. Nevertheless, the available numbers indicate that an IPR Market would have a high monetary volume. Harhoff (2004)

estimates the present value of the patents granted worldwide in 2001 to be between 1 and 1.5 trillion USD. Gambardella, Giuri et al. (2006) estimate the 2000-2002 EU-8 market for technology at 15.6 bn. EUR or 0.2% of the EU-8 GDP. Arora and Fusfori (2000) estimate the worldwide market for technology between 35 and 50 bn. USD.

Table 6: IPR Market potential and demand for IPR by the EPO top 1000 applicants.

	Ratio	Number	Value
Number of applications total		95 000	
Granting ratio EPO	48%	46 000	
Commercial usability	67%	31 000	
Value composition of average patent portfolio*	28%	8 544	15 k EUR
	17%	5 328	65 k EUR
	14%	4 363	200 k EUR
	14%	4 341	650 k EUR
	9%	2 633	2 m. EUR
	5%	1 405	6.5 m. EUR
	2%	623	20 m. EUR
	5%	1 628	65 m. EUR
	3%	836	200 m. EUR
	3%	987	300 m. EUR
Market potential		31 000	600.3 bn. EUR
Average Pat. Value		1	19.5 m. EUR

Demand			
Market potential		31 000	
Average external purchase	16%	5 000	19.5 m. EUR
Value			96 bn. EUR

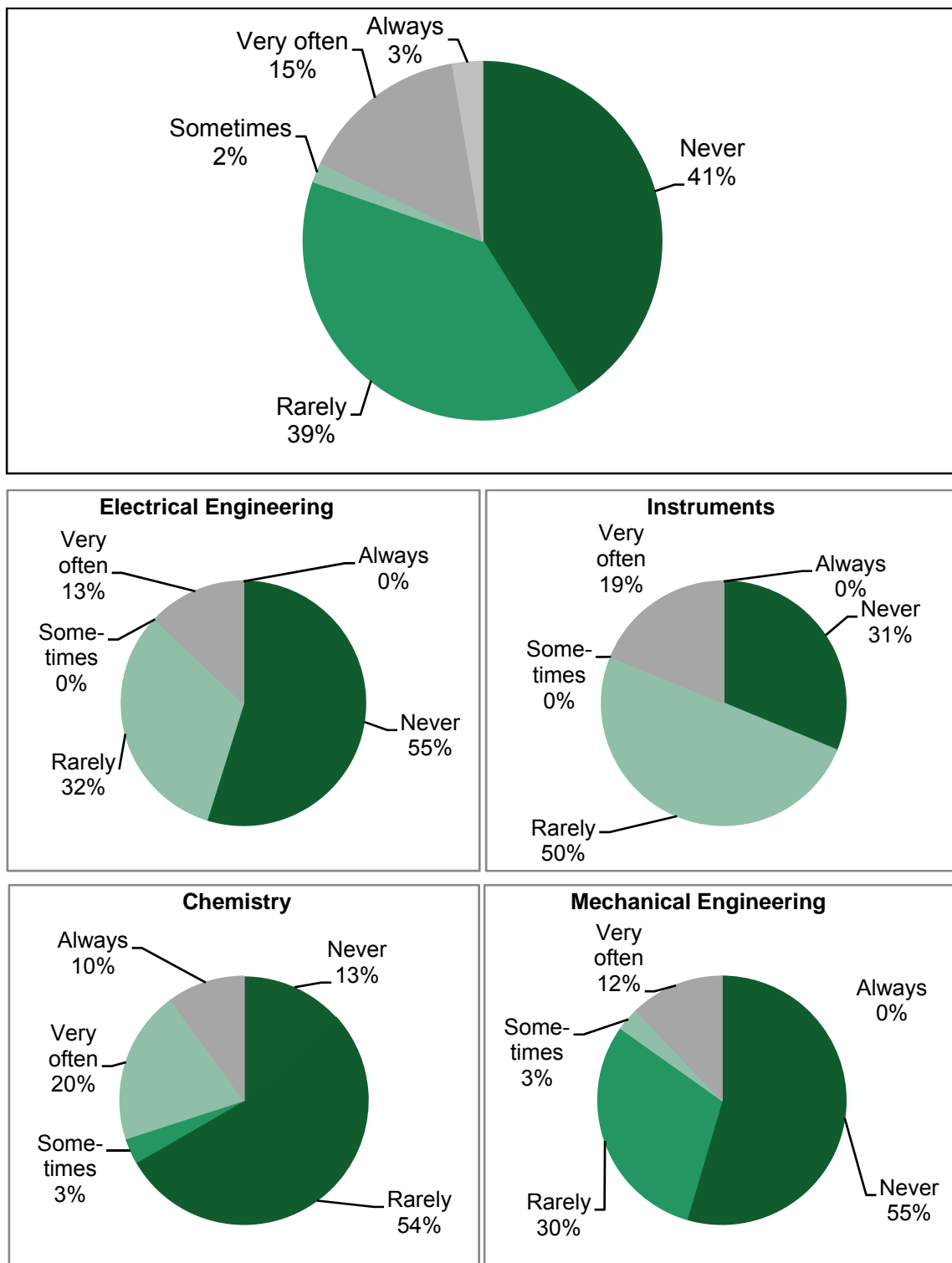
Source: Own calculations based on quantitative survey data. *Estimations of value within one interval and the relevant ratios are based on mean values within one interval.

4.4 Characterising patent transactions

The purchase, sale or licensing of patented technologies is linked to a transfer of the IPR. However, 80% of the respondents indicated that they never or rarely perform patent transactions (see Figure 34).

We would have expected a higher familiarity with patent transactions among the top 1000 EPO applicants. However, many firms use patents as a pure right of exclusion in order to retain the freedom to operate (see Figure 23).

Figure 34: Frequency of IP transactions (n=112).



Source: Own illustration based on the quantitative survey.

Q21: How often does your organisation purchase, sell, or license patented technologies?

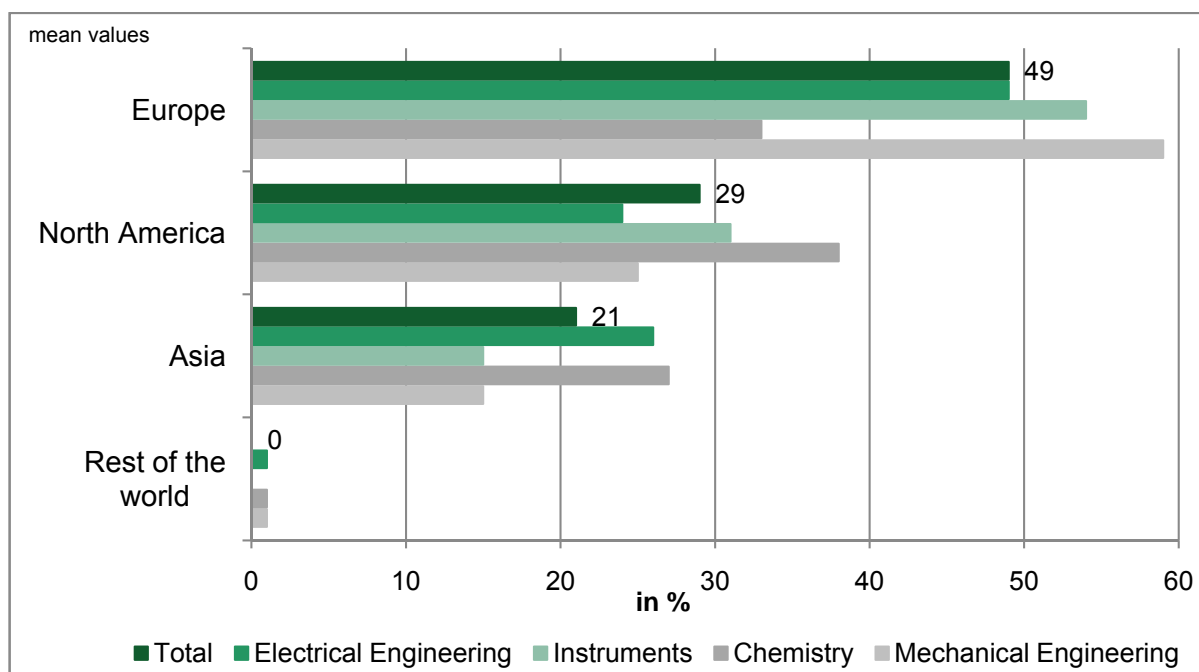
20% of the respondents indicated a higher frequency of patent transactions and they tend to perform patent transactions on a continuous basis.

In the technology areas, Chemistry seems to deviate. It shows a tendency to purchase, sell, or license patented technologies more often than the others. The same is true of Instruments, but on a lesser level.

Serrano (2011) found that 23% of US patents were at least sold once. He further showed that trading patents is linked to their value. According to this study, traded patents account for 50% of the total value of patents. Our respondents' preferred region for purchasing, selling, and licensing patents is Europe (see Figure 35). On average, 49% of the transactions are conducted there.

On analysing the industrial areas, differences were determined between Mechanical Engineering, Electrical Engineering and Chemistry. Transactions in the field of Mechanical or Electrical Engineering are widely conducted in Europe. In accordance with the earlier results, Chemistry is more internationalised and its patent transactions around the world are balanced.

Figure 35: Composition of transaction regions (n=89), in%.



Source: Own illustration based on the quantitative survey.

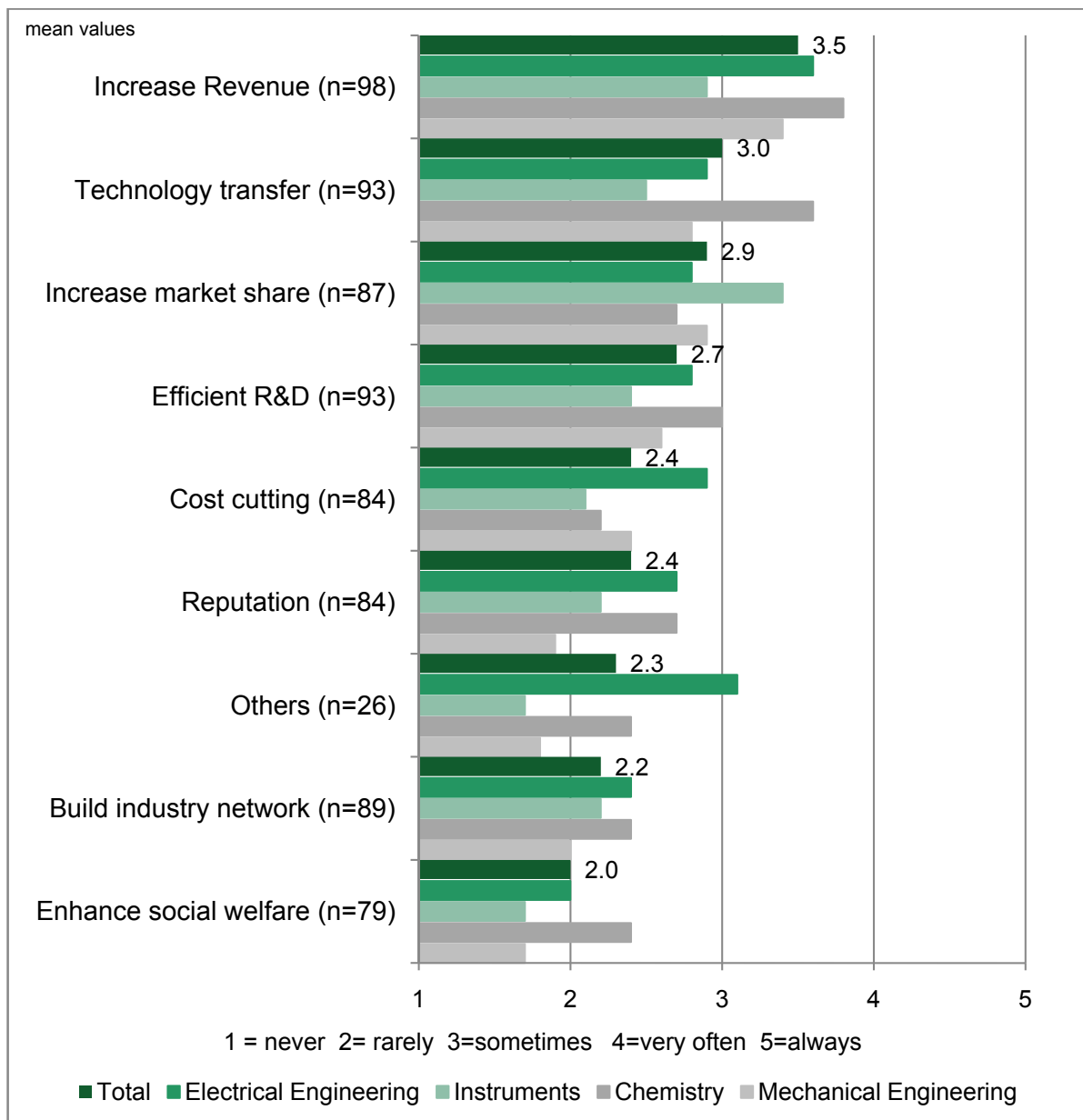
Q23: Please specify the geographical regions where you are selling, purchasing, and licensing patents.

Financial motivations seem to dominate the motivation for engaging in the IPR Market. The respondents' main motivation for engaging in selling, purchasing, or licensing patents is to increase their company's revenue (see Figure 36). This motivation points to the respondents being aware of the commercial potential of their IPR.

Transferring technology and increasing market share are additional motivation factors; however, they range behind the goal to increase revenue. Transferring technology could be considered a future-orientated motivation. It helps the company to keep pace with scientific advancements, to reduce the time to market of new products, to reduce the costs and the time required for their R&D efforts.

Chemistry again shows the strongest deviation from the others. Technology transfer has a higher importance for Chemistry. Efficiency in R&D is also more pronounced here than in other industrial areas. Furthermore, Chemistry shows a special motivation to use patents to increase market share.

Figure 36: Assessment of respondents' motivations for IPR transactions.



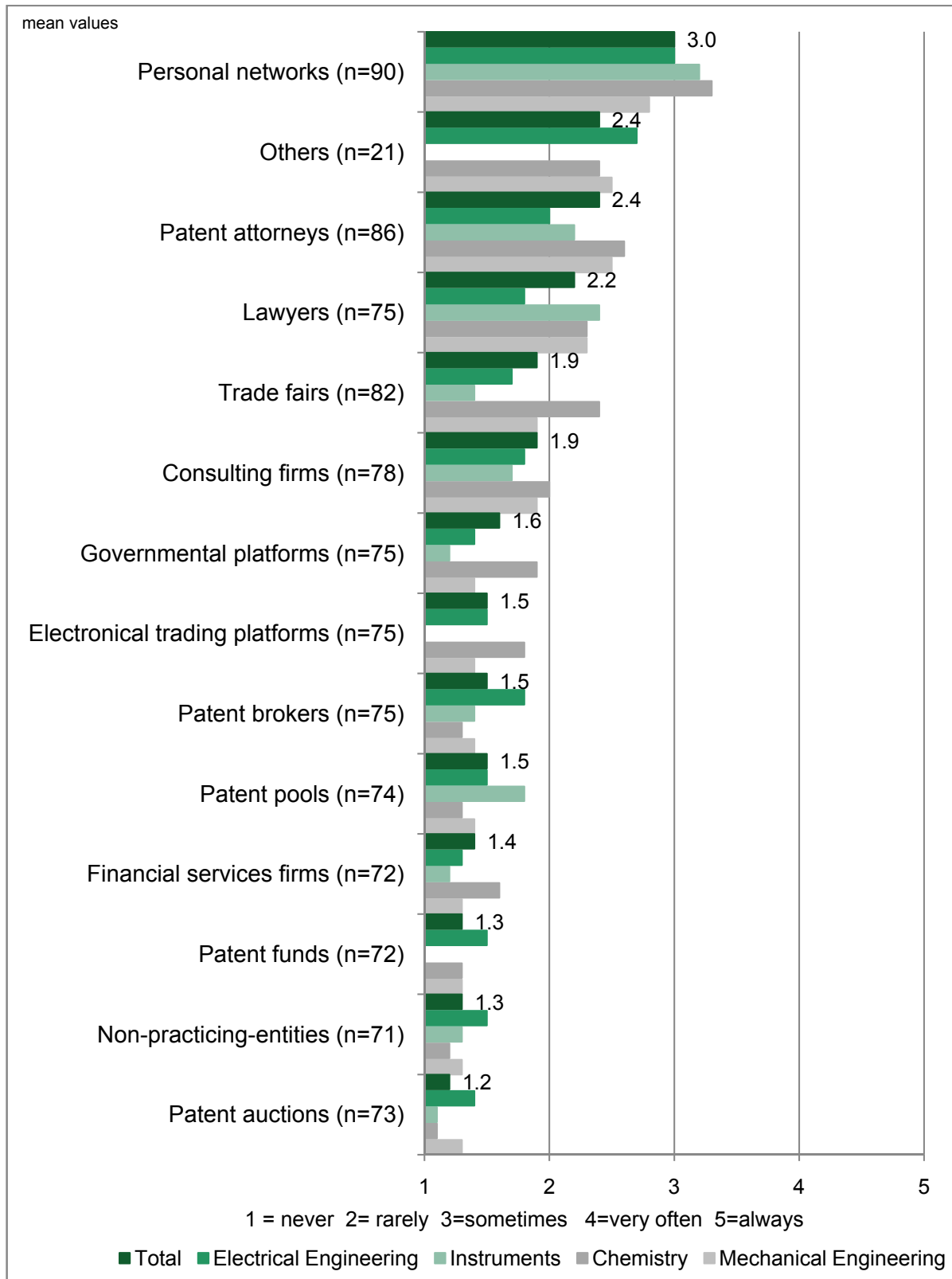
Source: Own illustration based on the quantitative survey.
 Q18: What are your main goals in selling, purchasing and licensing patents?

Personal networks and relations are preferred intermediaries in patent transactions. Patent attorneys and lawyers are, however, sometimes used (see Figure 37). The existence of intermediaries points to the existence of vital markets.

Using intermediaries is a sign of complexity in undertaking IPR transactions. This complexity is mainly caused by inefficiencies in the market. Intermediaries focus exclusively on the monetary value of patents, like the patent funds, and non-practising entities are a rather new phenomenon.

The respondents seem to be sceptical about using intermediaries like patent funds or financial services firms. The scepticism may be explained by a lack of experience in engaging with this new type of intermediary. Another explanation may be a lack of transparency in those intermediaries' decision, pricing, and partner selection processes.

Figure 37: Preferences regarding intermediaries for IPR transactions.



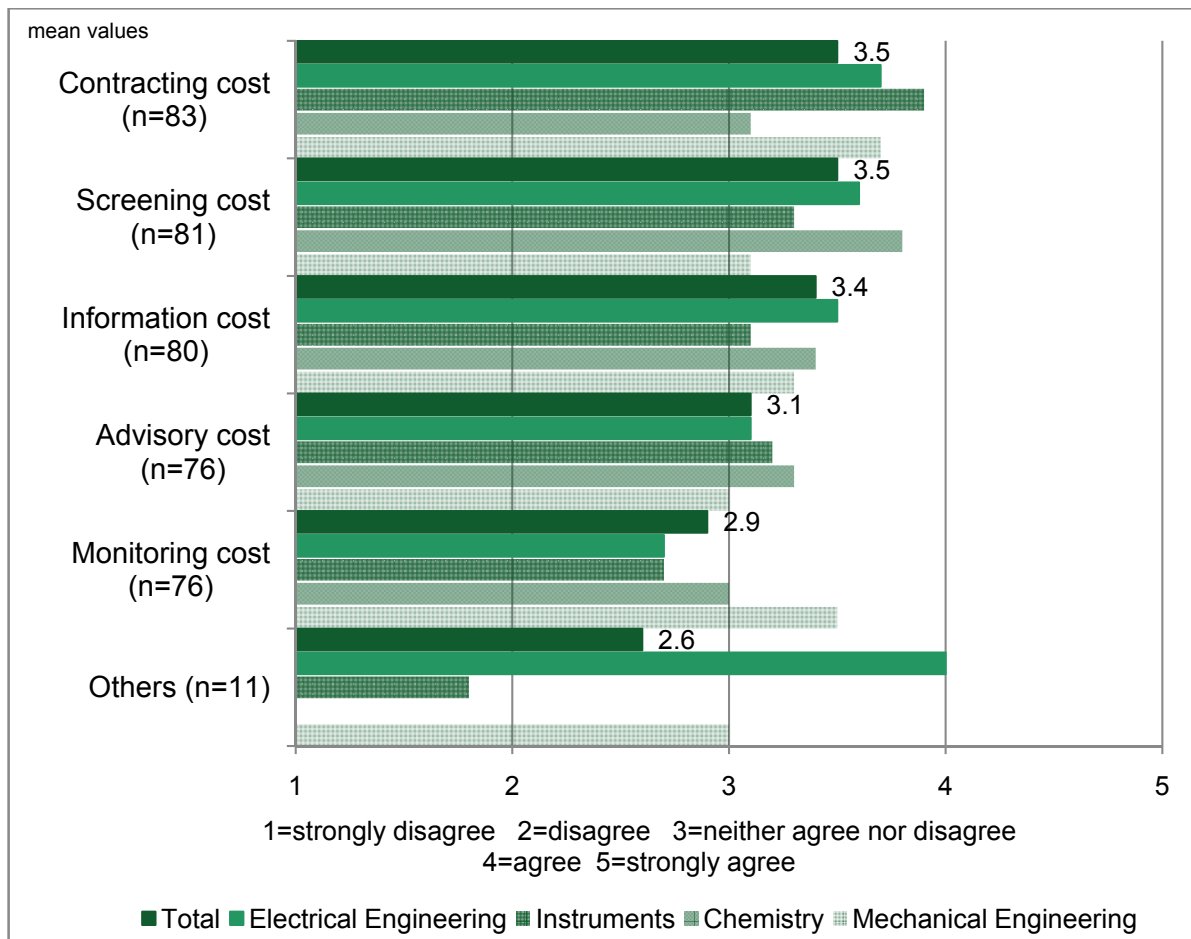
Source: Own illustration based on the quantitative survey.

Q20: Which of the following types of intermediaries are you using for patent transactions?

Inefficiencies in markets typically materialise as high transaction costs. The respondents report the highest transaction costs in contracting, screening, and obtaining information (see Figure 38). Screening costs can be considered the costs of finding high-quality patents and transaction partners as well as evaluating the novelty of a technology. Contracting costs are those for negotiating and finalising the buying or selling of contracts. They include all of the costs for negotiating the details of a property transfer or the licensing agreement, but also the costs of lawyers. The costs of information are costs related to obtain information about the patent, for example, the patent holder, the price, and the value.

The findings point out that especially price negotiation and the legal details of IPR transactions are complicated and demand many resources. Furthermore, the strong emphasis on screening and information costs shows that the IPR Markets are not transparent and that evaluating a technology's potential is complex.

Figure 38: Assessment of transaction costs of IPR transactions.



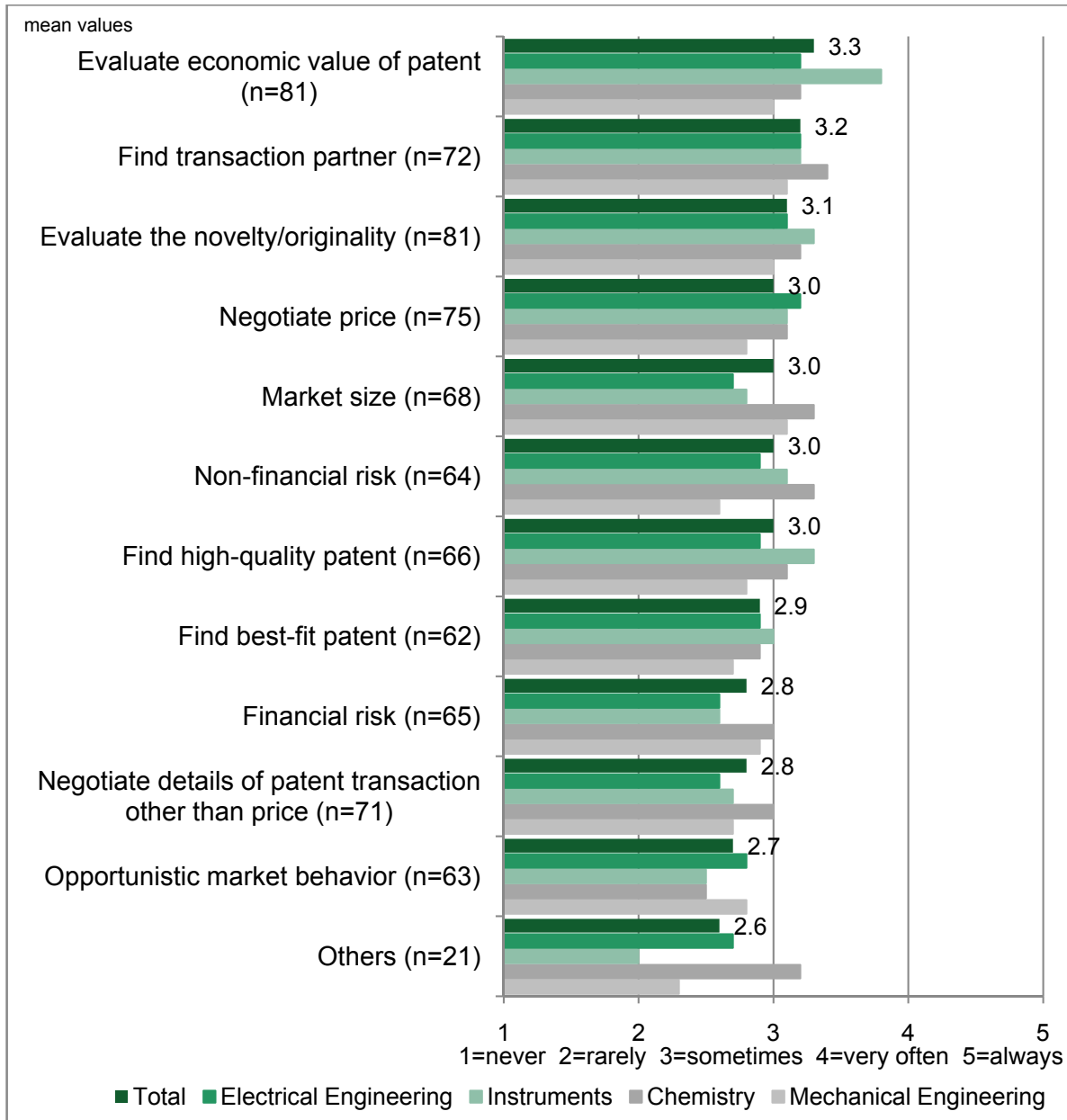
Source: Own illustration based on the quantitative survey.

Q22: What are the main types of cost for patent transactions from your perspective?

The main transaction barriers are the valuation of a patent, finding a transaction partner, and evaluating the novelty of a technology (see Figure 39).

Interestingly, the (insufficient) size of the market is also among the top transaction barriers. It can be assumed that this issue may be resolved by increasing the scope and accessibility of the IPR Market. Overall, the differences in the different barriers' mean values are very small, which can again be interpreted a sign of patent transactions' lack of use.

Figure 39: Assessment of transaction barriers to IPR transactions.



Source: Own illustration based on the quantitative survey.
 Q19: Please evaluate if the following issues have a negative impact on selling, purchasing or licensing patents.

4.4.1 Type of patent transactions

IPR can either be transferred by transferring the property of an asset, by sales, or by licensing agreements. Transferring IPR ownership implies the transfer of the right to future exploitation. A transfer of ownership is typically associated with a single payment.

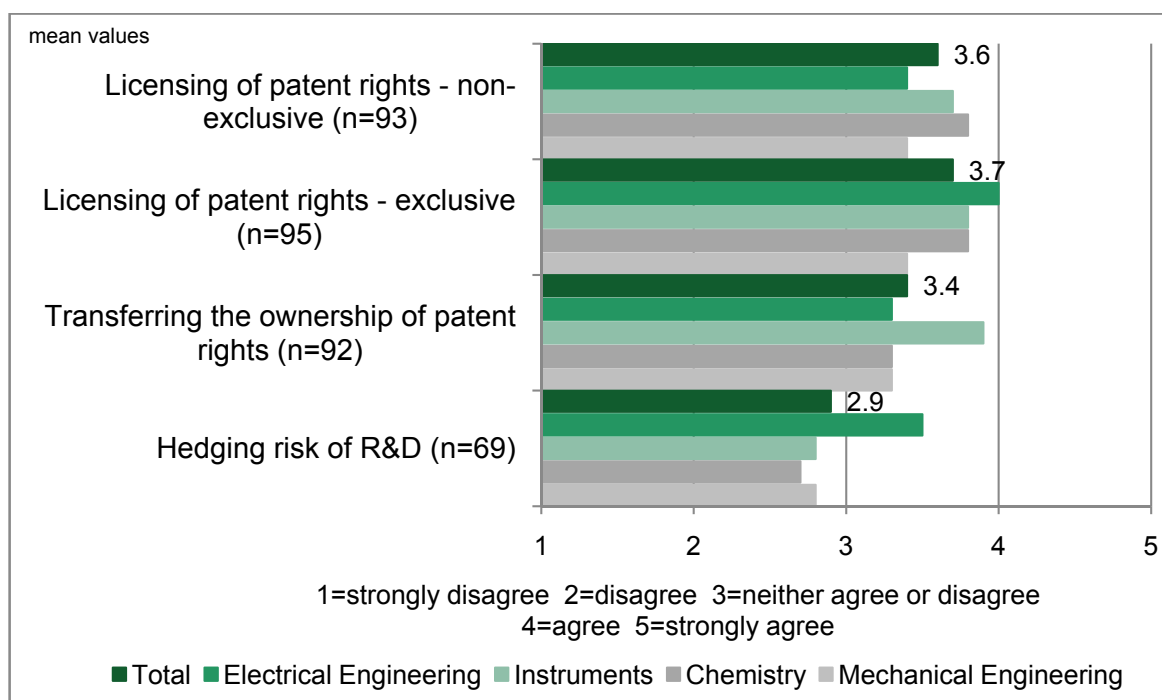
Licences are, on the other hand, contracts that allow the contracting party to commercialise a given technology for a defined period of time against a licensing fee. Licenses can either be granted exclusively to one party or non-exclusively to more than one party. In terms of payment, licensing agreements can be seen as a stream of cash flows over a longer period of time. Compared to the transfer of ownership, the licensor retains the right to capitalise on the future development of the technology.

The strength of the actors' IPR, bargaining power and firm size also strongly determine the likelihood of engaging in the IPR Market, since these factors also determine the likelihood of licensing (Arora, Fosfuri 2003). In fact, smaller firms are more likely to license than bigger ones.

In general, firms license as long as the licensing revenues are bigger than the marginal costs of creating competitors. The rent dissipation of creating competitors decreases when the licensor's product market share increases, or the product differentiation in the licensor's product market decreases. In fact, firms with fewer shares in the product market are more likely to license and an IPR market is more likely in a competitive product market.

The respondents expressed a strong interest in licensing (see Figure 40). Exclusive and non-exclusive licensing were both considered attractive options.

Figure 40: Nature of patent transactions.



Source: Own illustration based on the quantitative survey.

Q24: Please specify your preferences regarding the nature of patent transactions.

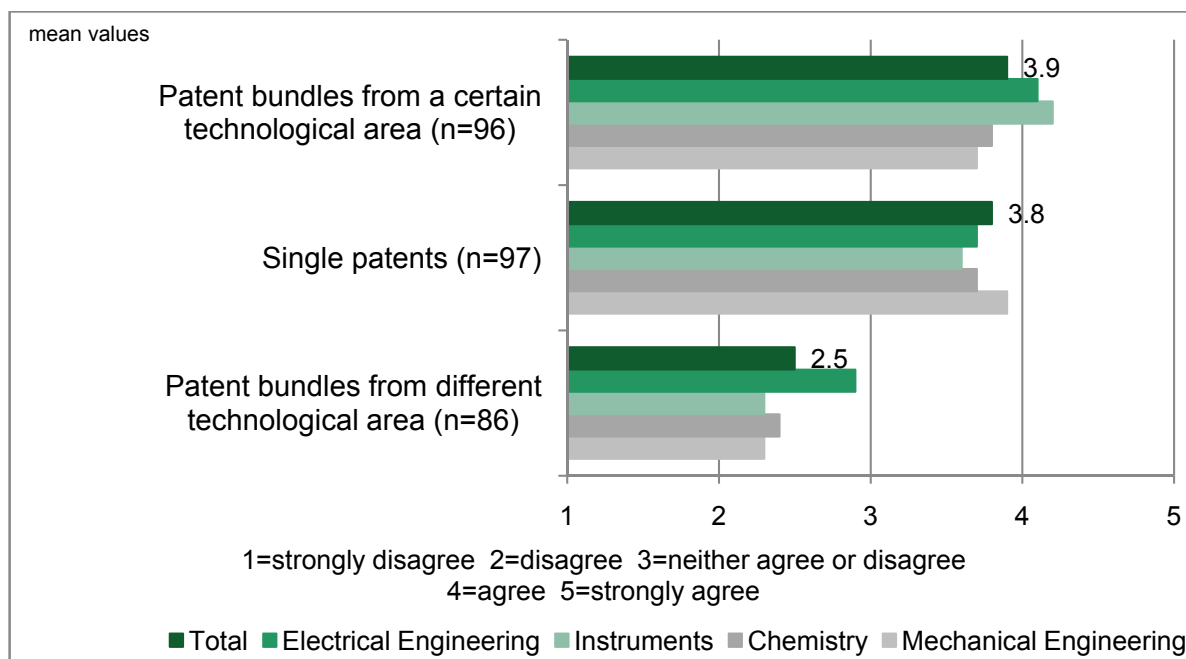
When the type of assets that the market prefers was examined, no difference was found in the preference for bundles of patents from a certain technological field or for single patents (see Figure 41). The preference is determined by the product markets' structural aspects. To make use of an innovation, for example, in the field of Electrical Engineering, access to a

whole set of patents is necessary, while in Mechanical Engineering a single patent allows utilisation. A second influencing factor is the structure of demand and supply. In markets with dedicated technology, the need for an IPR Market may be less than in markets with mainstream technologies (Arora et. al. 2007). There are fewer applications for dedicated technologies, and the demand is therefore likely to be lower than for technologies with manifold applications. Additionally, in fragmented product markets, the actors have a higher incentive to engage in the IPR market since they can be better controlled and won't create competitors in the actors' own product markets (Bresnahan, Gambardella 1998).

The complexity and maturity of the technology may also affect the type of asset demanded. The increasing complexity of products correlates to an increasing number of components in the product and therefore increases the number of rights necessary to produce the technology. Less complex products comprise fewer components and access is therefore required to just a single right.

Patent bundles may also be used as a strategic tool, either for building a wall around a certain technology, to avoid litigation or to use them as a bargaining instrument. Single patents can be interpreted as focused demand complementing the organisation's technology portfolio. There seems to be a slight preference for patent bundles within the Electrical Engineering and the Instruments industries.

Figure 41: Assessment of the scope of patent transactions.



Source: Own illustration based on the quantitative survey.

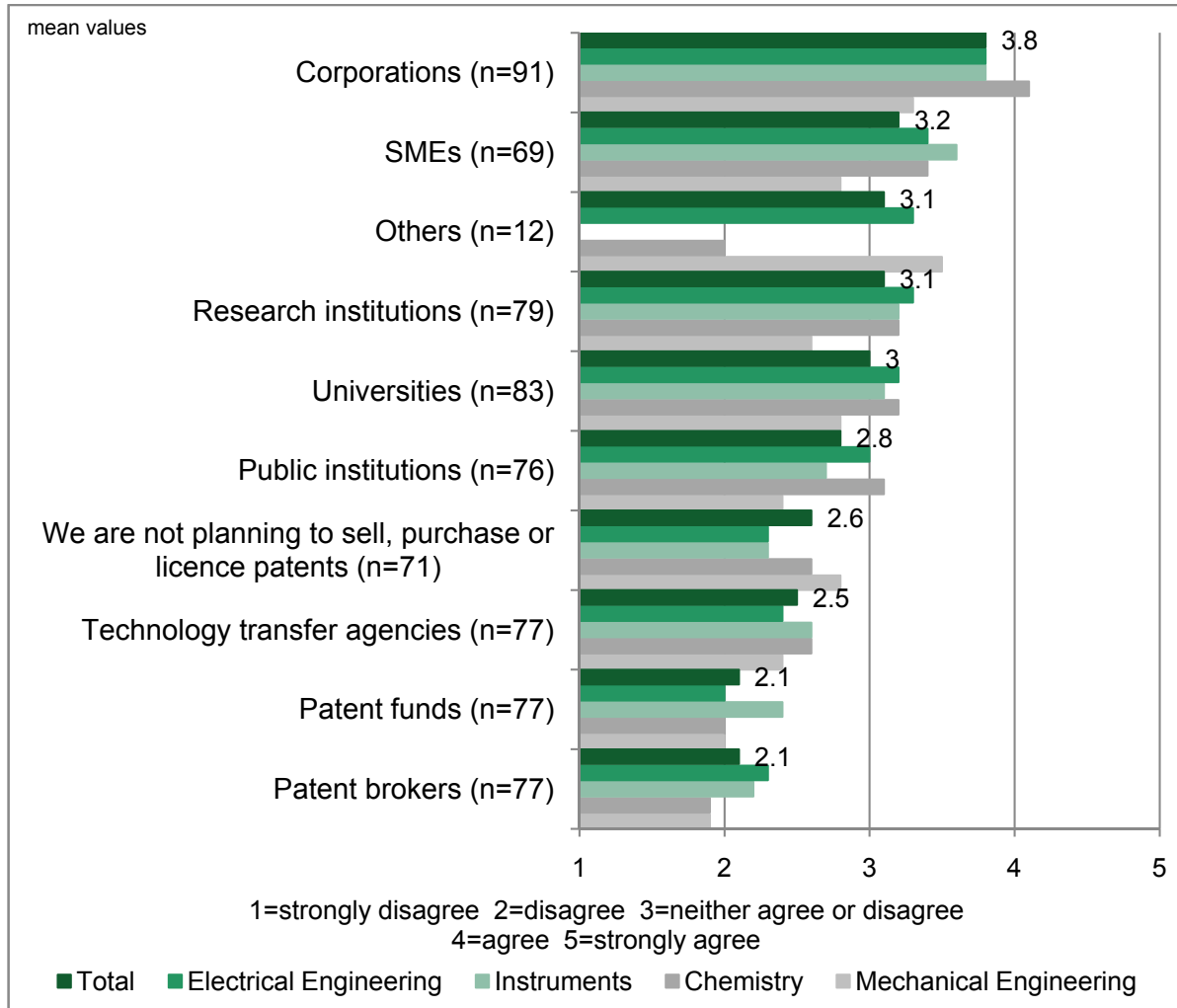
Q26: Please specify your preferences regarding the type of patent to be exchanged on the patent marketplace.

The respondents would like to increase their IPR trade with companies in general and with larger corporations in particular (see Figure 42). This preference may be explained by their desire to access more mature technologies. The interest in engaging with universities and

research institutions can be interpreted as ensuring access to novel technologies and innovations.

Increasing cooperation with technology transfer agencies, patent funds, or brokers tends to find less agreement among the participants. Their scepticism regarding using patent funds may be explained by their fear of potential litigation. As mentioned previously, there seems to be scepticism regarding using these actors to transfer IPR.

Figure 42: Preferences regarding IPR transaction partners.



...Source: Own illustration based on the quantitative survey.

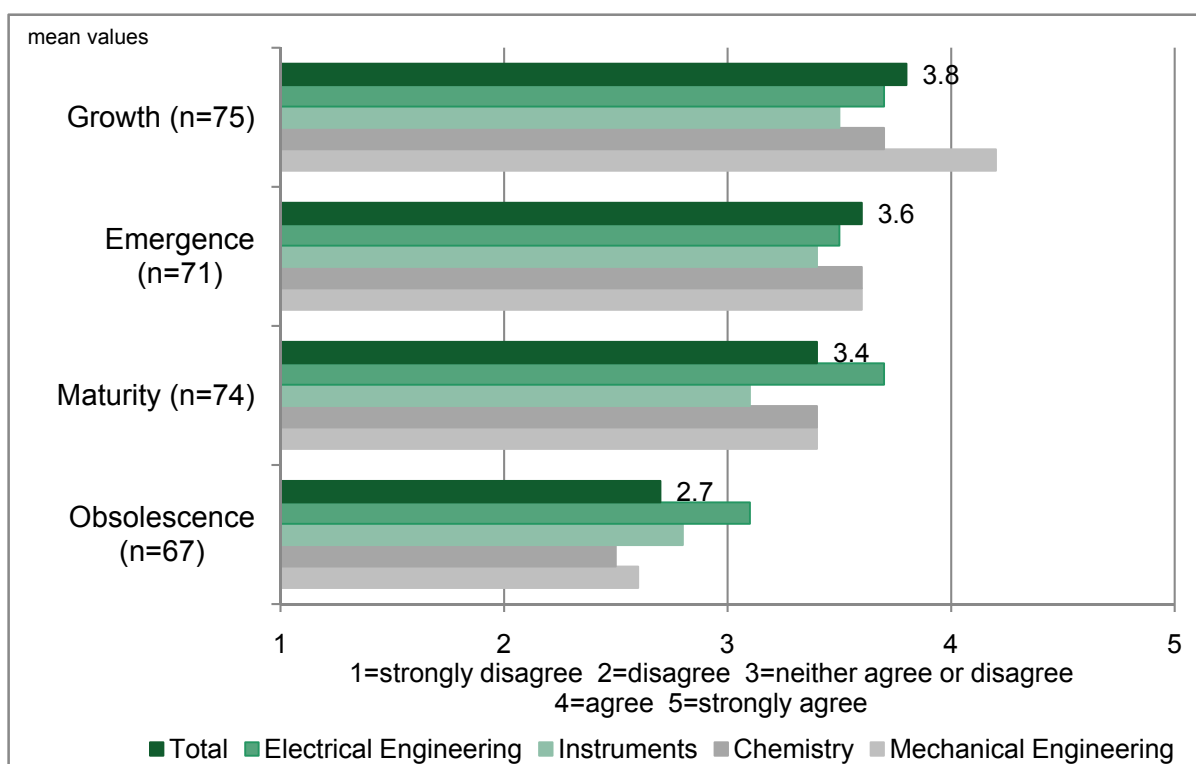
Q28: Please specify your preferences regarding institutions to which you are planning to increase selling, purchasing, and licensing of patents in future.

Emergent technologies are new to the market. Investing in such technologies can be considered rather risky since their commercial potential has not yet been proven. Growth technologies are new technologies that start to gain market share. Mature technologies are established technologies that already generate stable income. Usually, they are quickly replaced by a new technology in the near future. Obsolete technologies still generate a stable income, which is, however, already declining.

Regarding the development phase, a slight preference can be found for technologies in the growth phase (see Figure 43). Overall, there is a desire to obtain access to a rather broad range of IP assets. In accordance with our findings that indicate a preference for technologies close to the market, we found that access to growth stage IP was especially interesting for our respondents.

A stronger desire to engage with technologies in the growth phase is found in respect of the Mechanical Engineering industries. Electrical Engineering shows a stronger preference for technologies in maturation and even obsolescence.

Figure 43: Development phase

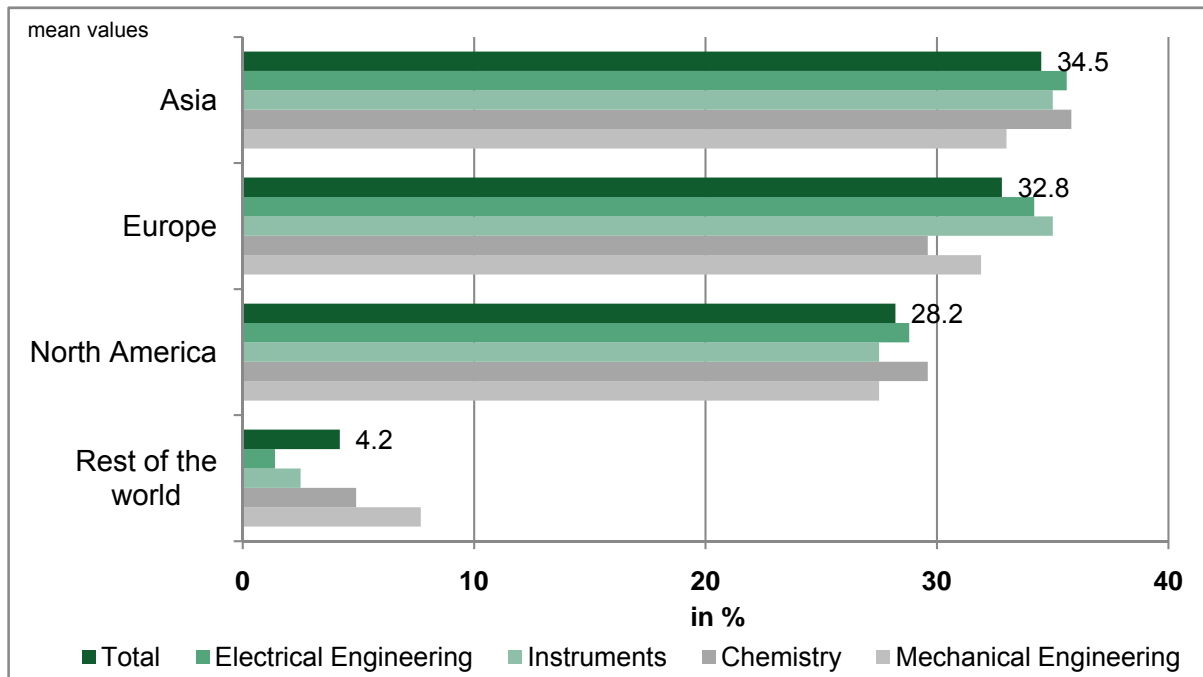


Source: Own illustration based on the quantitative survey.

Q29: Please specify your preferences for the development phase of patents you would like to sell, purchase and license on the new patent market.

For the development of an IP market, it is also of interest to know which regions are becoming attractive for future trade. The region worth highlighting is Asia, which it is assumed to be more prominent in future than currently (see Figure 44). Like the peer group, Mechanical Engineering industries show a stronger desire to engage stronger in transaction with ROW.

Figure 44: Future region of transaction (N=106)



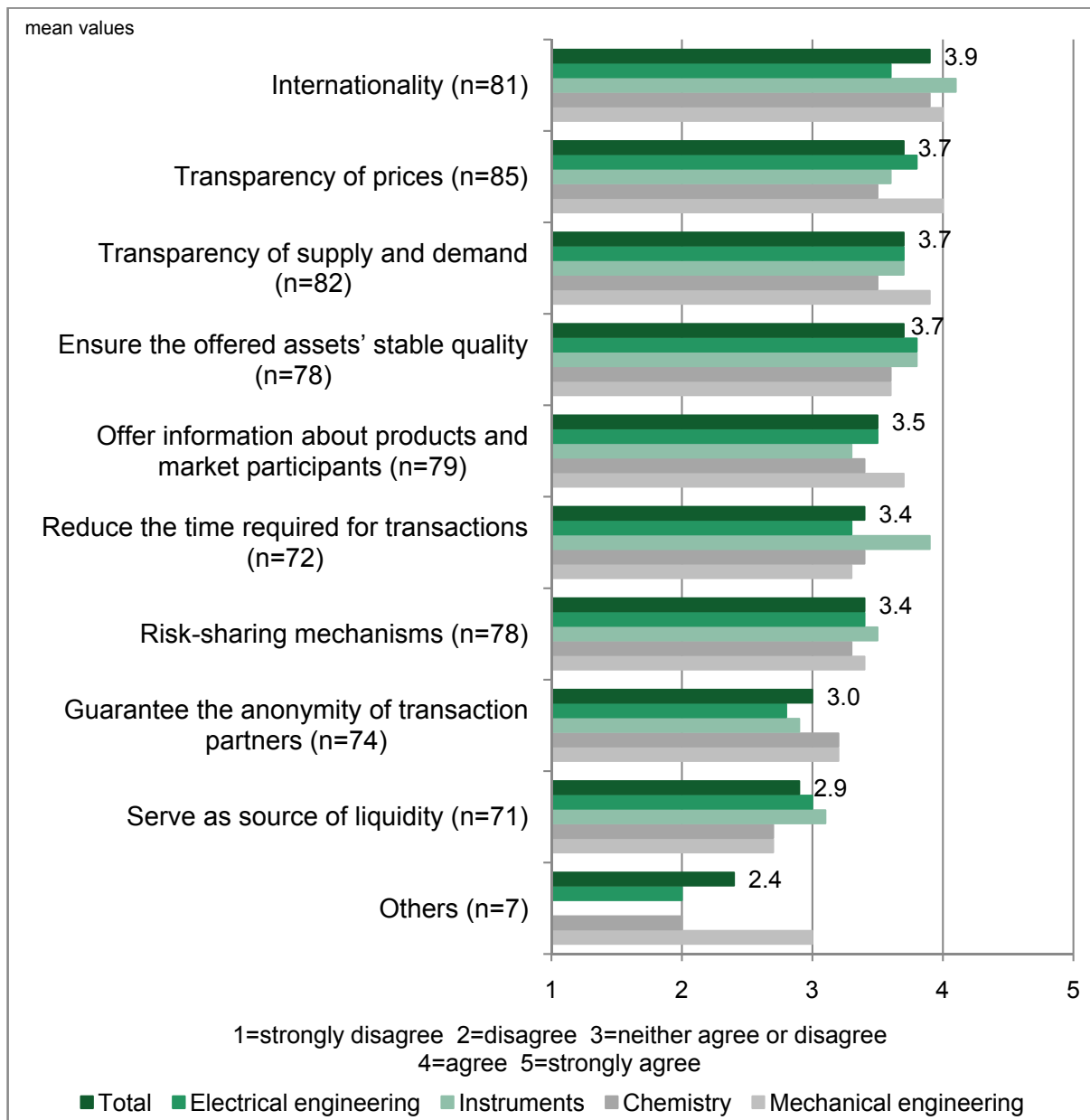
Source: Own illustration based on the quantitative survey.

Q27: Please specify your preferences for the region in which you would like to sell, purchase and license patents in future.

4.4.2 Market features and financial products

Finally, we asked the participants to identify required IPR Market features. Internationality was ranked first (see Figure 45). Our findings so far indicate that if firms engage in IPR transfer, they usually do so with a global perspective. Therefore, it can be concluded that a regulation that would restrict the market solely to Europe would not be attractive as a platform for the transfer of IPR. Transparency and quality were also determined as important market characteristics. The market needs to develop mechanisms that can determine prices fairly and make them accessible to all market participants.

Figure 45: Assessment of IPR financial market features.



Source: Own illustration based on the quantitative survey.

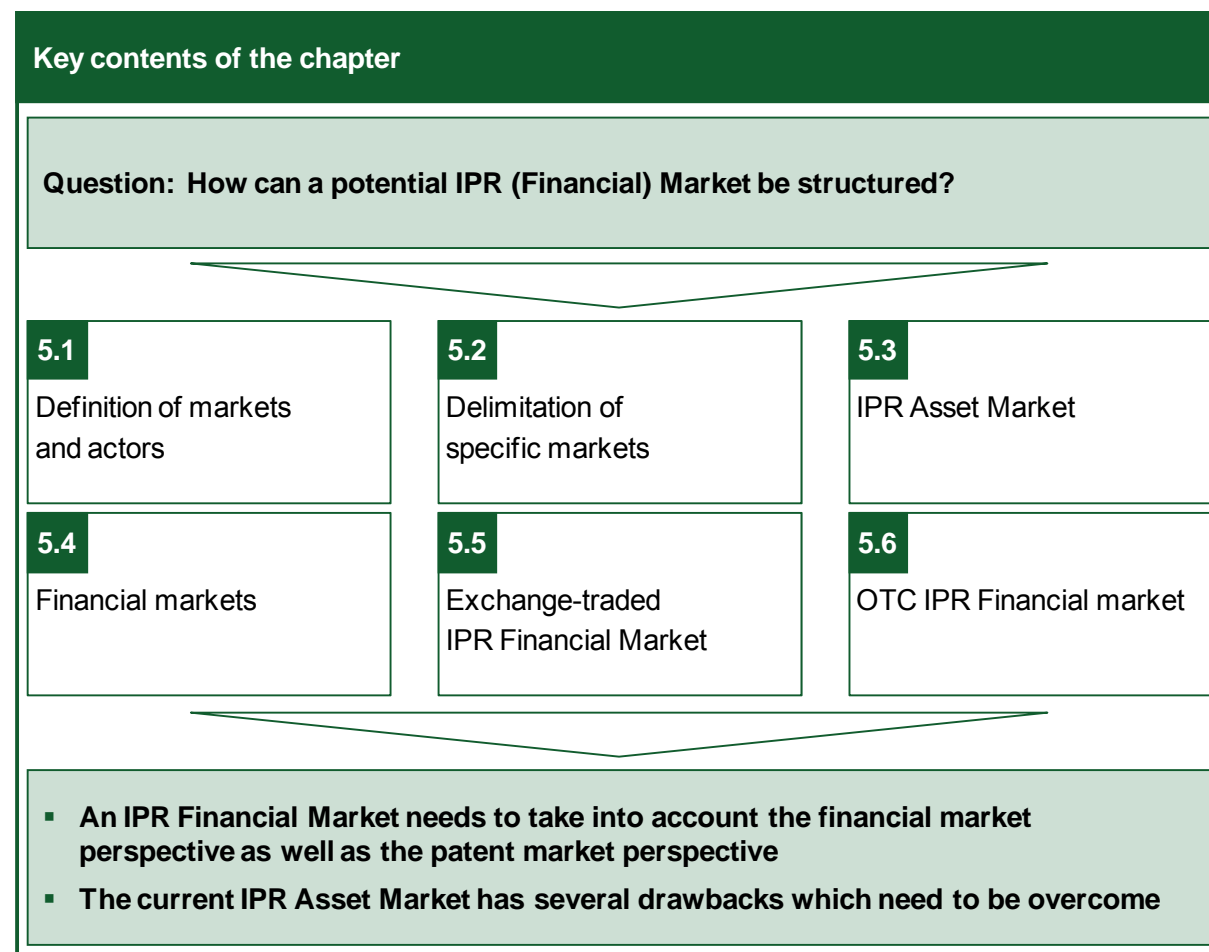
Q30: Please mention if the following features of the financial market for patents are relevant for a smooth functioning.

4.5 Main findings

Main findings of the chapter

- Characteristics of IPR as an asset for a European IPR market with a global scale
- The size of the IPR market is determined by:
 - Market depth
 - Liquidity
 - Efficient asset prices
 - Transaction costs
 - Market regulation and governance
- As a hub for technology trade, an IPR market could improve collaboration between actors in the field of innovation and therefore contribute to the competitiveness of the European economic area:
 - ✓ Central reference point for technology trade
 - ✗ Increased competition could pressurise SMEs and research institutions
- The IPR market offers the opportunity to access finance for innovation initiatives at all stages of maturation. The funding gap between innovation research and prototype developing could especially be improved
- Stronger integration of the private sector via the IPR market into the production of innovations may increase the efficiency and goal orientation of research efforts in Europe in terms of commercial applicability:
 - ✓ More funds available for innovation and a stronger applicability of research
 - ✗ Fewer funds for fundamental research
- Characterising patent portfolios, transactions, supply and demand
 - The survey participants were the top 1000 patent EPO applicants in 2010. No SME was among the top applicants
 - Applications at the EPO are mainly developed and traded in Europe
 - Firms engaging in patent trade engage on a global scale
 - The value of patents is strongly skewed. Only a small fraction of the patents in the respondents' portfolio are considered to have a high monetary value
 - Europe is considered an attractive region for IPR transactions in the present and in future
 - Asia is attractive and will be more attractive for IPR transactions in future
 - We found scepticism regarding cooperation with patent intermediaries like patent funds, patent pools or trading platforms
 - Increasing the firm's revenue is the most important goal for firms engaging in trading patents
 - Most of the technologies in a firm's portfolio are currently developed inside the firm

5 IPR Market structure and actors



5.1 Definition of markets and actors

This section defines the markets investigated in the study, derives specific characteristics of the IPR Market and proposes potential market structures for an IPR Financial Market.

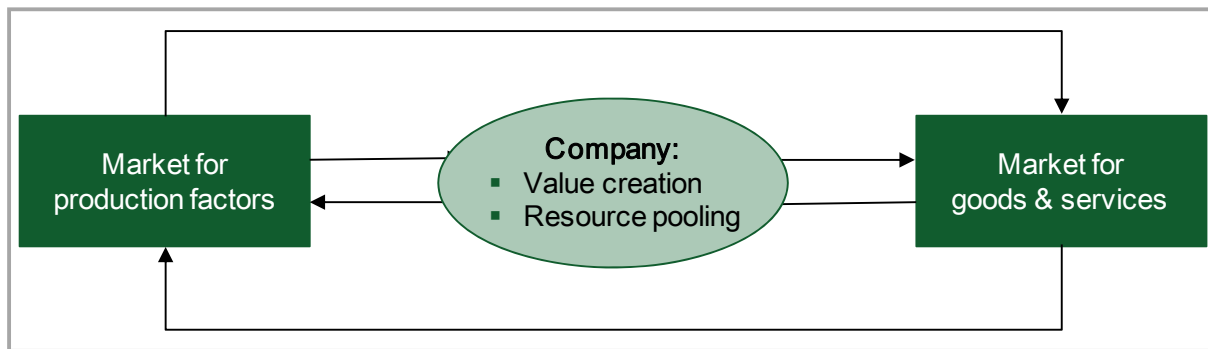
5.1.1 Market

Mankiw (2007) defines the market as any place where buyers and sellers of a particular good or service can meet and make a transaction possible. The buyer has to offer something in return, which is money.

This market can take many forms and types, ranging from highly organised to less organised markets. Moreover, the actors (buyers and sellers) differ from market form to market form (Mankiw, 2009). Depending on the market, there may be a third group of actors – intermediaries.

An example of the way in which markets function and connect is illustrated in Figure 46.

Figure 46: Overview of markets.



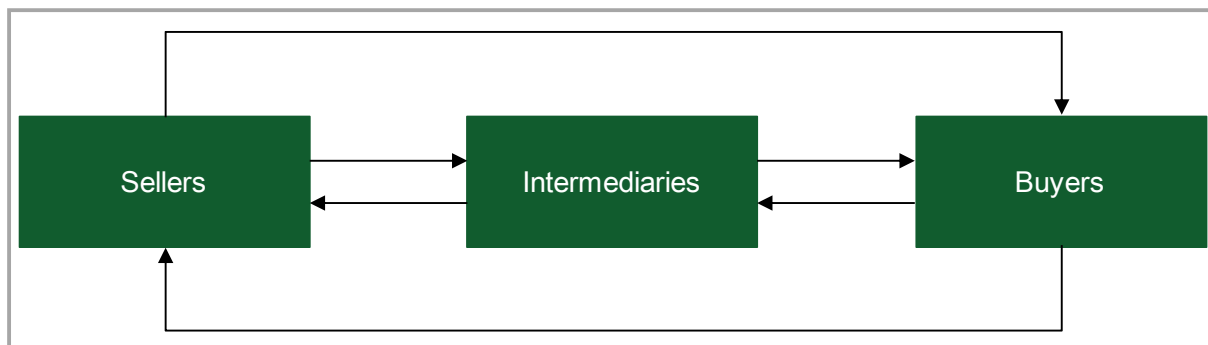
Source: Own illustration in accordance with Brealey (1996) and Mankiw (2007).

Companies need resources to create value. Therefore, they estimate their ideal combination of production factors and acquire these on the production factor markets. The pooling of production factors leads to value creation within the company. A company's final product is offered on the market for goods and services, which is a unique market.

5.1.2 Actors

Markets emerge through the interaction of parties called "actors". Market actors can be classified into three main groups: sellers, intermediaries and buyers (see Figure 47).

Figure 47: Classification of market actors



Source: Own Illustration.

Depending on the market form and type, different individuals and institutions take the role of sellers, buyers and intermediaries. In a financial market, for example, the seller might be a company obtaining a loan from a commercial bank (the intermediary), which securitises it to an institutional investor, the buyer.

5.2 Delimitation of specific markets

In this section, the financial market and the asset market are defined and delimited. The definition of an asset market is derived from the financial market definition in the literature.

5.2.1 Financial market

The definition of a financial asset is needed to define a financial market. Thereafter, we explain what a financial market is and the different forms it could take. In addition, we present the market actors in a financial market.

5.2.2 Financial assets

A financial asset is an intangible asset and may be called a financial instrument or financial product. These terms will be used interchangeably in this report. A typical characteristic of a financial instrument is that it makes a claim on future cash (Fabozzi, Modigliani & Ferri, 1994). This asset can take many forms, including loans, bonds and a company's common stock. For definitions, please see the Glossary section of the study.

According to Fabozzi, Modigliani and Ferri, financial assets have two main economic goals: "The first is to transfer funds from those who have surplus funds to invest to those who need funds to invest in tangible assets. The second economic function is to transfer funds in such a way as to redistribute the unavoidable risk associated with the cash flow generated by tangible assets among those seeking and those providing the funds" (1994).

One example is a company choosing not to finance itself solely with equity, but by issuing a bond on the capital market, where investors are willing to provide funds. From the company's perspective, these funds constitute a debt. The investor now holds the financial asset and has the right to claim future interest and principal payments. Another example is a company deciding on an initial public offering, through which it offers its common stock on the capital market and, thus, receives equity from investors.

5.2.3 Financial market and classifications

The market on which financial products are exchanged is called a financial market (Fabozzi, Modigliani & Ferri, 1994). Financial markets add three more functionalities to those of the asset market: determination of the product price, offering liquidity and reducing transaction costs. These functions will be explained in more detail in section 5.4.1.1.

The variety of financial assets implies that there must be different forms of financial markets on which different financial products are traded. Financial markets can be classified according to different criteria: the nature of the claim, the maturity of the claim, the seasoning of the claim, the immediate delivery or future delivery, and the organisational structure. Depending on the category, different types can be identified. In the scope of this study, we use the organisational structure categorisation, since the study is targeted towards an IPR Financial Market's potential structures. This categorisation includes the auction market, the

over-the-counter (OTC) market and the intermediated market (Fabozzi, Modigliani & Ferri, 1994). For a complete list see Figure 48.

Figure 48: Summary of classification of financial markets.

Summary of classification of financial markets

Classification by nature of claim

Debt market
Equity market

Classification by maturity of claim

Money market
Capital market

Classification by seasoning of claim

Primary market
Secondary market

Classification by immediate delivery or future delivery

Cash or spot market
Derivative market

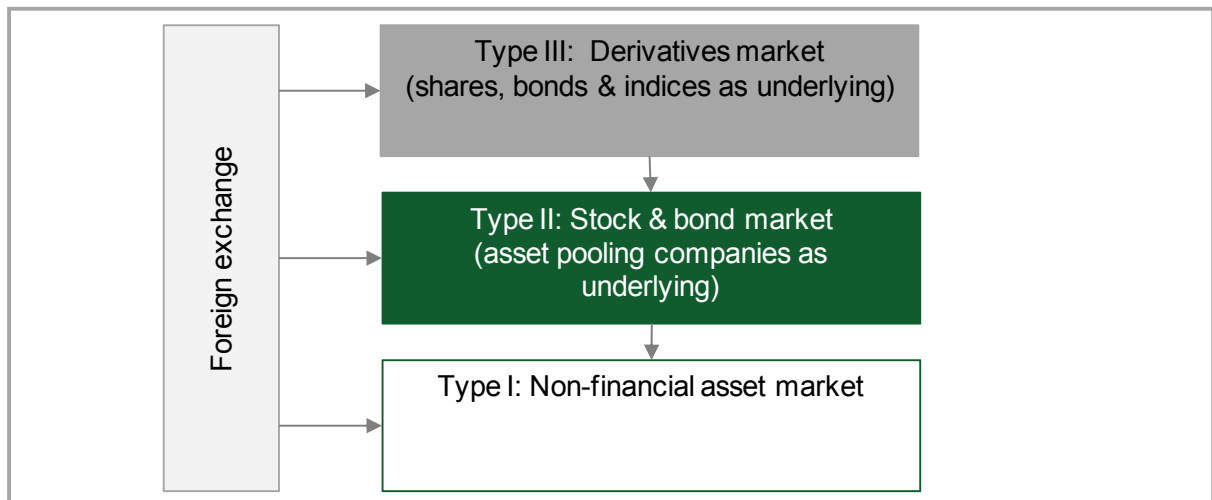
Classification by organizational structure

Auction market
Over-the-counter market
Intermediated market

Source: Own illustration in accordance with Fabozzi, Modigliani & Ferri, 1994.

The general relationship between asset markets and financial markets is shown in Figure 49.

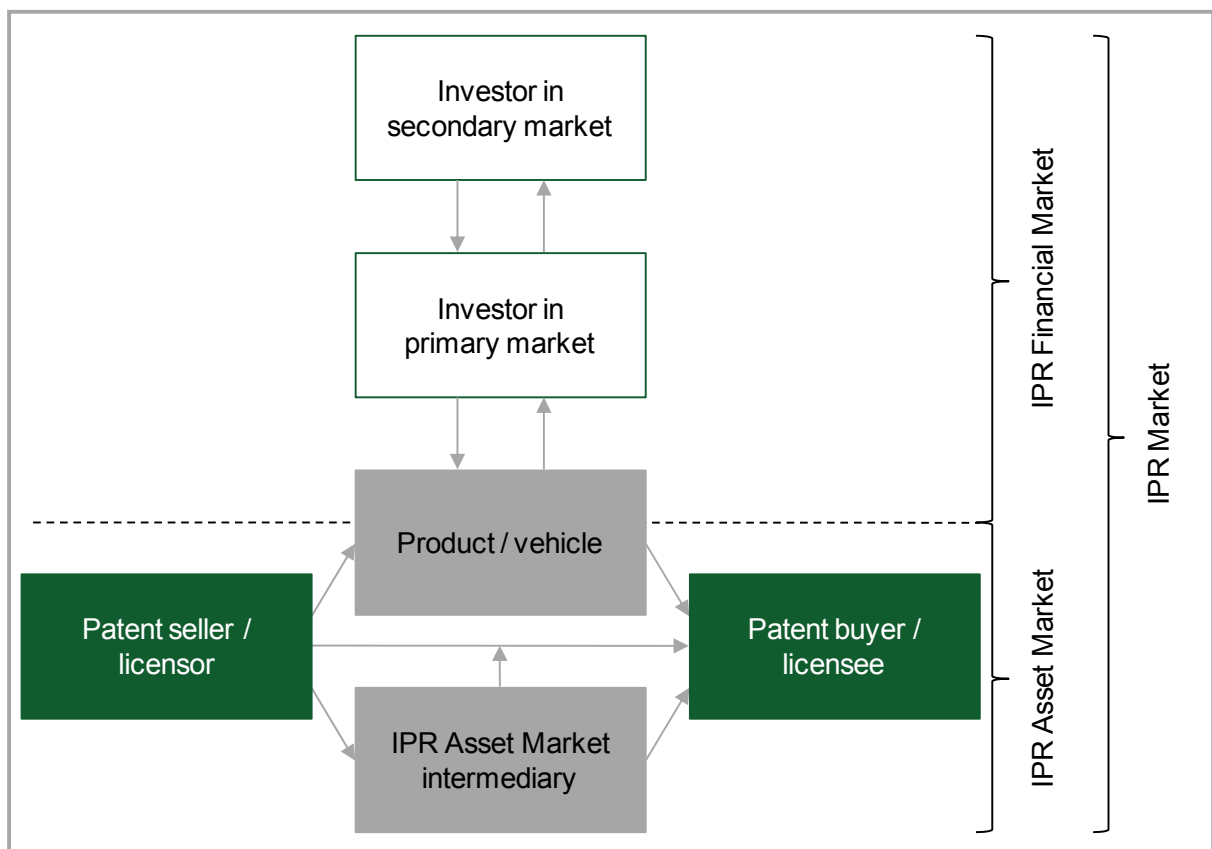
Figure 49: Market levels.



Source: Own illustration in accordance with Brealey (1996) and Mankiw (2007).

When applied to IPR, the connection is shown in Figure 50.

Figure 50: Indicative market structure.



Source: Own illustration.

5.2.4 Market actors

According to the general market actor framework explained in section 5.1 and displayed in Figure 47, there are three groups of market participants in the financial market. In the context of the financial market, sellers are called issuers, buyers are called investors and intermediaries are called financial intermediaries. Issuers and investors include "households, business entities (corporations and partnerships), national governments, national government agencies, state and local governments, and supranational bodies (such as the World Bank, the European Investment Bank, and the Asian Development Bank)" (Fabozzi, Modigliani, & Ferri, 1994). Financial intermediaries are, for example, "commercial banks, savings and loan associations, investment companies, insurance companies, and pension funds" (Fabozzi, Modigliani, & Ferri, 1994). Their role is to assure an inexpensive and sustained flow of funds between the issuers and investors. Financial intermediaries play key roles in today's modern economies, (Fabozzi, Modigliani, & Ferri, 1994).

5.3 IPR Asset Market

In the course of this study, the patent market is categorised into two market designs: the direct market and intermediated market. The former denotes the market where direct patent transactions occur, whereas the latter denotes a market involving intermediaries. The focus is on the intermediated market due to the increasing importance of patent intermediaries, as reflected in their steadily increasing numbers.

In the following sections, different actors are investigated in this market. Thereafter, three specific patent intermediaries are observed: auctions, patent funds and the IPXI. After the market examination, patents' properties are examined in order to extract additional implications of and guidelines for the way a potential IPR Financial Market and its products need to be designed to work with this particular kind of asset as an underlying asset class.

5.3.1 Intermediated market

Arai (2000) maintains that the existence of patent intermediaries shows that there is a market for patents: "The 500 or so patent brokers in the United States now have a decade of experience, and the United States is gradually developing a regular market in patents". Patent intermediaries can be many different types of individuals and organisations, for example, patent brokers, patent exchanges, patent aggregators, patent securitising entities, patent investment funds, and patent defence funds (Millien & Laurie, 2007). As mentioned by Arai (2000), these intermediaries would not exist without the existence of a market for patents. This raises the question of location, internationality and the concentration of the patent market. According to research conducted by Monk (2009), 72% of patent intermediaries are located in the United States. This is linked to the considerable size of the US technology market. He believes that the US regulatory and legal environments offer patent intermediaries an incentive. In addition, almost one-third of US patent intermediaries are located in Silicon Valley, which shows the correlation with the technology sector.

Furthermore, most of these patent intermediaries did not exist 10 years ago, implying that the market has experienced or is experiencing a growth phase.

If Europe is examined, we observe an international influence. According to the findings in chapter 4, there are numerous North American and Japanese patents, while the BRICS group of countries does not play an important role. The growth argument is further supported by a study conducted by the OECD, BMWI et al. (2005): "market intermediaries have become more numerous and diverse as demand for technology transfer and patent valuation have grown". They also state that the marketplace is currently in a probe-and-learn period with the number of intermediaries increasing. According to Tietze (2011), this gives rise to the new models that the intermediaries use. In addition to patent brokers and auctions, he mentions partnerships, technology pools, special purpose investment vehicles and publicly traded IPR indexes, as well as patent value funds as the new, emerging business models.

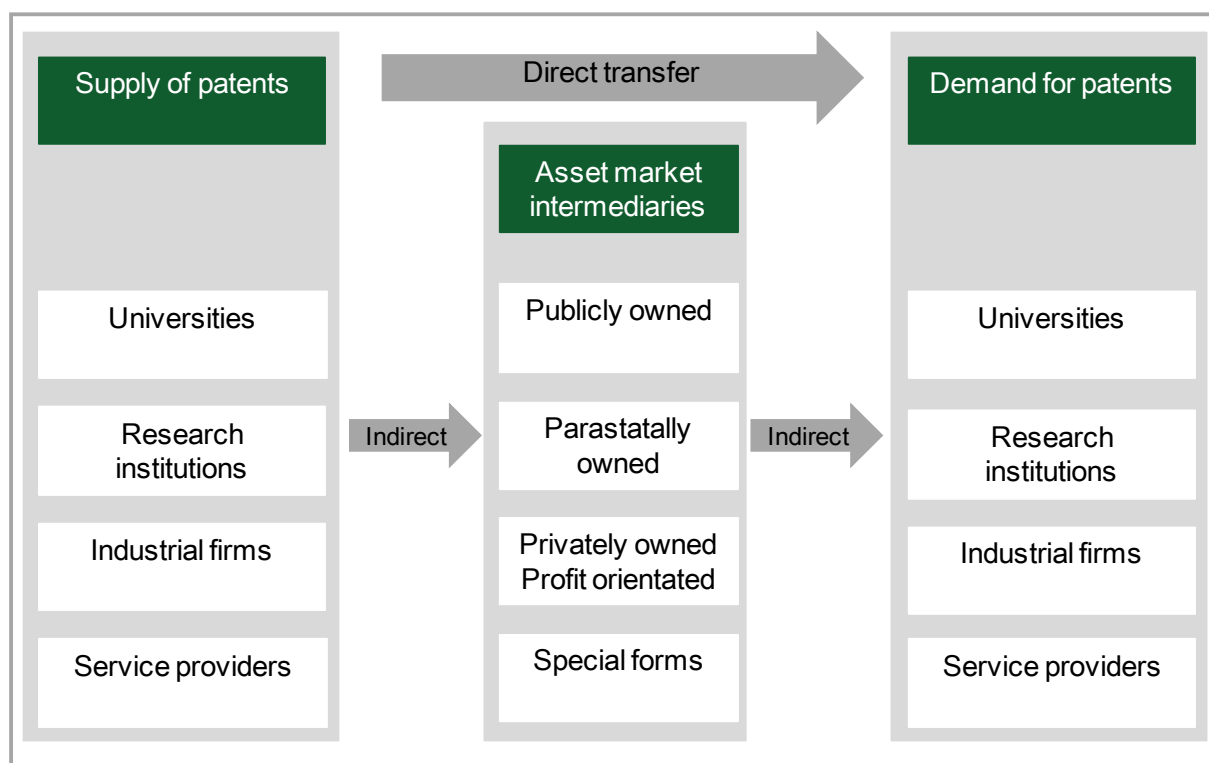
The main role of these market makers is to coordinate transactions (Spulber, 1996). An important aspect of this is to help buyer and seller determine a patent's value. As has been concluded in the quantitative survey (see chapter 4) and mentioned by Monk (2009), this is one of the main problems of the IPR Asset Market. Another important role is that through patent intermediaries, transaction partners can trade more anonymously than without their help.

In conclusion, it should be noted that there is evidence – the most prominent the existence and growing number of patent intermediaries – that there is already a market for patents. Evidence suggests that a large part of the US patent market involves middlemen (patent intermediaries). However, the European market seems less evolved, although the number of intermediaries may grow in future and Europe has the potential to become an attractive marketplace for IPR. Since patent intermediaries are expected to play an increasingly important role, the next subsection outlines the actors of this intermediated market, and provides examples of who they are.

5.3.1.1 Actors

The exchange or the transfer of patents takes places between certain actors. If the previous classification of actors (see) is taken into consideration, they can be allocated to three categories: sellers, buyers and intermediaries. In this context, the sellers supply patents, and the buyers demand patents. Intermediaries are responsible for the (indirect) transfer of the patents as illustrated in Figure 51.

Figure 51: Direct and indirect transfer of patents.



Source: Reinhard & Schmalholz (1996).

Sellers and buyers might be institutions like universities or other research institutions, private industrial companies and service providers. Intermediaries can be publicly, parastatally or privately owned entities, or might take on special forms. Following the findings from the quantitative survey (see chapter 4), sellers and buyers of patents in Europe are mostly large global corporations.

This transfer through intermediaries can be conducted through different contractual forms. Based on the literature review, the following major contractual forms have been distinguished: licensing agreements (exclusive and non-exclusive), the sale of patents, spin-offs/joint ventures with patent portfolios, and strategic alliances backed by patents (e.g., Escher, 2005; Fischer & Henkel, 2009; Ford, 1985; Granstrand, 2000; Mittag, 1985; Monk, 2009; Vickery, 1988; Berman, 2009).

The actual form of patent transfer depends on the company's or institution's objectives and on the extent to which it is willing to exploit its patents. Therefore, external exploitation of patents may be undertaken in combination with additional know-how or other intellectual assets (Marcy, 1979), or as a transfer of the bare legal right (McDonough III, 2006).

Technology market intermediaries are agents that fulfil a wide variety of tasks and functions in patent transfers between two or more partners (Howells, 2006). The literature is highly fragmented, and there is a large variety of terms for this type of agent. These agents are also called intermediary companies (Stankiewicz, 1995), bridgers (Bessant & Rush, 1995), brokers (Benassi & Di Minin, 2009; Hargadon & Sutton, 1997), or superstructure

organisations (Lynn, Mohan Reddy, & Aram, 1996). In the literature, technology market intermediaries are not limited to patent transfer, but are also associated with innovation processes or external technology exploitation projects. Morgan and Crawford (1996) state: "Technology broking is not a well-defined activity and the heterogeneous nature of the participants is a key characteristic of the industry."

Based on an extensive literature review, the following IPR Asset Market intermediaries can be identified¹¹.

IPR Asset Market intermediaries that foster IPR and technology transfer by merging supply and demand

The following types of intermediaries are directly involved in the transfer of patents. They are able to bridge one of the largest problems in patent transfers: merging supply and demand.

- *Licensing agents*: These intermediaries assist patent owners in finding licensees. They often function mainly as consultants and the patent owner remains involved in the process (e.g., Think Fire, IP Value)
- *Patent brokers*: These intermediaries assist patent owners in finding buyers rather than licensees. Often, they operate on both the buy-side and the sell-side. In sell-side brokerage engagements, the intermediaries are very involved in the process and take over a large part of the transaction process (e.g., Inflexion Point, iPotential, Ocean Tomo).
- *Live IPR auctions / online IPR auctions*: Auction houses provide a marketplace and a semi-standardised setting for the transaction of patents. While there are various auction formats, sellers can offer their patents according to a pre-determined set of conditions (e.g., ICAP Ocean Tomo, IP Auction GmbH).
- *Online IPR exchanges*: These intermediaries provide Web platforms and interfaces offering patents, technologies, and other IPR (analogue eBay) (e.g., Yet2.com, InnoCentive).
- *University technology transfer institutes*: The focus of these companies is the transfer of universities' patents and technology to companies. They therefore function as a licensing agent, patent broker, or as acquisition funds (e.g., Innovaro, ETH Transfer).
- *Incubators*: Incubators foster R&D activities by supporting new businesses in their early phases. This may result in joint research and the exchange of IPR.

¹¹ See, e.g., Allen & McCluskey, 1990; Becker & Gassmann, 2006; Benassi & Di Minin, 2009; Bittelmeyer, 2008; Bittelmeyer, Ehrhart, Mark, & Zimmermann, 2003; Czarnitzki, Licht, Rammer, & Spielkamp, 2001; Fischer & Henkel, 2009; Gassmann & Becker, 2006b; Hetzel, 2010; Jarosz, Heider, Coleman, Bieri, & Hess, 2010; Lichtenthaler & Ernst, 2008a, Lichtenthaler & Ernst, 2008b; Lipfert & Ostler, 2008; Malackowski, 2009; McDonough III, 2006; Millien & Laurie, 2008; Monk, 2009; Natusch, 2009; Niioka, 2006; Shrestha, 2010; Sneed & Johnson, 2009; Tietze, 2008; Yanagisawa & Guellec, 2009; Yurkerwich, 2008; Zaretzki & Richardson, 2009; Berman, 2009.

IPR Asset Market intermediaries that foster IPR and technology transfer by aggregating patent portfolios

The following types of intermediaries foster the transfer of patents because they are the main demanders in the market for patents and aggregate portfolios as a service. The facilitation of innovation could vary from case to case.

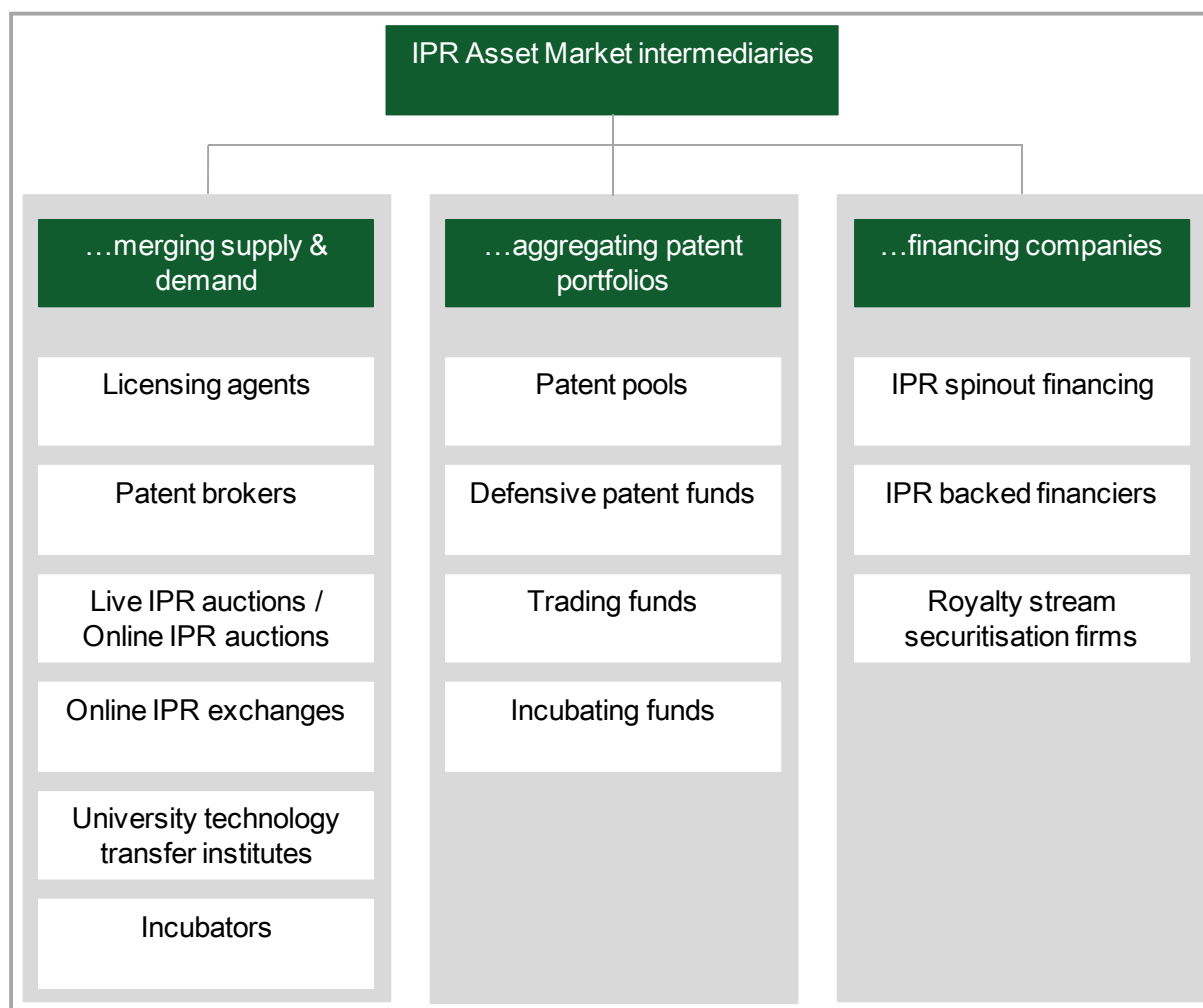
- *Patent pools*: These entities form portfolios which provide access to essential patents for certain standardised technology (e.g., MPEG, 3G licensing).
- *Defensive patent funds*: These entities acquire patents selectively for defensive reason. Their main motive is to clear the market before "patent trolls" can acquire problematic patents (e.g., RPX, Allied Security Trust).
- *Patent enforcement companies*: These companies own or acquire patents only to license them to (potential) infringers (e.g., Acacia, Alliacense).
- *Trading funds*: These entities buy patents, often from single inventors, only to trade them to larger companies (or potential infringers) (e.g., Alpha Patent Funds).
- *Incubating funds*: These intermediaries buy patents which cover early technologies. In the incubating phase, they invest in developing prototypes or business models. Backed by business models, the patents are then offered for sale (e.g., Patent Select of Deutsche Bank).

IPR Asset Market intermediaries that foster IPR and technology transfer by financing companies

The following types of intermediaries are not directly involved in the transfer of patents. However, by financing companies (often in addition to the traditional venture capital offered), they can foster innovation indirectly.

- *IPR spinout financing*: These entities are organised as venture capital or private equity companies, but they are specialised in spinning out promising non-core technologies (and patents) within larger companies (e.g., Blueprint Ventures, Analytic Capital).
- *IPR-backed financiers*: These entities (mainly) provide patent owners with debt financing. The security for a loan is the IPR asset. The loans either originate from the entities themselves, from banks, or from a network of specific investors (e.g., IPEG, Paradox Capital).
- *Royalty stream securitisation companies*: These intermediaries set up special purpose vehicles (SPV). Patent owners sell their patents to the SPV. The SPV is financed by investors, who in turn profit from the patents' expected future royalties (alset IP, Capital Royalty, Royalty Pharma).

Figure 52: IPR Asset Market intermediaries.



Source: Own illustration.

We conclude that the role of intermediaries in the patent market is highly important and that there is a large variety of different patent intermediaries (see Figure 52). However, the intermediated patent transfer market is still highly fragmented, and there is a very low level of organisation in this market. This leads to a lack of liquidity, transparency and pricing signals in the patent market. Hence, companies engage in bilateral agreements, slowing down the transaction speed and driving up costs. Additionally, there is no sharing of information or pooling of risk (Coster, 2011).

5.3.1.2 The role of non-practicing entities (NPEs)

A vital point in finding a description of a non-practicing entity is that they use patents which do not cover their own products to gain revenues from licensing (they do not practice their patents). On the one hand, NPEs take on an important role in the patent market: They need to continuously know and share the value of their patent portfolios to obtain money from their target companies. Furthermore, through their interactive nature – which means they have a strong demand for patents – they create liquidity in the market. Coster (2011) concludes: “In

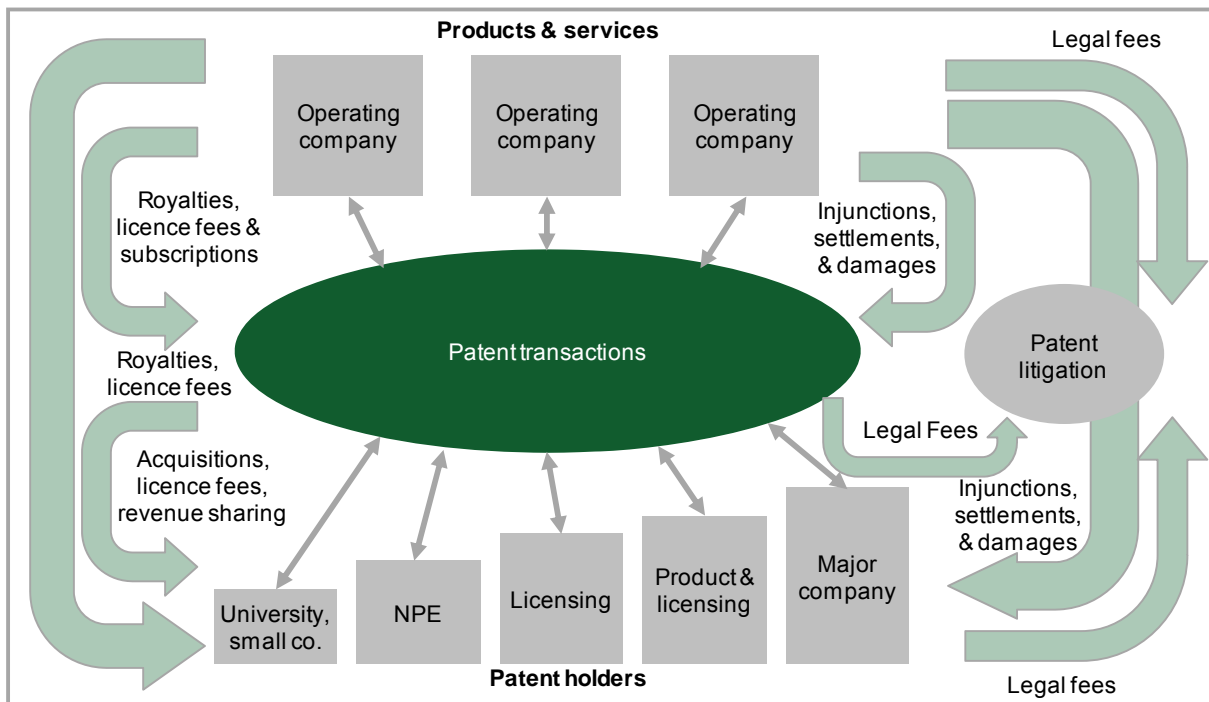
all cases, the patent aggregator is creating liquidity, transparency and providing price signals to all market participants. The patent aggregator is also reducing the probability of patent disputes going to litigation, which reduces litigation expense for all parties."

On the other hand, NPEs can be viewed in a rather negative light. As described in section 6.4.4, one main point of critique is that although their actions are legal and within the system, they do not exploit patents in the original meaning of the patent system (monopolising inventions for inventors and therefore securing rents from these innovations). In this context, they are called trolls, as pointed out by Reitzig et al. (2007): "Patent trolls (or sharks) are patent holding individuals or (often small) firms who trap R&D intensive manufacturers in patent infringement situations in order to receive damage awards for the illegitimate use of their technology".

In between these two extremes, the literature also offers more neutral descriptions. Magliocca (2007) states: "There is simply no way to subdivide NPE into 'good NPE's and 'bad NPE's. There is no judicially-manageable bright line between supposed 'patent trolls' and inventors who cannot practice their inventions because of resource limitations or managerial considerations". This discussion shows a variety of different viewpoints and opinions and is outlined in more detail in section 6.4.4.

In this section, NPEs are viewed solely from a market-based approach. From this view, they create liquidity, transparency and provide pricing signals, making the patent market more efficient.

Figure 53: Patent intermediaries may foster efficiency on the patent market.



Source: Own illustration in accordance with Coster (2011).

5.3.1.3 Ocean Tomo and ICAP Patent Brokerage

The first live auction was held in 2006 in San Francisco and was organised by Ocean Tomo (Malackowski, 2006). Ocean Tomo Transactions was merged thereafter and is now known as ICAP Patent Brokerage, a live auctioneer of IPR. On a nation-wide scale, they have held over 10 live auctions in the US with a total transaction volume of approx. 170 m. USD. The market actors are individual investors, SMEs, large companies, agencies, academic institutions, and investors (ICAP Patent Brokerage, 2011). ICAP Patent Brokerage's mission is defined as "the Auction platform creates a centre for IP liquidity and promotes transparency for a market in which none had historically existed" (ICAP Patent Brokerage, 2011).

The development of live auctions and the traded volume to date indicate that there is growing interest in the patent marketplace, as well as in patent live auctions. Tietze (2011) furthermore maintains that auction market designs increase transaction speeds in the patent market. However, he adds that certain transaction costs persist, the most costly being auctioning companies' commission fees. From his study results, Tietze (2011) concludes that "technologies are more likely to be auctioned if they are characterised by low complexity, high technology quality and technological impact." Furthermore, technologies for which sellers have medium to moderate value expectations have a higher probability of being auctioned. As far as sales prices go, "[t]he results show also that technologies reach higher sales prices if they have a higher technological complexity, higher technological impact and higher technology quality. The sales price appears also positively related to the value perception of the sellers" (Tietze, 2011).

5.3.1.4 Patent funds

Together with live auctions, patent funds are considered important patent intermediaries and contribute to the discussion of an example of a possible IPR Financial Market design.

Generally, investment risk may be diversified by adding additional asset classes, for example, patents. Examples of such investment opportunities are the patent funds aimed at exploiting patents by licensing, selling them to other companies, or litigation and, finally, letting the return flow back to investors (Buchtela, Egger, Herzog, & Arina, 2010). A distinction is made between various investment fund characteristics. A fund can be open (investors are allowed to join and leave the fund anytime they want) or closed (investors can only place money during a specific period). Furthermore, a fund can either be an asset pool or a blind pool. An asset pool determines its investments before investors subscribe. On the other hand, a blind pool defines its investments after the investors subscribe. Patent funds are usually closed funds (Buchtela, Egger, Herzog, & Arina, 2010). This constitutes a potential approach to establish a financial market for patents based on a traditional stock market design.

Public-private funds

In addition to these privately owned and shareholder-value-maximisation-orientated funds, there are publicly controlled types of patent funds, which are partly aligned with national and supranational political interests.

These funds may aim to hold a portfolio of rights on patents owned by institutions like universities and privately held companies. These rights would then be licensed to companies and SMEs. The return on the licensing would be paid to public and private research institutions (after recompensing the equity employed). Thus, their main goal is to enable institutions and national companies to exploit their patents more effectively and provide domestic companies and research institutions with a knowledge advantage. Furthermore, such an investment fund aims to help the knowledge-based economy grow faster, because research institutions and companies could then bring their inventions to market faster, allow patents to be organised by technological clusters, and would have better access to IPR. This is especially true for SMEs that may not have the means to acquire useful licences.

Actors would include IPR sellers:

- Potentially interested universities, schools of engineering, medical faculties, and public-sector research bodies, in association with their patent agents;
- Potentially interested innovative companies, particularly those working in innovation clusters, SMEs and mid-cap companies;
- The international market, particularly to complete technological clusters

and licensees:

- European companies that need licences in order to consolidate their innovation or guarantee their freedom to exploit it;
- Economies with which Europe cooperates and with which it has formed partnerships.

To summarise, such funds may accelerate the growth of the European knowledge-based economy, allow companies to have better access to IPR and additionally provide an incentive for research bodies and companies to invest more in R&D. However, efficiency arguments have to be considered due to these funds' non-profit-orientated structure and public sector influence.

Private patent funds

Besides the public-private option, several private patent funds have emerged. These funds have different business models and may therefore overlap with other intermediaries' business models. The SEEP.IP Fund Feasibility Study is a rich source of private patent fund approaches that allows a more detailed discussion.

- **Technology Development Funds:** They try to close the gap between inventions and the exploitation of IPR. These kinds of funds invest in the acquired IPR to

increase the market value (which is very similar to the idea of an IPR bank). Although this business model claims to have its focus on innovation, individual funds may overlap with the NPEs' business models:

- The Patentpool Trusts I and II (40 m EUR) invest in ground-breaking technologies and invest in the marketability of IPR;
- Intellectual Ventures established the Invention Development Fund I (1 bn. USD) and the Invention Investment Fund II (2.5 bn. USD) to buy, develop and monetise patents in various patent families;
- Patent Select I (24 m. EUR) and II (32 m. EUR) are Deutsche Bank products which invest 5% of their respective volume in the acquisition of patents. The main investments go into the monetising, exploitation and marketing of the acquired IPR (which does not necessarily imply innovative activities in respect of IPR).
- **Technology Trading Funds:** They try to achieve results by trading without further development of the acquired IPR:
 - Patent Invest 1 (20 m. EUR) – expert institutions like Fraunhofer IPA and Steinbeis TIB select 128 patents/patent portfolios from 10 000 potential candidates;
 - Alpha Funds 1 (32 m. EUR), 2 (49 m. EUR), and 3 (10 m. EUR) are Vevis products which monetise patents through complex financial constructs. The investments are made after a thorough and expensive selection process mainly conducted by Steinbeis companies.
- **Patent portfolio aggregators:** They can act as strategic protection vehicles to maintain the owners' freedom to operate; litigation-oriented business models are also present in this group:
 - Companies like Acacia, the Rembrandt Group, IP-Com (a company backed by the hedge fund Fortress) assemble patent portfolios that could be exploited like the technology trading funds mentioned above;
 - Altitude¹² invests up to 250 m. USD in portfolio companies that have valuable patents, trademarks/brands, copyrights, royalty streams, trade secrets, and other intangible assets. In contrast to other funds, they do not trade IPR as assets, but only IPR packaged into companies. The Ocean Tomo Capital Fund (200 m. EUR) has a similar business model;
 - Paradox has expertise in financing non-royalty and royalty-generating IPR by using a wide variety of credit structures, including loans and securitisations. Paradox Capital has established a 280 m. USD fund that provides financing for companies with strong patent, trademark, and copyright portfolios.

The authors of the SEEP.IP study are very sceptical about the availability of sufficient high-quality patents to fulfil the expectations of returns on the 300 m. EUR already invested in the

¹² <http://www.altitudecp.com/firm.html>

European market. This scepticism about the market volume of private patent funds is shared by the majority of our interview partners. However, the interview partners agree that private funds have a higher probability of success than public-private funds; hence, they seem to have a higher potential to increase IPR circulation in Europe.

Trading Patent Fund Shares

As current privately owned patent funds are closed-end structures, shares could, in principle, be traded continuously. For example, theoretically, closed real estate fund shares could be traded in the real estate market. They are not, however, because there is no secondary market (Schäfer & Conzen, 2005), implying that efficient trading of patent fund shares would only be possible if a platform were implemented where potential buyers and sellers could meet. This could either occur if the patent fund is quoted on a traditional stock exchange or an entirely new platform is built, which would be necessary if listing on a traditional stock exchange is not possible.

Listing patent fund shares and trading them on exchanges would mean that the patent fund has to inform its shareholders (as public companies do). Consequently, a publicly traded patent fund needs to be fully transparent in order to inform investors about its current state of business. In the case of a successful listing of patent funds, these transparency regulations have already been determined. If a new exchange platform were implemented, transparency rules would need to be determined.

However, legal hurdles need to be considered. One of the interviewed experts, a financial market specialist, stated that the listing of actively traded patent funds should be possible but he does not see this happening immediately. Consequently, before such a market design can be implemented, the legal details that a closed patent fund would have to fulfil in order to be traded on a stock exchange need to be examined.

5.3.1.5 The Intellectual Property Exchange International (IPXI)

Description

The IPXI is described as "the world's first financial exchange focused on IPR" (IPX International, 2011a). To date, it has not yet started trading but, according to our interview partners, it is expected to commence soon. Its objective is to provide licensors and potential licensees with the possibility of discovering their counterparties more efficiently and of increasing the market's transparency (IPX International, 2011a). Currently, a due diligence is required to trade a patent over the counter or to find a licensee, which can take up to 18 months (Gray, 2008). The exchange aims at a significant reduction in the time needed for businesses to acquire technologies. Today, prices are still negotiated on the basis of inconsistent valuation methods. Given that the IPXI model has been accepted by the market, market prices may be available for technology use and to eventually attract private and institutional investors who are able to actively trade technologies (IPX International, 2011e).

Functionality of the IPXI

The basic IPXI idea is the realisation of an efficient and transparent trading possibility to allow a certain technology’s use. According to Malackowski (2006), to make trade possible, it would be beneficial to use a unit licensing system. Not all companies using a protected technology are meant to pay a percentage of their sales as a licence fee, but should rather pay for the units they produce or sell (Malackowski, 2006). The patent-owning company can offer these units at an exchange and the potential licensees can buy them at the market price. This model also allows potential non-producing investors to trade these licence units. Believing in a technology would result in a buying decision with the hope of selling the units at a higher price at a later point in time. Even short positions would be possible (Malackowski, 2006).

ULR contracts

The IPXI was based on the carbon (CO2) emission

Figure 54: Example of different issue tranches of ULRs.

allowances trading scheme. The unit-based licences will be traded as standardised products – ULR contracts (IPX International, 2011g). The ULR contracts and the IPXI market platform could solve some concerns regarding the traditional licensing system, such as the valuation, the difficult search for a potential licensee, uncertainty about the patent validity and the high costs of negotiation and auditing (which are going to be outsourced to the IPXI). Even a “third

SAMPLE UNIT LICENSE RIGHT CONTRACT SPECIFICATION	
USP X,XXX,137 A/B/C	
General Description: USP X,XXX,137 A/B/C Valve Seat Insert	
Patent(s):	USP X,XXX,137 and continuations, continuations-in-part and foreign counterparts
Field of Use:	All
Restrictions:	All secondary sales through IPXI
Issuer Right to Use:	Yes including all subsidiaries
Unit Basis:	Each ULR contract covers one automotive or light truck engine
Total Offered Qty:	50 million license units offered in 10 unit lots
Term of License:	Until consumed
Opening:	Dutch Auction (50% minimum quantity & price)
Encumbrances:	Third Party License(s)
IPXI Price Banding:	+/- 20%
Amnesty:	Full
Tranches	
U137A: 10 million ULR contracts	\$0.50 per unit
U137B: 10 million ULR contracts	\$0.75 per unit
U137C: 30 million ULR contracts	\$1.00 per unit
Follow-on Offerings Through Term (2017)	
50 million ULR contracts each	Deemed Market Price

ANTICIPATED RESALE MARKETS			
ULR contracts are anticipated to develop a secondary market with price discovery through the IPXI Bulletin Board, supported by third party liquidity providers. Illustrative data follows:			
USP X,XXX,137 A/B/C			
Expiration: 12/31/17			
PRIMARY MARKET DATA			
Tranche	Authorized	Issued	Consumed
U137A	10,000,000	10,000,000	6,888,658
U137B	10,000,000	2,500,000	–
U137C	30,000,000	–	–
Follow-on (each)	50,000,000	–	–
SECONDARY MARKET DATA			
Tranche	Bid	Ask	% Inventory Held by Institutional Users
U137A	\$0.625	\$0.630	28%
U137B	\$0.750	\$0.750	0%
U137C	–	–	–
Follow-on (each)	–	–	–

Source: IPX International (2011g).

party enforcement funding” is being considered, which would additionally minimise the patent enforcement costs (McClure, 2011). The IPXI concept standardises patent trading processes and makes them more transparent for the relevant parties. Furthermore, it would allow small market players to defend their patents against big market players (IPX International, 2011d). McClure (2011) argues that “increased transparency and market pricing will cause [an] increased buyer confidence, increasing demand and thereby [will] facilitate adoption of [a] technology [which] reproduces more demand causing ULR contract purchasers to return to the marketplace”.

According to the IPXI's homepage and based on the information from interviews, the process of issuing a tranche of ULR contracts will work as follows: Firstly, when a patent owner decides to have licences traded on the IPXI, a special purpose vehicle (SPV) will be created: The patent owner (IPR sponsor) licenses his patent exclusively to the SPV. Thereafter, the SPV will evaluate the patented technology and offer a certain amount of licence units (ULR contracts) at a certain price per unit on the primary market at the exchange platform and in several tranches. The initial offering price will be determined by a Dutch auction (McClure, 2011). The asking price will be lowered until a minimum amount of ULR contracts can be sold to the bidders. Follow-up tranches will only be granted if a high percentage of the first tranche is sold and the technology is mostly consumed by producing companies. Each tranche will have a higher price than the one before (see Figure 54). 80% of the received payments will flow back to the patent owner. The SPV will basically operate as a broker and try to sell the units to other companies (or investors) on the market platform (IPX International, 2011c).

According to one interview partner, there are three basic requirements for a patent to be listed as ULRs. The first requirement is that the patent owner has to be "willing to license [the patent] on a non exclusive basis". Secondly, the technology the patent protects needs to be "unitised", which means that there has to be some sort of unit that can be linked to a product or a measurable output. Furthermore, the "consumption of these units must be easily monitored". Thirdly, the expected size of the demand for the technology has to reach a certain level: On the one hand, there is a need for a minimum expected volume of 10 million USD ULR contracts in revenue and the number of technology users "must be significant to assure an active trading".

IPQ score

The parent company of IPXI, Ocean Tomo, has developed a patent ratings system, which, as mentioned by one interview partner, will be used besides "many other tools" at the exchange to determine the offering price of one ULR contract and for the evaluation of the patent quality.

The score is determined as follows: Each patent starts with an average score of 100. More than 50 relevant variables such as "number [and] length [...] of patent claims" and the history of the inventor or "patent prosecution history" are analysed and valued (Ocean Tomo, 2011b). In the end, a patent has a score of more than 100 if it has an above average economic benefit potential. The score will be around 100 if it is average and below 100 if it has a below average potential. The following rating is based on the score each patent receives during the valuation process. A patent is given an A+ rating if it belongs to the top 5% and a C- rating if its score is part of the worst 5%. A patent with an average score is given a B rating (Ocean Tomo, 2011b).

Trading Unit License Rights

The SPV's primary sales to licensees will not be the only possibility for ULR contracts to change owner. The ULR contracts could also be traded on a secondary market by investors who hope to profit from rising (or falling) prices, or by companies that bought too many (or too few) units (Malackowski, 2006). Given sufficient liquidity and volume for active trading in ULR contracts, the IPXI would work like the stock market. The big difference is that it will not be the expectations regarding a company's future success that will determine the market price. The expected future demand for technology licences will drive the IPXI price. The stronger the demand is compared to the supply, the higher the price will be.

Trading Derivatives

Assuming sufficient liquidity in ULR contracts, the IPXI model allows for the creation of derivatives. A ULR contract could be used as an underlying for an option or a future contract. Since derivatives need a functioning underlying market; the evolution of such a derivative market is expected to take time until the market for ULR contracts has built liquidity.

Main Actors

IPXI: The IPXI funds itself in the following way: According to the IPXI's (2011c) proposed structure, it will hold a part of the licence payments (20%) received during the primary market sales back to cover its expenses. Furthermore, there will be an annual membership fee of 5 000 USD for IPR sponsors and buyers. Additionally, the IPXI will charge the IPR sponsors a listing fee of 100 000 USD.

Patent owner (IP Sponsor): Since there are many different motivations to hold a patent, there are many different reasons to use or not to use the platform. As described in chapter 4, there are different "motives to patent", leading to the conclusion that all patent owners have to evaluate if offering their technology on the IPXI fits their strategy.

It is essential that the patent owners are differentiated, firstly, according to their motives but also according to their organisation. For example, the reaction of big companies with thousands of patents, like those of Sony, will differ from that of small and medium-sized companies, start-ups or NPEs. In contrast to large corporations, small companies often do not have the resources to find potential licensees. Consequently, outsourcing the search for licences seems to be more attractive to small companies. Nevertheless, the IPXI may benefit from attracting big players in order to launch the platform. However, one expert mentioned that producing companies could have concerns about the IPXI business model. He emphasised that producing companies are not interested in having speculators on the market due to the market price reactions this could cause.

Technology users (companies or licensees): The IPXI argues that URL buyers could benefit from the fairly priced unit prices, the lower prices if they adopt a technology early, the anonymity of the buyers, the standardised contracts, which decrease the due diligence costs, the right to resell with the possibility of making a profit and from the possibility to request the IPXI's enforcement committee to accuse non-buying companies (IPX International, 2011d).

In addition, they expect technology users to buy voluntarily since “purchasing ULR contracts will be viewed as an efficient risk management tool against patent infringement” (IPX International, 2011d). Furthermore, they expect technology users would want to avoid the negative consequences, such as the loss of reputation, of being sued (IPX International, 2011d; IPX International, 2011e). One of interviewed experts explained that for pricing to function properly, every company buying ULRs would have to be obligated to supply information about their production volume.

Investors: There are two different classes of investors that could participate on the IPXI. One group comprises institutional investors, like investment banks, hedge funds or pension funds. They have several advantages over the second class – private investors. Firstly, they can establish expert teams to systematically evaluate patented technologies. Secondly, they can take higher risks, because they can diversify better. Thirdly, the annual membership fee would not truly hurt them. An interview partner mentions that having private investors involved in the IPXI is only a realistic future scenario when the IPXI has proven to be a stable, efficiently operating market and the fees for single market participants have decreased. Another possibility is that private investors could gain access to the IPXI secondary market, using a bank as a financial intermediary.

Potential challenges

This section explains the potential challenges relating to the IPXI. For general challenges related to a potential IPR Financial Market in Europe, please see chapter 6.

The first challenge is that the market could lack liquidity. Liquidity is primarily due to technology users (licensees) buying ULRs on the primary market and trading them on the secondary market. If they do not use this new opportunity, possibly because they do not fear the negative consequences of being caught using a protected technology, other investors will not participate in the secondary market. Therefore, an efficient market screening system is needed. The producing companies must have a concrete incentive and financial advantage to buy voluntarily. It could therefore be considered dangerous to build the IPXI model on the assumption that producing companies’ normative orientation is sufficient to drive them to buy voluntarily. McClure (2011) points out that the IPXI management is aware of this challenge and that they are already considering several market monitoring possibilities.

Secondly, assuming the potential licensees do buy, it would be more a sale from an eternal source than a trade if the offered unit tranches are too large compared to the actual demand for units and nobody would “invest” in the technology; it would be “consumed” by the licensees. If the offered unit tranches are too small, prices would rocket, satisfying investors, but the technology users would feel cheated because speculative traders would exclude them from the market. Therefore, the quantity of units offered by the IPXI is crucial. Thirdly, as mentioned by Malackowski (2006), technology users and investors could be tempted not to buy the ULR contracts if not enough information is provided on the patented technology. While producing companies have the resources to fully understand a technology, investors may not. When a patent is licensed bilaterally, due diligence takes a great deal of time (Gray,

2008). Although all the information about a patent might be available on the IPXI, the technology users may not buy before evaluating if it is indeed necessary. Investors may generally not have the resources to evaluate the quality of a patent, therefore potentially only betting on the market reactions. Institutional investors would thus be forced to establish teams of experts, or to work together with patent intermediaries, to trade technologies professionally.

5.3.2 Properties of patents

This section focuses on the patent and its relevant properties if it is viewed as an asset class. Unlike tangible assets, patents can be viewed as assets containing knowledge. The following section will analyse important patent attributes with respect to their implications in a business context. More precisely, we discuss the properties of knowledge as a patent subject as well as the uncertainty concept.

5.3.2.1 Knowledge

Patents confer the right to exclusively use certain knowledge. Knowledge possesses certain attributes which distinguish it from tangible concepts. Winter (1987) classifies different types of knowledge. The most important distinction here relates to "tacit" rather than "articulable" property. It may not be possible to reproduce a certain piece of information graphically or in the form of words, making it tacit. In addition, knowledge possesses varying degrees of context dependence. Both attributes have implications for the suitability of patents as an asset class.

Tacit knowledge

Polanyi (1966/1983) states that individuals may find it difficult to articulate certain parts of their knowledge, making it "tacit". Arora, Fosfuri and Gambardella (2001) add that making knowledge more articulable is a question of profitability since the required documentation comes at a cost.

One of the interviewed experts mentioned that tacit knowledge can similarly affect patents. Firstly, certain knowledge may not be sufficiently articulable to be patented. Patents are created on the basis of clear, unambiguous documentation. If the new knowledge cannot be presented in this form, it is impossible to grant exclusive rights to its use.

Secondly, tacit knowledge can make the transfer of patents more difficult (e.g., if the costs involved in making knowledge more articulable is too high). For example, an inventing firm may decide to sell a patented technology it has developed over many years. The buying company initiates the purchase because it wants to profit from the same fall in production costs that the selling party has experienced. After obtaining the patent and introducing the innovation, however, the cost savings are only a fraction of those realised at the inventing firm. It emerges that in order to make full use of the technology, background information from various other areas, as well as operational routines, is required (see, e.g., Gassmann & Becker, 2006a). Since the patent file does not include such extensive information, the

purchasing company does not realise all the expected benefits. To mitigate this loss, it would have to employ specialists from the inventing company to teach the knowledge that cannot be articulated, thereby incurring further costs. Teece (1998) argues along similar lines, stating that the more difficult it is to codify information, the higher the transfer costs. In summary, the presence of tacit knowledge can make patents less transferable, even if the ability to patent a technology is not primarily affected.

Context dependence

The restrictions placed on patents by tacit knowledge are closely linked to knowledge's context dependence attribute. This relates to the usefulness and value of information varying according to the respective situation. Therefore, adaptation may be required (Arora et al., 2001). Context dependence implies that knowledge needs to be adapted to be valuable for the receiver (e.g., when transferring of a technology from one industry to another); therefore, the value of patents depends on the context in which they are used.

5.3.2.2 Uncertainty

Another attribute of patents influencing their suitability as an asset class is uncertainty. According to Knight (1921/1941), uncertainty is understood as a type of risk which does not follow assessable probability distributions; therefore it is difficult to calculate. Under conditions of uncertainty, managing a business becomes increasingly difficult. With respect to patents, Ewing (2010) identifies their validity and commercial relevance as important factors. The question of validity relates to the intrinsic value of a patent, while the ability to commercialise is linked to the generation of cash flows, i.e. the future value.

Validity and intrinsic value

An estimate of a patent's intrinsic value is linked to its validity in two respects. Firstly, the exclusive right must be valid from a legal perspective. Realistically, however, this does not ensure that all patents are legally protected over their entire lifetime. Article 21 of the German Patent Act, for example, lists several conditions under which exclusive rights can be revoked. Therefore, a patent's legal validity is by no means guaranteed, even during the lifetime of protection intended by law. This view is confirmed by one of the interviewed experts, who pointed out that a patent may be nullified in a court. The consequence is the potential of considerable uncertainty, making a reasonable value estimate difficult.

Besides legal constraints, patents need to be valid from a technological point of view. The conditions required by law should ensure that an invention is initially new and not part of existing knowledge. However, technology is subject to constant change and improvement. Consequently, a legally valid patent may become obsolete when the underlying knowledge is replaced by more advanced innovation. Jarboe and Furrow (2008) point to the area of competition, stating that technology constituting a firm's core competency could become useless in the face of innovative competitors. While a patent may still successfully protect a certain invention from a legal point of view, it could lose its applications due to innovative change. In this case, the uncertainty derives from the questionable technological usefulness,

which again emphasises that patented knowledge is difficult to value. In summary, the intrinsic value of patents is highly dependent on their legal and technological validity.

Ability to commercialise and future value

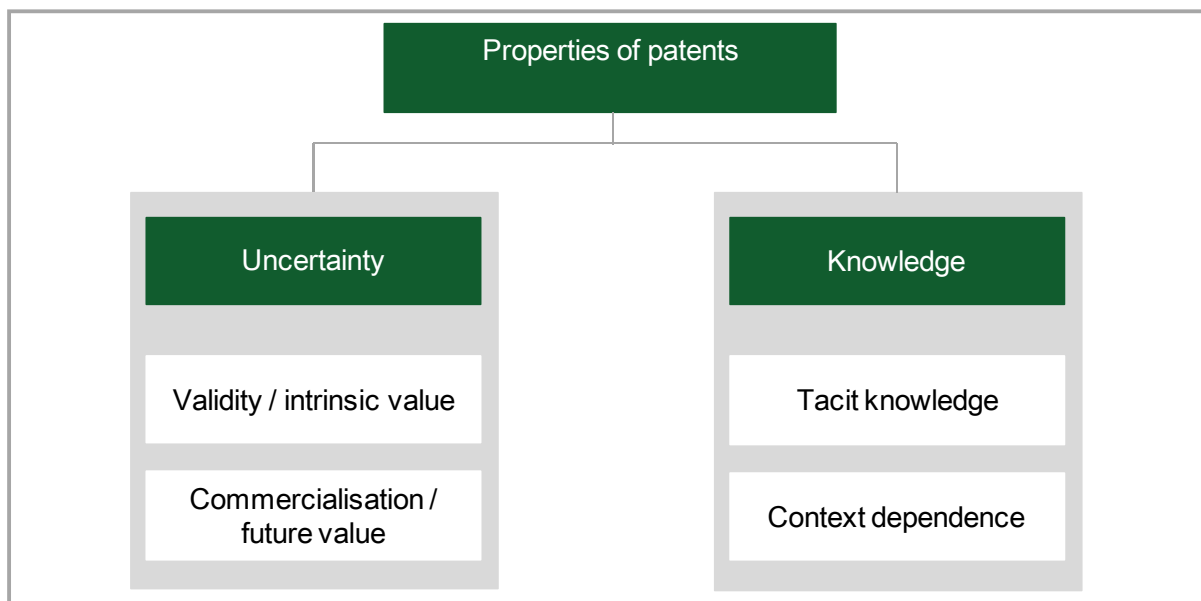
While the above section discusses factors which can fundamentally affect the value, the following analysis investigates the ability to generate cash flow generation if a patent is legally protected and technologically up-to-date. The issue of profitability is widely recognised in the literature. Kami Yama, Sheehan and Martinez (2006) conclude that the majority of patents in corporate ownership do not contribute to revenue. One of the interviewed experts stated that about 95% of all technology rights do not have economic value. These insights show that a valid patent does not automatically generate cash flows for a company. Successful commercialisation depends on whether it can be used to offer marketable products or services, either for the firm itself or a licensee, a restriction that one of our interview partners also pointed out. With regard to patents, this ability can be difficult to predict due to the complex technological environment and changing consumer preferences. Even in the absence of validity issues, the value of patents is thus difficult to estimate.

This effect is increased by patents continuously incurring expense, even if unused. This is partly because the costs of granted patents rise during a patent's life, the underlying reason being that the opportunity costs of unused patents increase (Gassmann & Bader, 2011). The legal fees alone place a considerable financial burden on patent owners, even if the technology in question is not used (Bader, 2006). In this respect, patents differ considerably from other assets such as bonds or stock; the latter generate income even if they are idle. Cash flows from patents must furthermore be used to first recover the maintenance costs before contributing to profits.

In addition, the influx of cash is not guaranteed but requires active management. A company must first decide to file a patent and decide between the alternatives of in-house use or licensing agreements with the aim of ensuring the overall profitability of the patent portfolio. Consequently, additional costs are generated in terms of management and controlling if cash flows are to be realised, which add to the legal fees outlined above. The overall expenditure decreases the future value of patents, which is already affected by the fast-changing and volatile nature of profits. To summarise, the questionable validity and commercial success of patents lead to uncertainty, meaning that both their intrinsic as well as future values are subject to high variability.

To conclude, four issues associated with patents in a business context have been identified (see Figure 55). The first two stem from patents constituting the right to exclusively use certain knowledge. Consequently, they are affected by tacit knowledge and context dependence. Furthermore, questionable validity and ambiguity concerning the commercialisation of patents contribute to uncertainty, which extends to their intrinsic and future value. These attributes are the second reference point for identifying the requirements for financial products based on patents.

Figure 55: Properties of patents.



Source: Own illustration.

5.3.3 Implications of an IPR Financial Market

Concluding section 5.3, the implications from the analysis can be extracted in order to use them as guidelines when developing potential market designs for an IPR Financial Market. Clearly, there are some indications that an IPR Market already exists and that it is growing. This is supported by the growing number of intermediaries and emerging models. Chesbrough (2006) underscores this argument by saying “that a small number of intermediary firms have arisen in recent years to assist in the process of identification, negotiation and transfer of patents from one firm to another.”

Nevertheless, at the moment, the market for patents is not very liquid and also lacks transparency. This leads to an inefficient market, most of whose transactions are bilateral with high transaction costs and slow transactions speeds. The participating companies thus lack pricing signals. Together with the absence of historical price trends and the inability to compare pricing with other transactions, these issues ultimately lead to all companies or institutions perceiving the value of a patent differently (Coster, 2011). Coster (2011) concludes by stating that “the patent market is therefore largely adversarial and this leads to agency conflicts and inhibits free flow of information often to the detriment of both the patent owner and the potential licensee”.

This indicates that when considering an IPR Financial Market in Europe, financial products and market designs that do not require a high level of liquidity are expected to emerge first. Furthermore, there is a relatively low level of homogeneity in patents, which arises from their tacit knowledge and context dependence. Every patent is unique and not interchangeable. In addition, the market lacks a generally accepted patent valuation method. This is also underscored by the findings from the quantitative survey (see chapter 4) that there are

uncertainties regarding patent value and quality, and that these factors influence the IPR market negatively. Therefore, we can conclude that the three following main implications or properties of the current patent market are important when building a financial market:

- Low liquidity
- Low homogeneity
- Value uncertainty

5.4 Financial markets

In this section, examples of different financial market designs, which are based on evaluation criteria derived from the IPR Asset Market section, are examined, allowing for the extraction of success factors. Today's three main organisational structures (auction market, intermediated market and over-the-counter market) will also be examined.

5.4.1 Evaluation criteria

The evaluation criteria are structured into two subsections. Firstly, the criteria for financial markets are presented. This is followed by a discussion of the criteria for financial products.

5.4.1.1 Financial markets

Financial markets fulfil three different economic functions: determining the product price, offering liquidity and reduction transaction costs.

Price discovery process

The product price is determined by the interaction of the financial market actors. Generally, the product price corresponds to the required return on a financial asset. This is an important function, since it determines how the funds in an economy are allocated among financial assets. Therefore, this function is also called the price discovery process (Fabozzi, Modigliani & Ferri, 1994).

Liquidity

Although frequently cited as a requirement of a functioning market, both Lippman and McCall (1986), as well as Fabozzi and Modigliani (1996), state that the concept of liquidity is not conclusively defined. O'Hara (2003), for example, states that liquidity constitutes a situation in which supply matches demand, i.e. in which buyers and sellers come together with complementary aims. Black (1971), with yet another focus, defines the term via small bid-ask spreads – the difference between the highest buy and the lowest sell offer. All of these approaches allow a valuable insight, but only represent part of the entire concept. For investors, the focus is on being able to sell an asset whenever they wish to without having to accept significant discounts on the price.

The extensive trade of financial instruments only takes place when these instruments can be exchanged with a certain ease. Amihud and Mendelson (1991) list several costs associated with illiquid markets which inhibit trade. Therefore, liquidity and the existence of secondary

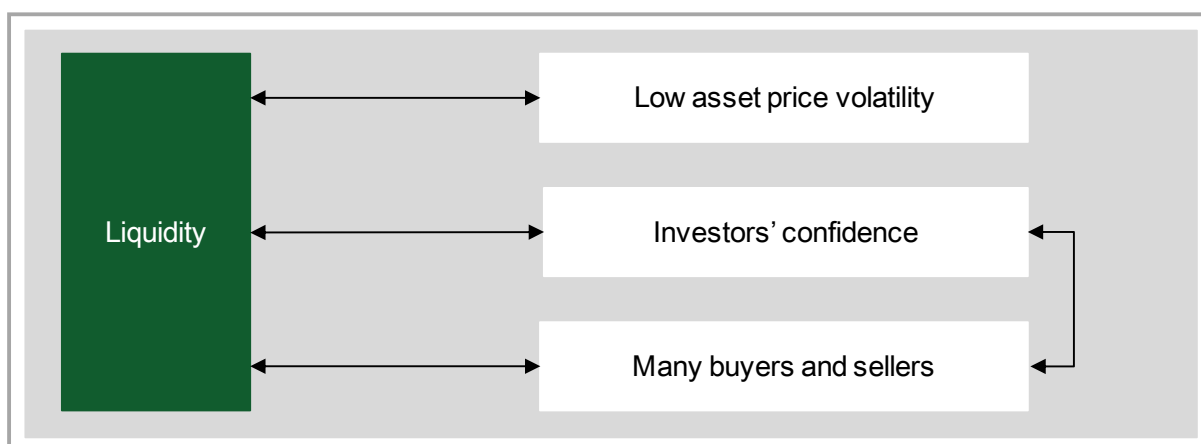
markets are closely related; on the one hand, if assets can be traded easily, a market is likely to develop. On the other hand, an existing market structure can facilitate the exchange of instruments. Consequently, liquidity and secondary markets foster as well as require each other. The advantages of secondary markets are, however, only valid if they are liquid.

Identifying the factors contributing to liquidity is complicated by the circularity of cause and effect (State Street Corporation, 2008). As with the existence of secondary markets, determinants simultaneously cause and are caused by liquidity. This caveat needs to be kept in mind when liquidity has to be created, as the first determinant illustrates: A large number of buyers and sellers make a market more liquid. Empirically, Benston and Hagerman (1974) find an inverse relationship between the number of shareholders and dealers and bid-ask spreads. Chordia, Roll and Subrahmanyam (2000) confirm the correlation between high trading volume and small bid-ask spreads in respect of individual stock as well as the market. In general, a large number of buyers and sellers are therefore associated with liquidity. In turn, however, a liquid market also provides an incentive for actors to enter (O'Hara, 1995). This circularity has an important implication: If liquidity is to be increased by inducing actors to enter the market, this can be achieved either by providing incentives other than liquidity or, paradoxically, increasing liquidity through another determinant than the one just presented.

The same principle applies to investor confidence – a determinant related to the number of buyers and sellers (State Street Corporation, 2008). If investors believe in the functioning of a market, they will be inclined to participate in trading. Consequently, the number of market participants rises, contributing to liquidity. Equally, a liquid market enhances smooth transactions and will thus strengthen the investors' confidence in the market. Again, in order to start the process, either liquidity or investor confidence can serve as a trigger.

As a final determinant, the volatility of asset prices has a negative influence on liquidity. Brunnermeier and Pedersen (2009) present a model which explains this relationship. Chordia, Sarkar and Subrahmanyam (2005) empirically confirm the finding, identifying a positive correlation between volatility and bid-ask spreads in both the stock and the bond market. Although Chordia, Roll and Subrahmanyam's (2001) results suggest otherwise on the market level, they acknowledge that individual stocks' volatility is clearly associated with larger bid-ask spreads. On the whole, research points to higher volatility affecting an asset's liquidity adversely. Again, there is evidence of causal circularity, meaning that an illiquid market entails more volatile returns (Chordia, Sarkar & Subrahmanyam, 2005).

Figure 56: Determinants of liquidity.



Source: Own illustration.

In summary, the number of buyers and sellers, investor confidence and volatility determine the liquidity in a market (see Figure 56). Conversely, each of these factors is influenced by liquidity. While the circular relationship means that the determinant factors will improve as liquidity increases, it is clear that the latter will not develop in response to one determinant when inhibited by the others. While the above analysis has important implications, liquidity is not the only attribute required for a functioning market. Transaction costs play an equally important role and are thus discussed in the next section.

Transaction costs

Prior to a more detailed analysis, it should be noted that transaction costs are closely linked to liquidity. Various publications, such as the State Street Corporation (2008), consider the low costs of transacting a defining characteristic of liquid markets. De Haan et al.'s (2009) definition, which describes transaction costs as the effort required in terms of time and money to complete a transaction, presents a similar picture. This clearly links to the definition of the liquidity concept as the ease with which an asset can be exchanged. Transaction costs can thus be viewed as another determinant of liquidity. Nevertheless, their importance and scope justify a separate analysis. As mentioned by Lüdecke (1996), besides liquidity, transaction costs are the most important criterion for actors to assess the quality of a market. Furthermore, numerous factors with potentially adverse effects on trade fall under the transaction cost category.

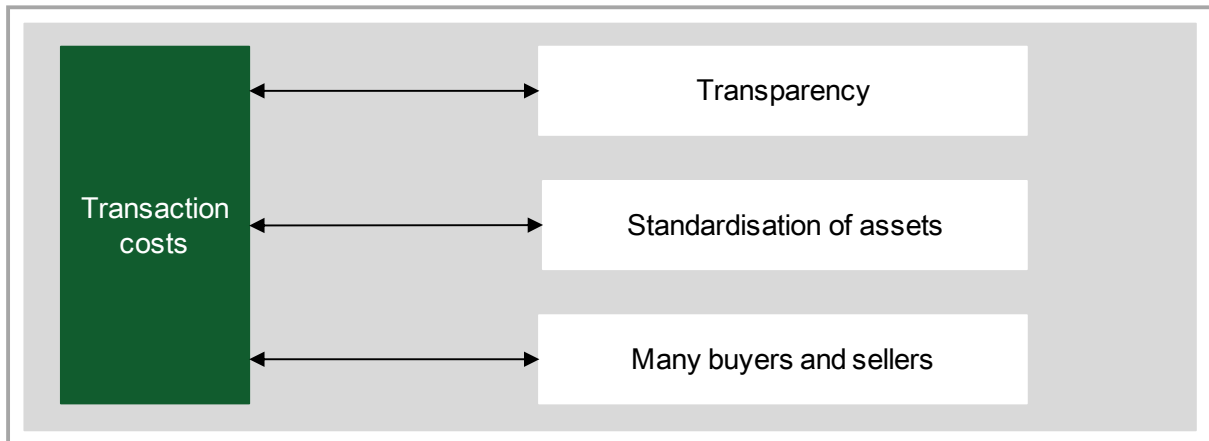
The transaction cost concept goes back to Coase (1960), who mentions that market participants need to find a counterpart and acquire information about the terms and the traded asset. The parties then have to come to an agreement that is mutually accepted. Dahlman (1979) classifies the different costs involved as “search and information costs” and “bargaining and decision costs”. Since low transaction costs are essential for the functioning of a market, the following analysis focuses on how the above cost categories can be minimised.

Transparency plays an important role in terms of finding a counterpart and the necessary information. If the participants, conditions and assets traded in a transaction are disclosed, actors can form an idea of the prevalent market conditions. They know whom to approach when trying to buy or sell an instrument and gain a rough understanding of the prices paid, and can assess different products and their exchange conditions. Extensive analyses prior to an agreement or even an offer become obsolete. By ensuring transparency in a market, search and information costs can therefore be reduced (Pagano & Röell, 1996).

The bargaining and decision costs category concerns the effort required to come to an agreement. Again, transparency can help to create a “standard of best practice” adhered to in the market. This would abolish the need to change the way an agreement is closed with each new counterpart, allowing more efficient, and therefore less costly bargaining. Williamson (1985) points out that the specificity of traded assets is another important determinant. He argues that transaction costs are higher for assets which can be used for fewer purposes, i.e. these assets are confined to a specific function. Instruments with unique features mean that the market participants must spend considerable effort analysing the subject of a transaction each time they engage in trade, leading to high bargaining costs. In order to counter this effect, it is necessary to achieve a certain degree of standardisation (Williamson, 1985). Through this, the process of bargaining is simplified and the costs involved can be reduced.

Nowadays, the ability to trade almost without bargaining is usually itself associated with costs in financial markets. Actors such as dealers and brokers enable markets, which require minimal effort in terms of coming to an agreement, but charge for their services. Fabozzi and Modigliani (1996) identify several such costs, for example, brokerage fees. While actors are not readily influenced by the design of financial instruments, the authors point to the frequency of transactions as another determinant. Williamson (1985) argues that in the case of high trade volumes, the costs of introducing the market-making institutions mentioned above can be spread out over a larger number of trades, reducing each transaction’s share. Since many buyers and sellers increase the frequency of trades, they are another determinant of bargaining costs.

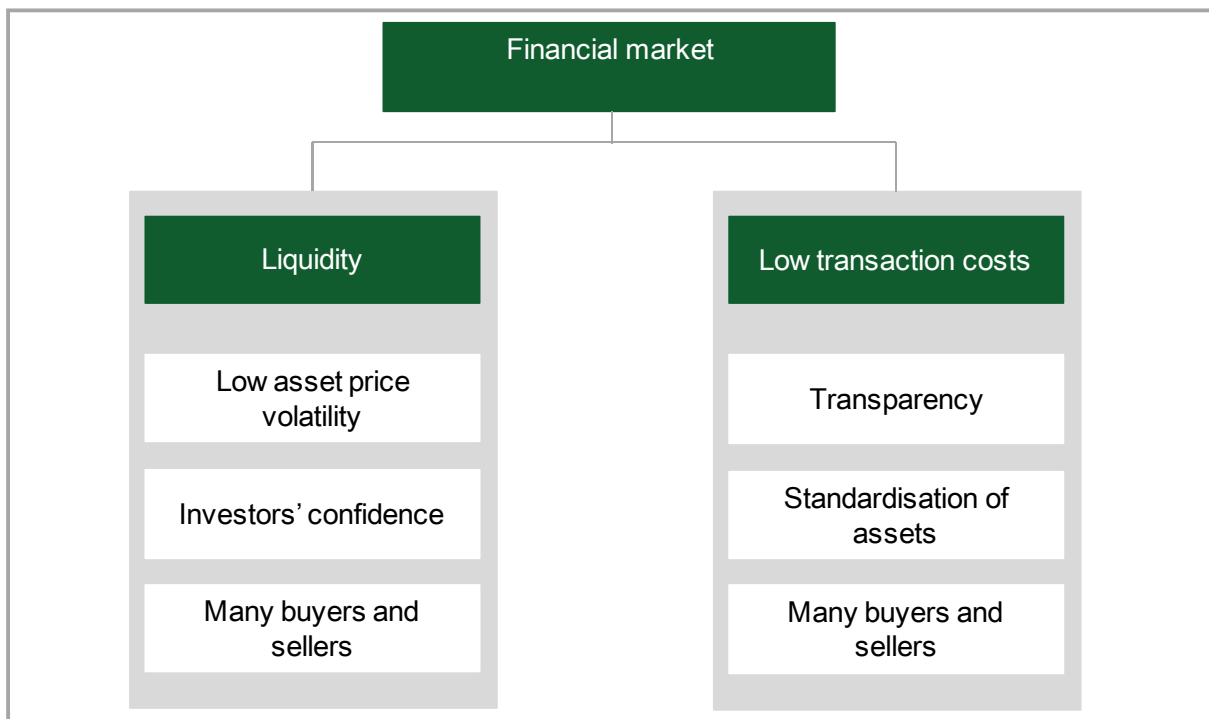
Figure 57: Determinants of transaction costs.



Source: Own illustration

In conclusion, we only select two of the three functions as evaluation criteria. The first function, the price discovery process, is not suitable as a criterion since it is more a consequence of the two other functions. Hence, liquidity and the reduction of the transaction costs are used as evaluation criteria for the different market designs (see Figure 58). These two evaluation criteria will be complemented by the four evaluation criteria for financial products, which will be outlined in section 5.4.1.2.

Figure 58: Financial market evaluation criteria.



Source: Own Illustration.

5.4.1.2 Financial products

After having defined the evaluation criteria for financial markets, the evaluation criteria for financial products are presented. Although the above-mentioned criteria ultimately depend on the financial products, the literature suggests additional criteria for financial products. The identified criteria are homogeneity, simplicity, and the predictability of cash flows, which are explained in more detail below.

Homogeneity

Homogeneity means that financial products of a certain class have the same properties. There are no differences in their principal structure. Large corporations' common stock, for example, is usually considered a homogeneous asset class (Spremann & Gantenbein, 2005). Clearly, shares differ in terms of the issuing company, dividend payments, denomination, voting rights, etc. However, they adhere to the same rules and share their basic features with the whole class. They are easily interchangeable, therefore homogeneous. One interviewed expert touched upon the attribute of homogeneity, mentioning that the aim is to convert instruments into commodities. While desirable, it should be noted that interchangeability is not invariably linked to a certain class of financial instruments. It can, however, be influenced to a degree, for example, through pooling (Saunders & Cornett, 2009).

As a first advantage, this means that financial instruments are standardised. Homogeneity addresses this issue by ensuring that financial instruments are interchangeable and do not exhibit significantly different attributes. Investors do not have to sacrifice substantial time and effort to assess a product. This reduces the overall transaction costs and contributes to the quality of a market.

Simplicity

Shen (2009) emphasises that "The design of [the financial product] should be chosen carefully to make [it] easy to understand and trade". The simpler a financial product is, the better is its appeal to the potential market participants. In such a case, the investors' demands increase and, as a consequence, so does market liquidity. In addition, Garnaut (2008) points out that financial products should have simple and common characteristics to be accepted by potential market participants. This is further underscored by one interview partner's statement that actors "need to know what they are investing in". Another interviewed expert similarly mentioned that investors have to be informed about the structure of financial instruments.

Predictability of cash flows

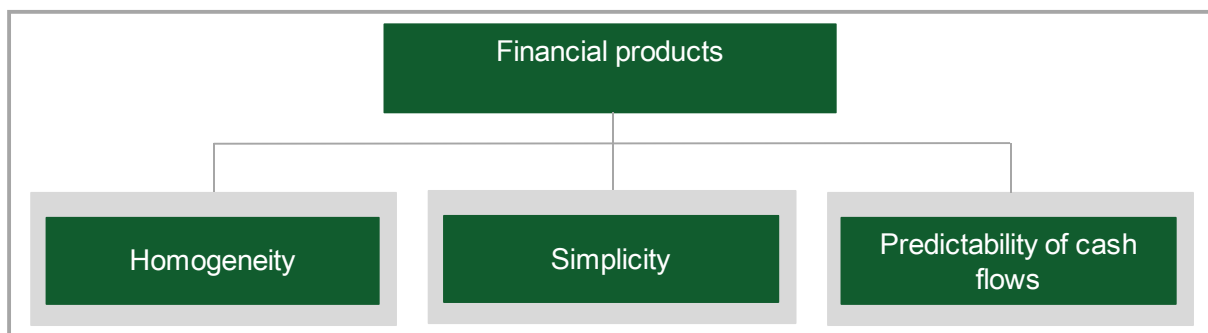
Cash flow predictability means that the cash flows generated by a financial product should follow a certain pattern, which can be assessed beforehand. The requirement is the product design level's response to the demand that efficient markets must entail a certain degree of predictability, as one interview partner stated. This also reflects his opinion that investors, to some extent, rely on returns and valuation. It is important to note that cash flow predictability

does not exclude returns contingent on events. It merely demands that the relationship between the cause and the resulting cash flow is clearly defined. The element to be avoided is a seemingly arbitrary variation in returns.

This concept can help to reduce the volatility in an instrument’s price. The valuation of financial products is usually based on discounted future cash flows. In this context, arbitrary returns that are difficult to assess make it more likely that market participants will be surprised by market developments. Consequently, their estimates of what an instrument is really worth are abruptly revised, causing high fluctuations in the asset’s price. If, on the other hand, returns follow a reasonably predictable pattern, investors’ expectations do not experience such sudden shocks. Although cash flows may vary, they do so for at least theoretically predictable reasons. The fundamental estimate of a financial instrument’s value is therefore adapted, but generally subject to less volatility. This concept can be considered one of the reasons for companies tending to maintain stable dividend payments even when doing so requires additional outside financing. A predictable cash flow structure could mitigate volatility, contributing to a more liquid market.

In summary, the homogeneity, simplicity and predictability of cash flows serve as evaluation criteria for financial products (see Figure 59) and, consequently, for the assessment of financial markets, which we present in the following section.

Figure 59: Financial product evaluation criteria.



Source: Own Illustration.

5.4.2 Organisational structure

In the following, today's three major financial market classes are presented: the auction market, the intermediated market and the over-the-counter (OTC) market. Each sub section explains what the specific class of financial market is and presents at least one example of such a market. These markets are analysed according to the evaluation criteria derived in the previous sections.

5.4.2.1 Auction market

Description

As the name suggests, in markets organised according to the auction principle, the transaction price is determined by an auction. The underlying goal is to approximate an auction which perfectly matches demand and supply. To achieve this, a market clearing price is obtained by aggregating market supply and demand. The auction market is also called an order-driven market. Unlike a quote-driven market (see section 5.4.2.2), this type of market does not require intermediaries (Bosch, 2001).

One can further subdivide the auction market into a continuous auction market and a call action market. The difference between the two is that, in a continuous auction market, prices are continuously determined throughout the day. In a call market, orders are grouped together and then executed simultaneously; for example, a call market could have three auctions in one day.

Examples

Figure 60: The New York Stock Exchange.



Source: NYSE (2011).

The New York Stock Exchange (NYSE) is (according to 2010 figures) the world's largest stock exchange in terms of equity capitalisation (World Federation of Exchanges, 2010). Currently, it is quoted as NYSE Euronext, after the 2007 merger between the NYSE Group, Inc. and Euronext N.V. It describes itself as "the world's leading and most liquid exchange group" (NYSE, 2011). NYSE Euronext has equity and derivative markets in the US and Europe, providing a variety of financial products such as cash equities, futures, options, fixed-income and exchange-traded products (New York Stock Exchange, 2011).

The NYSE is a continuous auction market, which means that it is order-driven. Additionally, there are specialists (market makers) who enhance liquidity through their market making activity. These actors are complemented by other floor traders, who call markets at the open and close, and dealers providing proprietary capital to enhance block transactions. The NYSE is therefore a hybrid market. This hybrid functionality is underscored by it opening and closing with a call auction (Jones & Fabozzi, 2008).

Evaluation

Homogeneity, simplicity, and predictability of cash flows

As outlined, the products traded on the NYSE show common and basic characteristics. Cash equities, futures, options and fixed-income instruments have existed for decades. All of these

products are standardised, meaning there is a high level of homogeneity. Furthermore, all of these products are simple and easy to understand. Where cash flows are given, they are relatively predictable. Stocks have dividend payments; like bonds, fixed-income instruments have interest rates and principal payments. In conclusion, all three criteria are strongly fulfilled.

Liquidity and transaction costs

The given high investor confidence drives many investors to participate in the NYSE. This ensures liquidity and low transaction costs because it is very easy for sellers to identify buyers (and vice versa), and they do not lose time and money searching for a suitable deal.

5.4.2.2 Intermediated market

Description

In this market, intermediaries, called market makers, play a pivotal role. They continuously quote, ask and bid prices for the financial asset. The spread between the bid and the ask price is called the bid-ask spread. This implies that all other market participants need these intermediaries to execute transactions, and the prices are solely determined by the market makers. The advantage lies in this increasing liquidity, since market makers always buy at the quoted prices, which means that sellers and buyers do not need to look for a transaction partner themselves. This market type is also known as a quote-driven market (Bosch, 2001).

Examples

Figure 61: The London Stock Exchange.



Source: London Stock Exchange (2011).

The London Stock Exchange (LSE), founded in 1801, is – in terms of domestic equity market capitalisation and according to 2010 figures – Europe’s largest stock exchange. The LSE offers various domestic trading services, SETS, SETSqx and SEAQ, as well as international trading services like the International Order Book, the European Quoting Service, and the European Trade Reporting. Through the great variety of the services offered, the LSE has elements of an auction market, an intermediated market and a hybrid market with elements of the previous two. The SETS and SETSqx are hybrid markets, whereas the SEAQ is a quote-driven platform (London Stock Exchange, 2011a). The so-called Stock Exchange Automated Quotation System (SEAQ) is a “non-electronically executable quotation service that allows market makers to quote prices in AIM (Alternative Investment Markets) securities” (London Stock Exchange, 2011b). It is especially designed for smaller, growing companies with a small market capitalisation that cannot be listed in SETS and SETSqx (London Stock Exchange, 2011c). The SEAQ screens the different bid and ask quotes from the market makers, as well as other information (e.g., volumes). This provides transparency in the

market place. Market makers are not allowed to deal with one another on the SEAQ. Furthermore, there are some rules and regulations concerning the SEAQ, for example, that market makers must make two-way quotes for at least 5,000 shares of alpha stocks and 1,000 shares of beta stocks.

Evaluation

Homogeneity, simplicity, and predictability of cash flows

Since bonds and stocks have already been discussed regarding these properties (see the section on the NYSE), we conclude that the products offer a high level of homogeneity, are simple and have predictable cash flows.

Liquidity and transaction costs

The quote-driven system leads to very high liquidity and low transaction costs. Since there are always market makers who are ready to buy or sell at a certain price, this ensures high market liquidity, even if there are not many market participants. This liquidity reduces the transaction costs, because sellers and buyers do not have to look for transaction partners – there are always market makers who are ready to buy or sell. However, the market participants must agree with the markets makers' quoted prices, or no transactions will be conducted.

5.4.2.3 Over-the-counter market

Description

"The OTC is a decentralized, electronically linked market that comprises thousands of geographically dispersed, competitive dealer and member firms that are linked together by telephones and computer screens" (Schwartz, 1993). The term "over-the-counter" has its origins in the era when physical shares were traded over-the-counter in banks. Although the current financial OTC market is technically supported, the term over-the-counter has remained for all trading other than on an exchange (Schwartz, 1993). One of the major advantages of the OTC market for non-financial companies is that the negotiations allow an adaptation of a contract's terms (Franzen, 2001). On the other hand, a disadvantage is the time needed to find a counterparty. Owing to the current close connection between banks and Web support, the OTC market has become increasingly efficient. Banks as well as hedge funds are the main market actors on this market. Nevertheless, for other market participants, such as companies, the indirect way of using banks as intermediaries is inevitable.

"In the OTC, [...] investors generally trade with a dealer who serves as an intermediary" (Schwartz, 1993). Owing to enhanced regulations about transaction price reporting and the surveillance of OTC dealers, the market starts acting much more like an exchange market (Schwartz, 1993).

Examples

Figure 62: Chicago Board of Trade.



Source: Chicago Board of Trade (2011).

The Chicago Board of Trade (CBOT) is part of the CME Group, which is one of the world's leading derivative marketplaces, and is located in Chicago (Chicago Board of Trade, 2011a). The CBOT offers financial products related to agricultural products, equity indexes and interest rates. One can, for example, buy a future or an option on soya beans, oats, wheat, rough rice, maize and even mini-sized maize. The products are either traded traditionally through open outcry on the trading floor, or through CME Globex, an electronic trading platform. This is a typical dealer market, where dealers trade financial derivatives over-the-counter (Chicago Board of Trade, 2011b).

The financial products used are futures and options on the agricultural products mentioned above.

Figure 63: European Energy Exchange.



Source: European Energy Exchange (2011).

The European Energy Exchange (EEX) is the leading energy exchange in Europe. It offers a market place for trading natural gas, CO₂ emission rights, power, and coal. The EEX comprises a spot market and a derivative market. Additionally, it provides clearing services for over-the-counter transactions of its financial products. In the course of this study, one specific market is analysed due to its potential similarity to the market for patents: the CO₂ emission rights derivative market. The reason for this choice is straightforward. The spot market is similar to the asset market, since it constitutes the market on which commodities are traded. In addition, of the EEX's different commodities, CO₂ emission rights offer the greatest variety of financial products by including futures and options, whereas power, natural gas, and coal only include futures contracts (European Energy Exchange, 2011).

The products offered on the OTC market related to CO₂ emission rights are the EUA Futures, CER Futures, and EUA Options. In terms of the OTC, the EEX does not provide a physical or electronic platform for market dealers to compete (unlike the Chicago Board of Trade). It only provides clearing services, allowing transactions between market actors to be completed securely and rapidly.

Evaluation

Homogeneity, simplicity and predictability of cash flows

As in the case of the NYSE, futures and options are standardised products with a high level of interchangeability, they are thus considered homogenous. They are relatively simple to understand, since the products on which they are based are commodities like maize and soya beans. Investors are capable of understanding the underlying asset. Both contracts define the cash or asset flows from the beginning; the cash flows are therefore predictable. However, the predictability is not as high as with fixed-income instruments or common stock.

Liquidity and transaction costs

At the Chicago Board of Trade, liquidity comes from two sources. Firstly, it comes from all three criteria for the financial products traded on these markets being fulfilled, which means this automatically leads to liquidity and also lowered transaction costs. Secondly, the use of the electronic platform for trading allows for further liquidity and directly influences the transaction costs. Since everyone can trade from everywhere in the world (as long as there is an Internet connection), this allows even more liquidity to be built up. Moreover, because the electronic platform aggregates all the data available, buyers and sellers do not waste time looking for a transaction partner. Additionally, many processes are automated. These two factors lead to reduced transaction costs.

The EEX is a special case. As mentioned, the EEX only provides clearing services for the financial products traded on the OTC market. This contributes to liquidity, as transaction partners might be more willing to close a deal because they know that the EEX will clear the deal quickly and safely, but this service does not influence the transaction costs.

5.4.3 Success factors





Since the examples shown are generally perceived as successful markets containing successful products, the evaluation criteria yield positive results. On the one hand, these results confirm that the chosen properties of the financial markets and designs are significant and important and, on the other hand, allow the success factors of the different markets designs and examples to be extracted. These success factors need to be considered when establishing a financial market. The four success factors are:

- The understandability of the product,
- The cash flow predictability,
- An electronic platform,
- A hybrid market design.

Having discussed the three different organisational structures of financial markets and providing examples of each, each design is evaluated on the basis of three product-based criteria and two design-based criteria. Owing to the identified success factor "hybrid market

design" (i.e. an auction and intermediated market combined), the auction and the intermediated market are analysed together, whereas the OTC market is analysed separately. The different market forms, together with examples, the market criteria and product criteria are depicted in Table 7.

Table 7: Types of financial markets.

Market type	Examples	Market criteria	Product criteria
Auction <i>Determination of the transfer price through auction</i>		<ul style="list-style-type: none"> ▪ Liquidity ✓✓ ▪ Transaction costs ✓✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓✓
Intermediated <i>Quotation of the financial product's ask and bid prices through market makers</i>		<ul style="list-style-type: none"> ▪ Liquidity ✓ ▪ Transaction costs ✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓✓
Over-the-counter <i>Decentralised, electronically linked, competitive dealer market</i>	 	<ul style="list-style-type: none"> ▪ Liquidity ✓✓ ▪ Transaction costs ✓ 	<ul style="list-style-type: none"> ▪ Homogeneity ✓✓ ▪ Simplicity ✓✓ ▪ Cash flow predictability ✓

Source: Own illustration.

5.5 Exchange-traded IPR Financial Market (auction and intermediated market)

5.5.1 Technical aspects

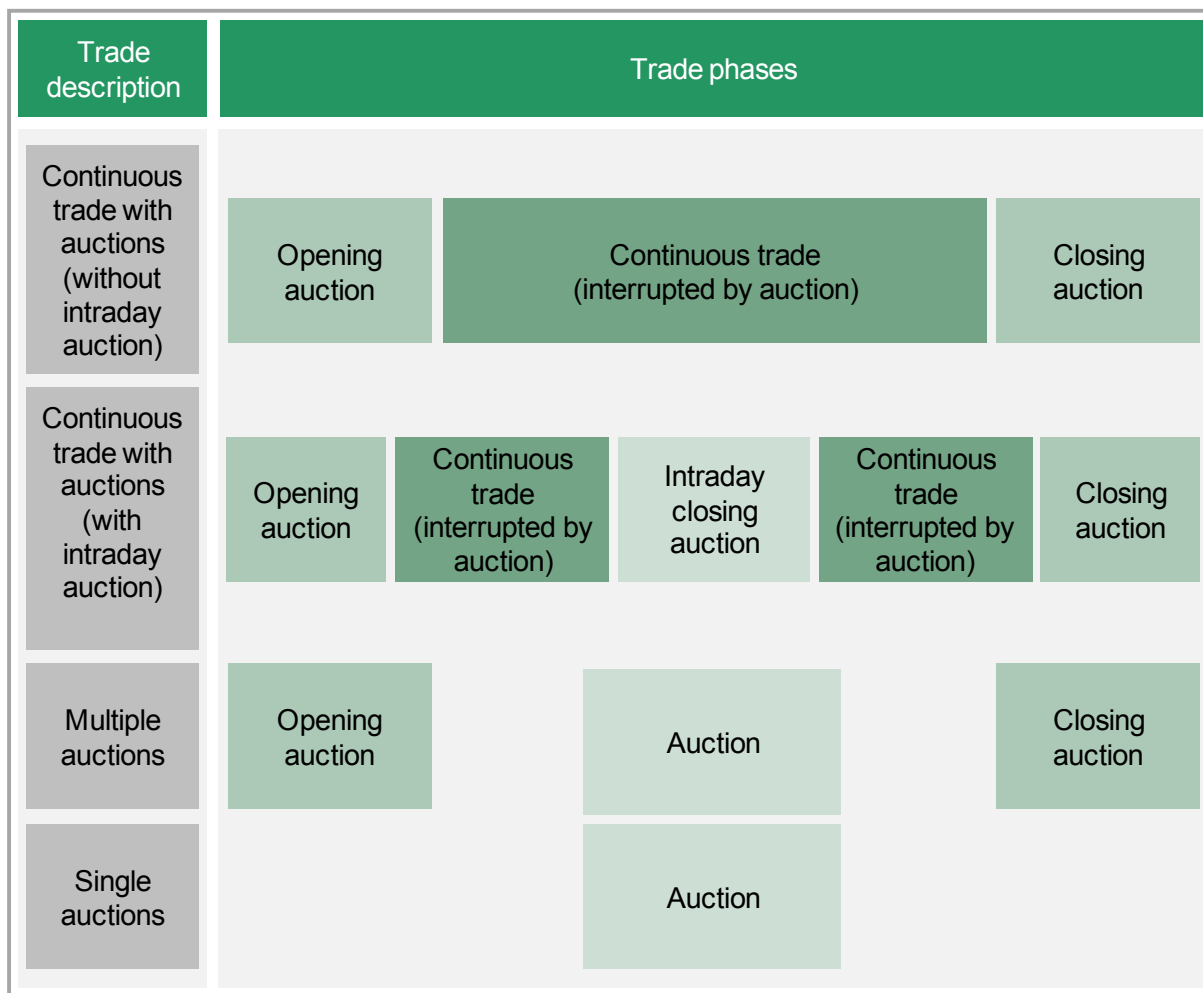
In the following, important technical aspects are presented that need to be considered when creating an IPR Financial Market. These aspects are based on the market models of the Deutsche Börse (2010), London Stock Exchange (2011) and New York Stock Exchange (2011).

Order-driven and quote-driven

Today's financial markets mostly do not differentiate between the auction market type and intermediated market type. Therefore, the combination of the two types is analysed. The resulting hybrid market's power is that it combines the advantages of both market types, making the market more efficient. A way of combining both would be to give issuers the choice of having their financial products traded by means of either continuous trading with auctions, or only auctions. Continuous trading could start with an opening auction and close

with a closing auction. Issuers could be given the option to request mid-day auctions. A summary of the different combination of order-driven and quote-driven trades is outlined in Figure 64:

Figure 64: Trade mechanisms.



Source: Deutsche Börse (2011).

Orders

If issuers choose an order-driven type, the exchange traded market could offer them various order types, for example, a market order, limit order, and market-to-limit order. There should not be a minimum order size. Orders should be executed according to a predefined prioritisation. This could be either time-based or price-based, or both. Orders need to be anonymous, meaning that the participants do not know the identity of the entity issuing the order. There should be a maximum duration during which orders are valid. For example, the Deutsche Börse has a 90-day maximum duration (Deutsche Börse, 2011).

Market orders are unlimited orders, which should be executed at the next determined price. Limit orders are orders which have to be executed at a minimum price or better. Market-to-limit orders are either executed at the auction price, or at the best limit in the order book. It is important that a market-to-limit order is only executed when opposed by limit orders. If only part of the market-to-limit order could be executed, the rest of the order is posted to the order book with the limit used when executing the first part of the order.

Furthermore, one can distinguish between different validity periods for orders. It is also possible to put restrictions on orders, for example, by stating that a certain order is only allowed in opening auctions.

Price

Price continuity can be ensured if the following aspects are taken into consideration: Firstly, there should be volatility disruptions if a product's price goes beyond a predefined corridor around the reference price. Secondly, market orders should be executed at the reference price if there are only market orders in the order book. Thirdly, if, in continuous trading, there are market orders that have not yet been executed standing against limit orders in the order book, price building should stick to the reference price.

Participation

The market participants need to be filtered by means of a set of rules and prerequisites. These rules can be based on existing (national) law and other measures, for example, mandatory certification by important financial institutions. This ensures safety and transparency. In order to increase this transparency, traders can be grouped into categories that indicate their position. For example, categories of agent traders, proprietary traders or designated sponsors could be created.

Agent traders are traders who trade on behalf of their client and not their own interests. Proprietary traders work with their own assets and own interests. Designated sponsors or market makers are part of the exchange platform's mechanism to ensure liquidity is high; they buy and sell, and thereby determine the quoted prices. To ensure high-quality market makers, the exchange platform should set requirements, for example, a minimum quote volume or maximum ask-bid spreads. By doing so, the exchange platform will ensure that market makers do not hinder trade. Furthermore, the market participants could be required to pay fees and other costs to cover the administrative costs. The exchange platform should determine trading rules (e.g., concerning the orders, settlement and market behaviour) with which the market participants must comply. This will help to ensure fair trading and investor protection.

Auctions

In auctions, every order and quote (as long as they are not restricted to special auctions) are considered. In the beginning of an auction, the participants should be able to enter new orders and quotes, or to change or delete existing ones. This phase should have a random duration to prevent dealers influencing the prices. After this first phase, the prices should

then be determined. The price is then the price of the highest order volume and the lowest surplus per limit in the order book.

5.5.2 Discussion

As implied, the auction market and intermediated market types have some advantages. Firstly, they provide a central place where all trade occurs. This helps to maintain an overview of the whole market. Furthermore, with the help of market makers, this feature results in a particular financial product having the same quoted price. This means there are no possibilities for special conditions as occur in a bilateral trade. Furthermore, this leads to a fairer market place, especially for participants with less market power. Secondly, the exchange platform guarantees a reduction in the counterparty risk, meaning it ensures proper delivery according to quality standards, thus allowing trading partners to generally fulfil their obligations. Lastly, this kind of market place is generally considered safer than an OTC market. This is ensured by the companies trading on the exchange having to be registered and being constantly controlled by regulatory bodies. Furthermore, they often have to provide reports on their financial situation and other areas of the company, for example, about their corporate governance practices. This adds to the market place's transparency and safety.

However, auction markets and intermediated markets also have disadvantages. Firstly, due to the regulatory requirements described, companies will have higher participation costs than when they participate in an OTC market. These costs are often passed on to the trading partner. Secondly, the institutions governing the exchange place have a strong power position. The market participants are also rather dependent on them. This can lead to high membership fees or the misuse of power by putting their personal interests first, which will in turn result in higher transaction costs for the market participants.

5.6 OTC IPR Financial Market

5.6.1 Technical aspects

OTC-traded products are not governed by as many rules and regulations as exchange-traded products. The rules should be decided on, keeping in mind that they should not be as strict as for an exchange market, because the OTC platform only settles and clears the deal, and the OTC market's goal is not to have strict oversight. It should only fulfil basic goals regarding proper and safe trading (European Energy Exchange, 2011).

In order to conduct a transaction, the seller signs it up (e.g., on an online platform), and the buyer confirms it. The platform sends both parties a confirmation of the deal. No further specifications are needed. However, as with the exchange traded platform, membership fees should be levied.

For example, the member application process could be similar to that of the European Energy Exchange, which is exhibited in Figure 65.

Figure 65: OTC market admission process (example: European Energy Exchange).



Source: European Energy Exchange (2011).

5.6.2 Discussion

Compared to auction markets and intermediated markets, the OTC market shows some advantages. Firstly, bilateral negotiations allow an adaptation of a contract's terms (Franzen, 2001). This can be advantageous or disadvantageous, and depends largely on the traders' relative power. Secondly, since there is no centralised marketplace, and only a few regulations, financial instrument sellers face strong competition when selling their products. This can be positive for buyers, who may find themselves relatively more powerful in the OTC market.

The negative points are: Firstly, because there are no market makers, the same product's prices may differ from deal to deal, as could the quality of the deal since there is no centralised body to ensure this. This is only a disadvantage when the market for a specific product is illiquid, because the buyer does not have the possibility to compare the price to other prices to determine which one is fair. In liquid markets, this disadvantage is not significant. Secondly, if there is no central regulatory body, all types of participants may enter the market. This poses the threat of fraud by companies and companies applying questionable practices. There is no requirement to publish reports, and no central entity oversees the market participants, leading to less transparency. Thirdly, it might take longer to find a trading partner than in an auction market or intermediated market, where there is a

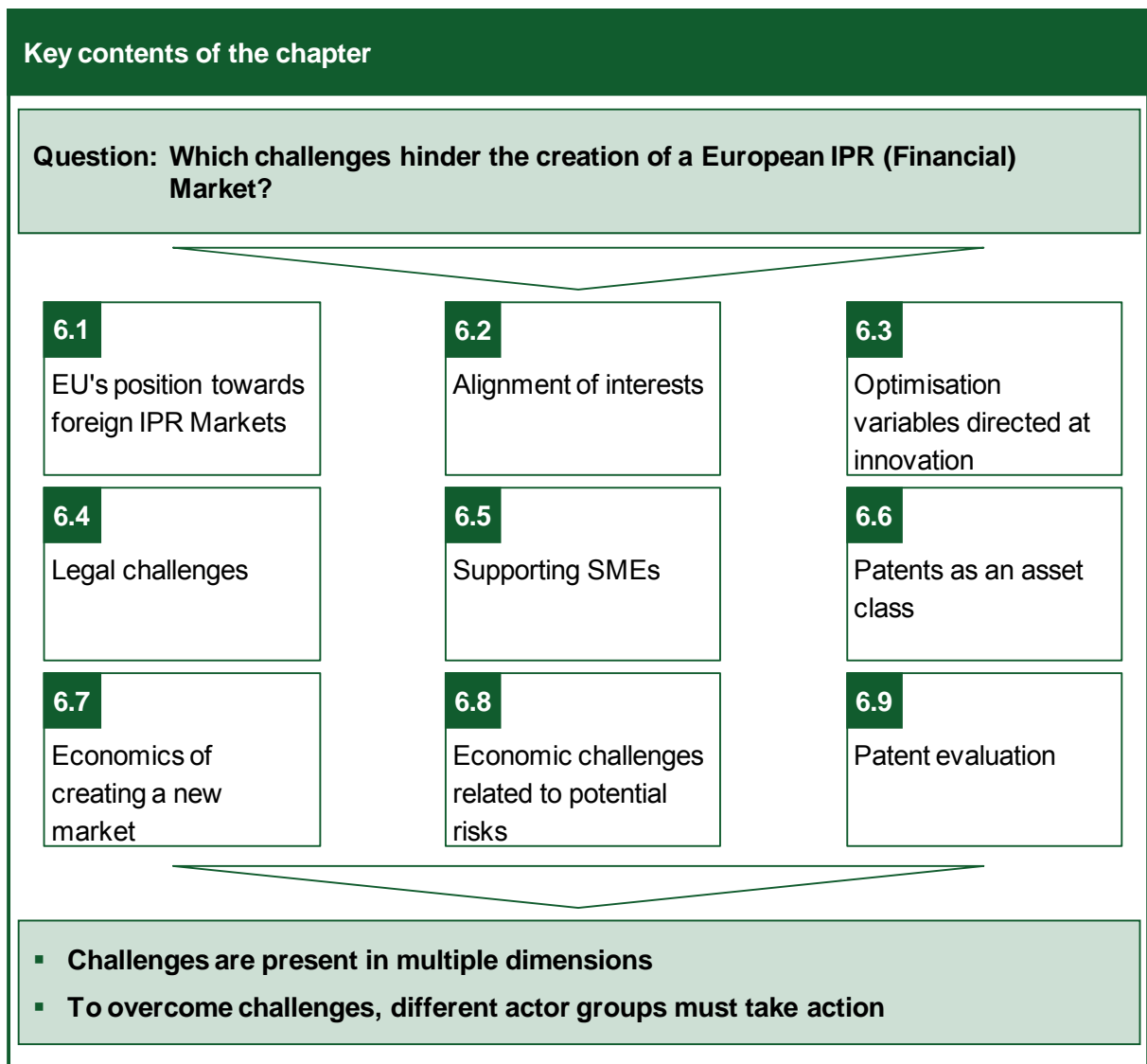
possibility to sell or buy as long as the market is open. Lastly, there is no entity to accept the counter-party risk. Consequently, this risk also needs to be considered when trading on the OTC market.

5.7 Main findings

Main findings of the chapter

- A potential IPR Financial Market requires an underlying IPR Asset Market
- The **IPR Asset Market** currently has three major drawbacks which need to be taken into account when establishing an IPR Financial Market
 - Low liquidity
 - Low homogeneity
 - Value uncertainty
- Three **financial market types** for establishing an IPR Financial Market are considered. Two of them (auction market and intermediated market) are grouped in keeping with today's financial markets characteristics
 - **Auction market and intermediated market**
 - ✓ Central and transparent pricing as well as reduction of counter-party risk
 - ✗ High regulatory requirements and strong position of power for exchange institution
 - **Over-the-counter (OTC) market**
 - ✓ More individual trade and competition for financial product sellers, thus probably decreasing prices
 - ✗ Transparency and deal quality may be lower than in the auction / intermediated market

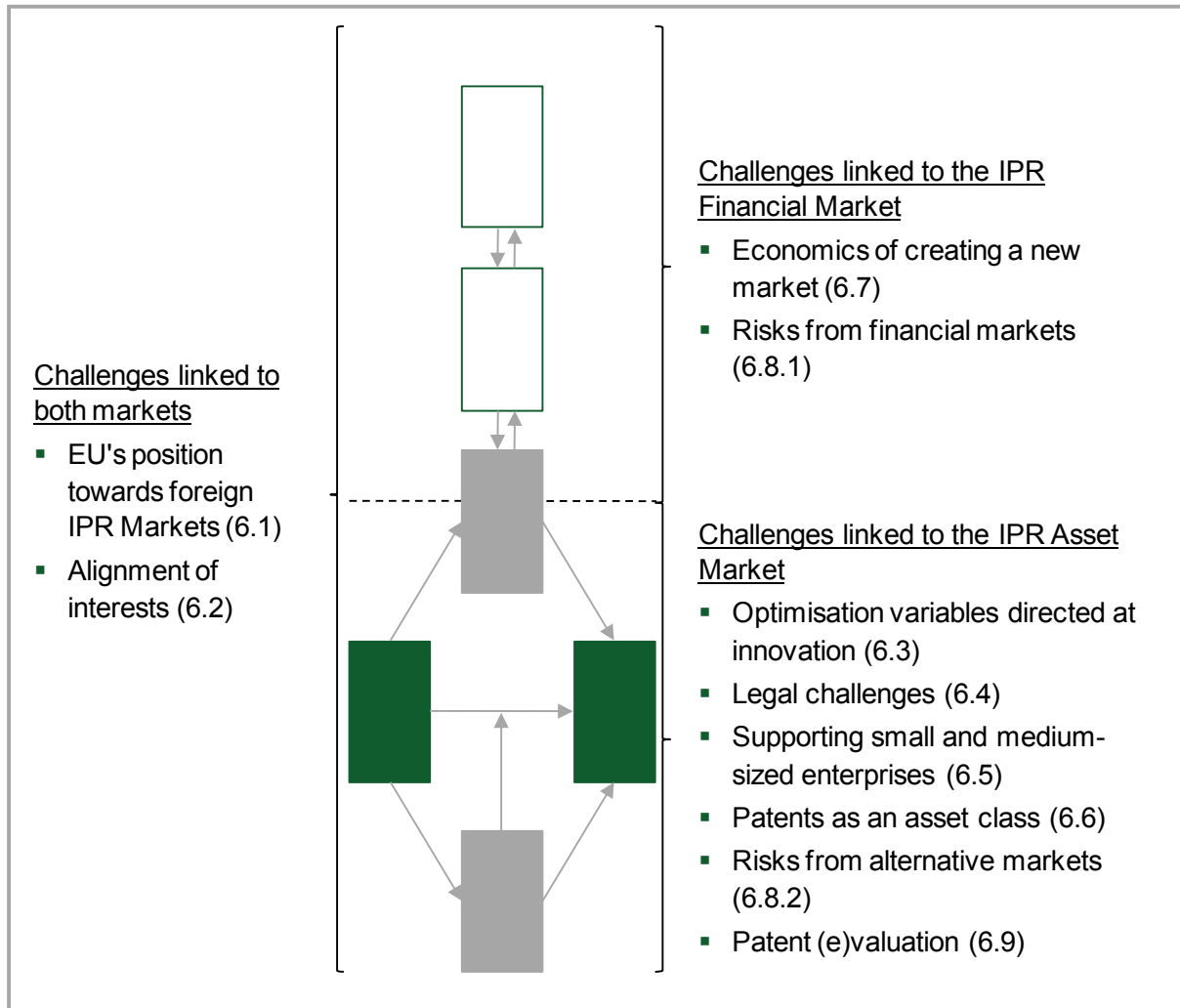
6 The challenges



As the IPR Financial Market concept is new, several challenges have to be overcome before such a market can be established and can function properly. The challenges have to be identified beforehand in order to prevent market failure, which would have a severe impact on actors' confidence and the successful implementation of a market platform.

We identified several challenges, which could prevent the successful establishment of an IPR Market, from surveys, expert interviews, and in the literature. These challenges are present in multiple dimensions and are investigated in the following sections. Figure 66 provides an overview of the challenges' sources and allocates them in the indicative market structure.

Figure 66: Challenges in the indicative market structure.



Source: Own illustration.

6.1 EU's position towards foreign IPR Markets

In the following, we examine the challenges the European Union faces arising from IPR Markets outside Europe. We focus on the United States and Asian countries.

The United States

In the US, the IPR trade is market driven and IPR are used as a tool to spread technological advancement across the world. US-based IP-centric ventures also have an extensive record

of acquiring technologies developed in other countries. Already in 2009, the Korean Intellectual Property Office (KIPO) expressed concern that South Korean technologies were being bought by US IP-centric ventures, a few examples of which are Microsoft and Intel, which used a 5 billion USD fund to purchase IPR around the world. In 2008, the group established a Korean branch through which it purchased rights to 200 projects (Technology Transfer Tactics, 2009).

US states support the IPR trade by providing an appropriate (legislative) framework. The State of Illinois and the City of Chicago, for example, supported the private company Ocean Tomo in launching the Intellectual Property Exchange International (IPXI), which trades unit licence rights (ULRs) on patent portfolios.

In the US, private actors are actively enforcing their IPR, which allows rapid developments both in court practice and new business models focused on litigation. Non-practicing entities (NPEs) known for their offensive approach towards domestic US companies have now become active in attacking technology developers from abroad who bring their products onto the US market. NPEs are spreading patent litigation practice across the world. They are also targeting European companies, whereby SMEs are specifically an easy target due to their difficulties with covering high litigation costs.

In the US the IPR Market is driven mainly by private actors, the creation of innovations is in forefront and the role of the government is to provide a suitable framework for IPR trade; however, in Asia the situation differs.

Asian countries

IPR Markets in Asia are still developing, but the focus is on countries' defensive strategies. IPR creation is not an immediate priority. Industries are first acquiring IPR to use them as a tool to expand to other markets outside Asia. Government intervention in Asian IPR Markets is high. Governments facilitate IPR trade and establish public or semi-public patent funds to pool patents in order to support domestic companies and research institutions.

The IPR Market in China shows huge growth potential. The country has technology exchanges and several commercial banks that offer financing through patent mortgages. For example, the China Technology Exchange (CTEX) has already held its first patent auction and is planning to launch a fund to aggregate patents (Bailey, C., 2011). In June 2011, China also opened its first international IPR exchange, the Tianjin Binhai Intellectual Property Exchange International. The exchange is jointly operated by the government and the local municipality. The aim of the exchange is to improve SMEs' financial situation and ease their technology transfer. Tradable IPR are expected to arise from China's technology-oriented SMEs. The trade will be international and market-oriented, and is planned to attract IPR from abroad. The exchange sees cooperation possibilities with Nasdaq-listed companies and intends to approach other major stock exchanges, such as the Deutsche Boerse, the London Stock Exchange and Singapore Exchange (Ministry of Commerce, 2011).

Regardless of recent developments, the Chinese IPR Market still has various deficiencies. The market lacks intermediaries (the present intermediaries are foreign-owned) and benchmarks against which to evaluate patent portfolios. In addition, language barriers complicate the acquiring of patent portfolios abroad. Owing to these difficulties, Chinese companies prefer to acquire access to (foreign) technologies via corporate acquisitions. Companies obtain access to market-ready technologies, IPR, know-how and R&D resources by acquiring established companies. It is estimated that almost 17% of all company acquisitions occur in the technology, media, ICT, and automotive sectors (Bailey, C., 2011). Foreign acquisitions can help European companies to obtain access to Asian markets more easily, which would otherwise be complicated. A precondition is, however, that foreign companies do not merely limit themselves to asset stripping. It is important that different regions in the world are driven by fair competition, which also includes respecting IPR.

Taiwan, like China, is also developing its IPR Market. The country is planning to launch a patent fund which would acquire patents across the world and make them available to domestic companies. The goal of the fund is to first of all provide a protective shield against South Korean companies, which are mostly engaged in patent litigations with their Taiwanese counterparts. The fund is expected to first target notebook, LED and mobile phone industries (Computex, 2010).

In reaction to the planned Taiwanese fund, South Korea established an IPR management company "Intellectual Discovery" in August 2011. The company plans to use private and public resources of approx. 277 million EUR by 2015 to pool excellent patents in certain technology acquired from foreign and domestic universities and research institutes (Kim, Hong & Associates, 2011).

Japan has started to pool patents in the life sciences. In August 2010, a public-private intellectual property fund, called the Life-Science Intellectual Property Platform Fund (LSIP) was launched (Intellectual Property Strategy Network, 2010). The fund will collect and bundle patents from public research institutions and companies. The fund will license the patent bundles to (pharmaceutical) companies, which will allow the creation of IP-centric ventures. The motivation for establishing this fund is the financial difficulties that universities and their technology transfer offices face when wishing to exploit patents. Japan seeks to close the existing gap with Europe and the US regarding the acquisition and exploitation of IPR related to medical treatment.

India should also be seen as a future IPR Market. Although the market is still in its infancy, the country is witnessing rapid increases in patenting rates and is subsidising research in multiple technology fields. Innovation activities are further supported by strengthening the domestic research-industry collaboration. With increased investments in R&D and with a stronger research-industry link, the research output, as well as the necessity to recoup investments through a successful IPR commercialisation process, will increase. India's IPR Market could evolve like that of other Asian countries where both technology/IPR exchanges and semi-public patent funds are already present.

In conclusion, the US and the Asian countries are developing their IPR Markets further. The US has a large IPR-orientated private sector that invests in new innovations and distributes new technologies across the world. The Asian countries do not yet have a strong R&D capacity, nor a large IPR-orientated private sector, but the various countries have taken active steps to change the situation. Providing companies and research institutions with better opportunities to transfer technology and trade IPR will generate revenues for the actors as well as allowing higher investments in R&D. The continuing developments in the US IPR Market and the emerging Asian IPR Markets pose a huge challenge for Europe. Both regions are aggregating patents and the private sector is either capable (the US) of expanding to other markets, including to Europe, or is being subsidized (Asia) to do so. European companies and research institutions are unable to exploit their innovations due to the lack of a common functioning patent system and IPR trading mechanisms, and are therefore an easy target for foreign patent aggregators. Europe may lose its most valuable innovations to other regions of the world, which will then collect revenues from these innovations. To hinder the flow of innovations abroad, Europe should have clear and simple mechanisms and frameworks to transfer technologies and trade IPR.

6.2 Alignment of interests

6.2.1 Access to and funding of intellectual property

Research funded by tax money will most likely lead to demands from politicians that the results of such research should be used to benefit the home country and nationally owned companies. Politicians may demand that nationally funded research results should be available only to national companies and, hence, may be more opposed to competition and the creation of a centralised IPR Market.

This assumption is in accordance with many expert interview partners – politicians tend to demand that the tax amount used to fund research on a European level should be exclusively available to the funding state.

We expect that opinions on this issue will primarily be determined by the degree of centralism and state intervention in specific EU member states. There might be fewer objections in countries with a more liberal, market-orientated approach.

In this respect, a comparison of France, Germany and the United Kingdom could represent three different traditions – more “corporatist” in Germany, more “statist” in France and more “capitalist” in the UK. General policy style differences between these countries could influence member states’ national research and innovation interests directly.

France has pursued a relatively “dirigiste” economic policy (Levy, 2011), with direct strong state intervention, for a long time. Since the first Thatcher term, the **United Kingdom** has tended to follow laissez-faire economic policies, emphasising deregulation and a reduced role for the state. This was partly in response to the Labour governments’ more dirigiste policies in the 1960s and 1970s, which were considered to have failed. In contrast to these

two countries, the political direction in **Germany** has tended to emphasise social partnership and strategic cooperation between companies, with cross-shareholding banks, rather than the state, providing most of the funding for major industrial investments.

Many of our interview partners from France, Germany, and the UK were sceptic about the practical value of a centralised IPR Market. The major concern was the experts' appraisal that only IPR with low commercial value would be supplied to the market. Some interview partners even argued that an IPR Market would be "bad bank" for IPR.

In order to foster the development of an IPR Market in Europe and guarantee the participation of the member states, it may be necessary to establish a mechanism that guarantees a significant element of national "juste retour", whereby each country receives approximately the same value it contributed back. It is, however, not clear how such a European arrangement could work in practice, given the national public origins of the funded research.

6.2.2 Location and liquidity

Another challenge with establishing a potential marketplace is related to the concept of liquidity, as described in section 6.7.3. Regarding the location of the marketplace, the possibility of liquidity fragmentation has to be taken into account, which means decentralising the potential IPR Market.

Europe comprises many different cultures and languages. Even though individual countries belong to the European Union, cultural differences and national interests could lead to discussions on the location and main language of a potential IPR Market.

If such discussions do not bring about agreement, the outcome could be several decentralised financial marketplaces in different countries, posing the threat of liquidity fragmentation as occurred in the Soviet Union with the so-called "birzhi" (Russian for exchange). In 1992, the Soviet Union had 700 institutional exchanges, resulting in illiquid markets and declining trade volumes (Patterson, 1992). In other words, even though there was liquidity potential in the Soviet Union, the exchanges did not work as well as they could have, due to fragmentation. This problem was eventually resolved by introducing a centralised stock exchange in 1995 (RTS Exchange, 2011).

6.2.3 Location and external effects

The country where the IPR Market is located, would have advantages that others would not. This argument was supported by our interview partners. Firstly, the country will have the opportunity to increase the state's income by earning additional taxes from trading or licensing IPR. Secondly, the state will have an advantage in terms of employment and economic growth.

If the IPR Market is established successfully, a range of specialised service firms could emerge in its periphery. This would increase employment opportunities and tax income. Furthermore, the country would have specialisation advantages in a new industry in which other regions may be interested. This specialisation advantage may also be used commercially. It is therefore likely that there will be a debate about the best location and that it will be a barrier towards establishing an IPR Market.

6.2.4 Taxation

Non-harmonised taxation policies among the EU member states could affect the acceptance of an IPR Market. According to several expert interview partners, taxation policies in the EU member states could be used as a competitive tool regarding attracting potential investors and innovative firms. Consequently, and in the interest of the EU, "the member states rely on an agreed code of conduct which is politically – not legally – binding, to prevent 'harmful' competition through taxation regimes" (Laule & Weber, 2011).

The IPR Market could be detrimental to countries with lower tax incentives, such as capital gains tax; their motivation to foster the market will therefore be lower. Such differences may directly affect the supply of and demand for IPR in an IPR Market.

6.2.4.1 Taxation and the mobility of IPR

International companies can increase savings by implementing effective tax planning (Fisher, 2005). According to several interview partners, many companies try to maximise the benefits of IPR trading and licensing activities as part of their intangible asset management strategies and centralise ownership of their IPR assets in offshore holdings and licensing vehicles.

Although IPR is often created in relatively high tax jurisdictions, the vehicles are in many cases located in a low tax jurisdiction (Nias & Choi, 2004). Consequently, taxes such as capital gains tax on the income generated through IPR are paid in low tax regimes even if developed or commercialised in a high tax region. This violates a basic taxation principle – the benefits theory of taxation. The beneficiary of an economic activity has to contribute an appropriate part to the state's income. This may be the case in respect of IPR developed by a university with tax money.

The existence of favourable national taxation regimes raises the question of barriers that are created by member states having an interest in harmonised taxation. Several scenarios are possible:

- **Single country initiative:** A single country with a favourable tax regime for IPR might take the initiative to create an IPR Market on its own territory. Its success would depend on its ability to attract buyers and sellers from other EU member states. A single country therefore has the opportunity to gain an advantage over supply and demand.
- **Multi-country initiative:** In this scenario, a group of member states – all or some of the EU member states – might seek to establish a single IPR Market. This might be

problematic if there were competing candidate locations in different countries. Taxation issues are relevant here, as individual countries might fear losing tax revenue if the marketplace were located in another country with a more favourable tax regime.

6.2.4.2 Tax benefits and innovation

Some European countries offer companies grants or other financial subsidies for being innovative. Furthermore, a low tax environment, combined with tax credits for innovation, is an incentive for companies to move their R&D activities to these countries.

Countries that do not offer this innovation-friendly environment risk losing innovative parts of their economy. This may result in tax competition among the EU member states. Balancing rights and duties in an IPR Market is also an issue of conditioning the European IPR tax issue.

6.3 Optimisation variables directed at innovation

6.3.1 Competition versus innovation policy

The interaction between intellectual property rights and competition law, plus the impact on innovation, is a sensitive topic. Although they should complement each other, aiming to promote innovation and economic growth, there is sometimes tension.

The essence of IPR is rewarding innovation by granting exclusive rights to utilise a new invention, thus inducing investment in new processes and products and boosting competition. IPR allow the accumulation of monopoly power, the degree to which is influenced by a range of factors, for example, the breadth of the patent pallet held (Ganslandt, M., 2008). Since this may lead to extensive monopoly positions, it may be argued that patents hinder innovation as they raise the price of a certain piece of knowledge and reduce the probability of follow-up inventions (Hall, 2007).

Especially in information-intensive sectors, the existence of patent thickets enables patent holders to prevent new and innovative firms from entering the market, which inhibits growth (Hargreaves, I., 2011). Andersen and Konzelmann (2005) claim that a protection mechanism can lead to innovations that are less beneficial to society or do not happen at the lowest possible cost. Since they are operating under a transitory monopoly, patentees have the option to make the prices of IPR higher than their marginal costs, which excludes some customers from benefiting from a certain innovation (OECD, 2004). An example of such customers' deadweight loss is the drug market, where customers who are not willing to pay a high price have no access to the drug until the monopoly position expires or competitors are able to offer a substitute.

Just as IPR policy cannot be judged one-sidedly as enhancing or hindering innovation, competition policy also has opposing tendencies. On the one hand, competition policy is crucial for the efficient functioning of a market economy, as it fosters the efficient allocation of

resources and can be expected to create incentives to innovate in order to obtain a competitive advantage. On the other hand, theories of industrial organisation and exogenous growth theories typically predict that product market competition discourages innovation. Competition reduces post-entry rents for new market participants and leads to a declining equilibrium number of market entrants. In addition, it reduces monopoly rents and destroys the incentive to innovate.

Nonetheless, Aghion et al. (2005) point to empirical works that show a positive correlation between product market competition and innovative output. They re-examine the relationship, finding clear non-linearity, approximating it graphically to an inverted U-shape. They distinguish between two intermediate sectors in the economy and two opposing effects which dominate at different levels of competition intensity. In a levelled (neck-and-neck) sector, where many oligopolistic firms have similar production costs, the equilibrium research intensity of neck-and-neck firms increases with higher product market competition because they can achieve a competitive advantage ("escape competition effect") via innovation.

In an unlevelled sector, where technology leaders have an advantage over followers, the equilibrium research intensity of technology followers decreases with higher product market competition because competition reduces the rents laggards will achieve if they manage to catch up with a competitor through innovative activities (the Schumpeterian effect). When the initial competition intensity is low, neck-and-neck firms will lack the incentive to innovate, while laggards will be motivated by the relatively high expected rents. As a result, the industry landscape will be predominantly levelled, i.e. the "escape competition" effect will dominate and the overall innovation level will be low. In contrast, when the initial competition level is high, neck-and-neck firms are highly motivated to innovate, whereas laggards will lack incentive due to the relatively low rents they can capture if catching up. Therefore there will be more unlevelled industries in which the Schumpeterian effect dominates and the overall innovation level will again be low. The maximum level of innovation will be reached at intermediate competition level, when all types of firms will innovate, and levelled as well as unlevelled industries will be present. The resulting initial increase in innovation, followed by a decrease, forms a reversed U-pattern. This is supported by the panel data from UK industries that Aghion et al. (2005) used in their study. Building on this model, Hashmi (2011) re-examines the competition and innovation relationship based on empirical data from the US and finds a sole positive relationship, attributing this contradiction to US manufacturing industries being technologically more neck-and-neck than their UK counterparts.

These studies illustrate the importance of national competition policy taking into account the characteristics of specific countries, markets and industries in order to avoid undesired policy implications. The relationship between IPR policy, competition policy and innovation activity is important, although complicated, and the existing interdependencies make it hard to define the right mix of policy measures which could lead to an optimal and efficient innovation output. Therefore, establishing an IPR Financial Market should also be considered in the context of its impact on competition and innovation activity in Europe. An IPR Financial

Market is likely to increase investors' interest in IPR, the transparency of IPR transactions and the motivation of inventors to commercialise their ideas.

The policies encouraging investment in research as well as in development and innovation base their justification on the positive relation between patent activity and economic growth. From this point of view, an IPR Financial Market would be justified if it is likely to increase the acceptance of the patent system as the prime standard in publishing and commercialising ideas.

6.3.2 Long-term objectives of the research system

The incentives the patent system provides to commercialise a technology without state support will fail for technologies with no clear short to mid-term commercial application. The high risks and uncertain market success that can only be realised in the longer term, if at all, make activities for value-orientated innovators, investors and industry players unattractive.

It is obvious that research in fields like healthcare and project funding plays an important role in a society's future. Therefore, the patent system needs to be complemented by other forms of research funding that help fulfil these important needs.

The downside of the strong value orientation is a one-sided allocation of resources and the negligence of long-term goals. On the other hand, this implies that more investment in R&D is made than what would be necessary to realise the invention and be socially efficient.

This effect is also considered the common pool problem or patent race (Greenhalgh & Rogers, 2010). Innovators, industry and investors tend to focus their efforts on promising technologies and neglect the less promising ones due to the quasi non-rival returns if they are the first to commercialise a given technology. Finally, just one of the group in the race can participate in the patent premium, which, from an economic perspective, should be seen as a waste of resources.

This does not necessarily apply to all cases. Every researcher uses different methods, standards and processes to develop ideas that may lead to other economically useful inventions. Furthermore, competition ensures that resources in research are used to maximise value and reduce costs, and therefore directs efforts according to efficiency criteria. This means that, in a competitive market, research becomes more profitable and speeds up the development of innovations in general.

Some member states or political groups in Europe may raise objections in order to subject the research system to market rules. Fundamental research in fields that are strategically important for society, for example, healthcare, may be specifically financially neglected by an excessive concentration of funds on research with commercial value.

6.3.3 Diffusion of innovations

Companies have to plan their resources strategically and experience market pressure to innovate. They have an incentive to use patent protection to block competitors from entering

the market (Arora, 1997). Only about 25% of an average industry patent portfolio is actively used in the company's products. Because of this strategic use of patents, cooperation is key to keep pace with the rapid developments in many areas of high technology. This is especially true, since most high technology products are becoming increasingly complex and demand input from many research areas.

This behaviour may not be in accordance with the idea that the patent system should help to commercialise and invent new products and services. Chesbrough (2008) concludes that the patent system fails its original purpose if it does not bring IPR to the market as products. Inventions do not occur in isolation. Blocking competitors from a market may be a valid strategy in the short run, but not from a long-term or societal perspective. The internal resources of a company may not be sufficient to improve, reinvent or create innovations. Research efforts are especially time consuming, costly and often tied to an uncertain outcome (Shapiro, 2001).

The diffusion of innovations in industry and their successful commercialisation in the product market are crucial for economic growth in Europe. The speed of innovation is determined by the amount of resources attached to the development of a certain technology or process. Furthermore, the patent system must be designed to establish an environment that supports innovation. If patent protection is too strong, innovation may be hindered by a lower possibility of complementary or additional research. In fact, industry might be less likely to accept the patent system. Defining this optimal protection and implementing the necessary unitary regulation can lead to controversial discussions among EU member states.

6.3.4 Societal welfare vs private (investor) return

A further challenge for establishing an IPR Market is the choice of the variable to be optimised, namely the trade-off between societal welfare and private (investor) return.

As elaborated in section 6.6.2, there is a potential challenge in the competition between investors' time horizons and the time needed for value creation through patents. As several interview partners stated, financial investors may prefer to invest in non-practising entities or litigation financing as opposed to, for example, incubating funds, due to their short-term investment horizon.

This development is not uniformly valued in the literature and expert opinions. Critics may argue that the non-practising entity (NPE) business model is harmful from a societal welfare perspective as, for example, one interview partner and Johnson et al. (2007) stated. Supporters such as Shrestha (2010) and McDonough (2007), however, stress the positive impact of NPEs, as they effectively enforce intellectual property rights. They also argue that NPEs impose litigation threats credibly, thus enhancing trade in patents and raising liquidity in the patent market.

Consequently, in developing an IPR Market, the trade-off between societal welfare and private (investor) return has to be addressed. This has been confirmed by our interview

partners. One interview partner viewed a business model based on infringed patents as the only one that has functioned well in the past.

6.4 Legal challenges

The objective of this section is to determine legislative matters in the EU member states that can be a barrier to establishing an IPR Market in Europe.

Since most of our interview partners referred to the absence of legislation that would ensure that the patents EU member states issue have the same legal quality, and due to the absence of a unitary patent litigation system, we regard these as the greatest legislative shortcomings in establishing an IPR Market in Europe. Therefore, in this chapter we focus on the patenting systems in the member states, especially on the legal quality of granted patents and patent enforcement.

6.4.1 Increased patenting and its effects

The fast pace of technological developments and the convergence of technologies resulted in patents being used in new ways. Patents are no longer used only to protect innovations against imitation, but to defend companies against other IPR owners. Patents are used for strategic reasons and not because patent protection is essential for recouping investments in R&D.¹³

Industries see large patent portfolios as beneficial in licence negotiations – when smaller technology developers are pressurised to license or sell their rights – as well as in avoiding lawsuits that competitors initiate, hoping to have disputed patents invalidated. Patent owners with larger portfolios have a better chance of raising counterclaims. For example, Google recently announced its intention to enlarge its patent portfolio by acquiring 6 000 patents at 900 m. USD.

This race for applications, often driven by strategic purposes and emerging economies, causes various problems for patent systems.

The increase in the number of patent filings harms the quality of patents and lengthens the backlogs. Larger patent portfolios and a high number of claims may also increase patent litigation. Court cases have become everyday practice, for example, in the telecommunication industry, which is known for strategic patenting. Major patenting systems that are overloaded with patent applications find it challenging to overcome these problems. The capacity of industrial property offices to secure timely and thorough examinations of

¹³ Various empirical studies have shown that patents are considered essential for the development of new innovations and for bringing them to market in only few industries: pharmaceuticals and chemicals. Other industries tend to use measures other than patents to recoup their investments in R&D, such as lead time, secrecy, learning advantages, complementary sales and services, and complementary manufacturing (e.g., Mansfield, 1986; Levin et al., 1987; Cohen et al., 2002). For example, the semiconductor industry, which has been shown to be patent reluctant, patents for strategic reasons. Similar effects can be seen regarding communication equipment and computers (Hall and Ziedonis, 2001; Danguy et al., 2009).

patent applications (availability of prior art data for assessing non-obviousness), the proficiency of patent examiners to understand increasingly complex patent applications (extended patentable subject matter) and their ability to cope with the increased workload are likely to become central questions in securing the quality of patents. Court procedures and the proficiency of the judiciary are likely to be decisive in handling increasingly complex patent disputes (e.g., Cremers, 2004; Bessen and Meurer, 2005; Hall, 2007; Harhoff, 2009).

6.4.2 Uncertainty and complexity of patenting in Europe

Patent systems in Europe are characterised by considerably different patent-granting and enforcement processes. IPR Market participants in Europe are uncertain because they cannot rely on high-quality patents across the region. They are also unsure of the outcome of patent litigations. Thus, patenting in Europe is complex and uncertain.

Our interview partners expressed concerns regarding patenting in Europe. It was mentioned that only after removing 27 different markets for patents, will actors gain trust in patenting in Europe. It was repeatedly pointed out that as long as there is uncertainty regarding patenting in Europe, it is not possible to handle Europe as a single IPR Market. It was also pointed out that as long as patenting is not easier and more affordable in Europe, patenting in the USA will prevail. The current complexity of patenting in Europe deters new patentees and harms Europe's competitiveness.

The fast-track patent examination project – the Patent Prosecution Highway (PPH) – that so far consists of 15 industrial property offices worldwide, was pointed out as a positive development on the IPR Market that reduces patent-related uncertainty. Most of our interview partners regarded a unitary EU patent and litigation system in Europe as essential for creating a single IPR Market in Europe. This also leads to the risk that once patenting in Europe becomes simpler, the number of innovators who intend to trade only in national markets but still acquire patents with full EU coverage, will increase. A unitary EU patent will allow the blocking of competitors.

The following section illustrates the heterogeneity in Europe by reviewing the patent-granting process and patent enforcement in terms of national patents in selected EU member states – Germany, France and the United Kingdom (UK), and with respect to the European patents granted by the European Patent Organisation (EPO).

6.4.3 Patent quality and enforcement

In **Germany**, a patent is not granted before it has been determined that the patent application complies with the formal legal requirements and that the subject matter is indeed patentable. Inventions must meet patentability criteria: novelty, non-obviousness and usefulness. The fulfillment of formal requirements is verified after a patent application has been submitted and the patentability criteria examined after the applicant has submitted an adequate request. The patent application system in Germany can thus be described as one with deferred examination (Lunze, 2007).

Patent examination in **France** does not have the same scope as in Germany. Although a search report issued by the industrial property office includes documentation that may be decisive about the novelty or non-obviousness of an invention, such evidence does not necessarily result in refusal to grant a patent. For example, the patent office can refuse to issue a patent due to lack of novelty, but it cannot reject an application due to lack of inventive steps. A patent may also be refused if the applicant avoids correspondence with the industrial property office, for example, does not respond to requests to modify patent claims. The patent application system in France can thus be described as a simple registration combined with an examination system (Lunze, 2007).

In the **United Kingdom**, the patent applicant has to submit both the patent application and a separate request for search as well as for examination to the industrial property office. In the course of the patent granting process, the industrial property office carries out both formal and substantial examinations of the application. It also determines whether an invention meets all patentability criteria. It is worth noting that the industrial property office in the UK must decide on a patent grant or refusal within 4.5 years of receiving the application. Generally, industrial property offices only make assumptions about the possible duration of the patent granting process (London Economics, 2010). The patent application system in the UK can be described as one of pure examination.

The European patent granting procedure at the **European Patent Organisation** differs from the application process in the UK in the sense that no separate application for search is needed and the search that is carried out is already based on the patent application. The research report that is sent to the applicant includes evidence that can be disadvantageous during the next phase, when a decision is made whether an invention meets patentability criteria. Applicants have six months to decide if they want to proceed with the examination of the application on which the patent-granting decision is based. The EPO patent application system, which is similar to the one in the UK, can be described as a purely examining system (Lunze, 2007).

Consequently, patent-granting processes in Europe vary considerably. The time available for patent examiners and the extent to which they have to study patent applications influence the quality of granted patents. In the literature, for example, French patents are considered to lack quality, while the UK, Germany and Europe have quality patents (e.g., Gowers 2006; Lunze, 2007).

It is assumed that EU member countries with stricter patent granting procedures issue higher quality patents than those who do not conduct substantial examinations of the patentability requirements. This reflects the complexity of patenting in Europe and facilitates uncertainty among the IPR Market participants.

Besides the diversity of patent quality, patenting in Europe is disadvantageous due to the lack of a homogenous patent litigation system.

Before we address the question which member state's law is applicable to a patent dispute, the issue of the international jurisdiction of the member states' courts has to be examined. The current system concerning the international jurisdiction of courts is based on the Brussels I Regulation and its parallel regulation, the Lugano Convention 2007, as well as on two landmark decisions – GAT/LuK and Roche Nederland – of the European Court of Justice (ECJ).

The first decision ruled that, contrary to practice established in some member countries, for example, Germany and the Netherlands, the courts in the country of registration are exclusively competent to adjudicate a patent's validity, even when this only arises as an incidental matter (Kur, 2006). This decision, which was widely criticised, encourages infringers to claim a patent invalid and stall judicial proceedings for an indefinite period until the validity of the patent has been decided by the patent office or a court of the country in which the patent was granted (Kumar, 2009). The second decision the ECJ ruled against was the possibility of hearing European patent infringement cases collectively. This means that patent owners have to fight fragmented infringement cases in each of these states if their rights are infringed by affiliated companies in different EU states. This leads to enormous litigation costs and possible irreconcilable diverse judgments (CLIP 2006; Kumar, 2009).

The patent holder that enforces exclusive rights on a national basis has to consider the possibility of "torpedoing", which happens when a company, which has reason to believe it will shortly be sued for infringement, takes legal action. Such a company will claim a declaration of non-infringement (Véron, 2004; Pitz, 2007). A "torpedo" is a legal instrument for blocking national infringement proceedings, because any court that handles subsequent action must stop its proceedings before the first "torpedo" action is decided.

The fragmentation of the patent system clearly leads to duplication of court cases and strategic patenting, which raises litigation costs in Europe. It is estimated that by 2013 there will be between 202 and 431 duplicated patent infringement cases in Europe. The cost of multiple litigations is disadvantageous to IPR Market participants in Europe, especially for individuals and SMEs. The cost of litigation has been estimated to be twice as high as in the USA (van Pottelsberghe de la Potterie and Danguy, 2009; Harhoff 2009).

Differently structured court systems also add to the litigation diversity in Europe. Whereas countries such as Germany, the UK and Finland have specialised courts dealing with patent cases, the Czech Republic and Estonia do not have them.

To illustrate the heterogeneity of patent enforcement in Europe, the following section describes patent litigation processes in the sample countries and in the EPO system.

Germany uses post-grant opposition proceedings whereby, within three months after the patent grant has been published, any person may request that it be revoked due to, for example, the non-fulfillment of patentability requirements. Industrial property offices will decide whether such a claim is substantiated and render a decision that can be appealed.

Appeals are decided by the office or transferred to the Federal Patent Court. All other patent cases, including infringement cases, are settled in the Federal Patent Court or in specific district courts appointed by Federal States (Lunze, 2007; EPO 2010). In the literature, German patent litigation is described as fast, relatively affordable and with a high level of technical competence. An additional advantage is that hearings are possible in specialised courts (Harhoff, 2009).

France does not allow post-grant opposition proceedings. Any person can request the industrial property office to issue "avis documentaire" after a patent has been granted. In this document, the industrial property office sets out its opinion on the patentability of the invention. The document can therefore be useful in subsequent court disputes about the validity of a patent. It is more important than the search report issued during the patent granting process, which only lists the documents that can be relevant when deciding whether inventions fulfil patentability requirements (Allgayer, 2005; Lunze, 2007). Later patent litigations, for example, infringement cases, are held in a specialised District Court of First Instance and the Court of Appeals in Paris (Lunze, 2007; EPO 2010). The advantages of French patent litigation are efficient preliminary injunctions, and, similar to Germany, the relatively low costs and experienced judges. The disadvantages are lengthy proceedings and the lack of technical competence in courts (Harhoff, 2009).

Compared to the two previous patent systems, the **United Kingdom** distinguishes itself by having an industrial property office which acts as a tribunal and decides a broad spectrum of patent issues, for example, the remuneration of employees and revocation of a patent. In other jurisdictions, industrial property offices first deal with pre-grant or pro-grants opposition proceedings, which are permitted within a certain time limit. In the UK, people can choose whether they are willing to submit claims to the Patents County Court (which handles less complex disputes), the Patents Court or the industrial property office, with the latter only acting within its competence as a tribunal. One should also consider that the office has fewer legal remedies, for example, the compensation of damages and destruction of goods, available than the courts (EPO 2010). The disadvantage of the UK patent system is its costs. In the UK, the costs of litigation can range from 150 000 EUR (fast-track procedure) to 1 500 000 EUR as a first phase and from 150 000 EUR to 1 000 000 EUR as a second phase. The advantages of the system are, for example, highly competent and experienced courts and fast proceedings without delays (Harhoff, 2009).

After a European patent has been granted, anyone may object to the **European Patent Organisation** within nine months and allege that the patent does not meet patentability criteria. The EPO will decide whether the patent will be revoked or maintained. The decision can be appealed at the EPO's Board of Appeal, which makes the final decision. Because a European patent is a bundle of national patents, any further patent litigation takes place in the jurisdictions of the EPO's member states. This means that the same patent may be subject to parallel litigation in several countries in Europe.

It can be surmised that due to differences in the legal procedures and legal practices, the outcome of disputes will vary among the EU member states. This reflects the complexity of patent enforcement in Europe and facilitates uncertainty among IPR Market participants.

6.4.4 Non-practising entities and a non-constructive use of patents

A further challenge relating to legal circumstances lies in the possibility of the non-constructive use of patents and their market. As US examples show, the legal system of patenting may give non-practising entities (NPE) the opportunity to earn profits against the original intent of the legislator. The following section analyses the challenges related to the role of NPEs in a potential IPR Financial Market in Europe.

Before analysing whether an IPR Market could increase the non-constructive use of patents or the development of non-practising entities, a short overview is given of NPEs.

6.4.4.1 Non-practising entities and their business (model)

In the last decade, a new business model, based on the external exploitation of patents, has emerged. Not only companies that develop, patent and produce goods exploit their patents externally, but also those that do not produce or that do not develop, patent and produce. These companies often litigate offensively to exploit their patents. Even though their actions are legal and within the parameters of the system, the main point of criticism against these companies is that they do not exploit patents according to the original meaning of the patent system. These companies are referred to as non-practising entities (NPE), non-producing entities, patent trolls or patent sharks. They have a broad range of business models and a common definition does not exist. The different names for these companies also show that they often have negative connotations due to their business model.

Definition and detection of non-practising entities

Non-practising companies¹⁴ use patents which do not form part of their own products to gain revenue from licensing (they do not use their patents). Some companies create these patents in their own R&D department, for example, Rambus, Qualcomm and Tessera; others buy patents from distressed securities or other willing-to-sell companies to litigate potential infringers, for example, Acacia. There is a wide range of them.

Reitzig et al. (2007) call this type of company a troll and define it as follows:

"Patent trolls (or sharks) are patent holding individuals or (often small) firms who trap R&D intensive manufacturers in patent infringement situations in order to receive damage awards for the illegitimate use of their technology. [...] We denote patent sharks or trolls as individuals or firms that seek to generate profits mainly or exclusively from licensing or selling their (often simplistic) patented technology to a manufacturing firm that, at the point in time

¹⁴ Recently, another term for this business model has emerged. According to the Federal Trade Commission, patent assertion entities (PAE) refer to firms whose business model primarily focuses on purchasing and asserting patents (Federal Trade Commission, 2011).

when fees are claimed, already infringes on the shark's patent and is therefore under particular pressure to reach an agreement with the shark." (Reitzig et al. 2007).

McDonough (2006) also calls these companies trolls and states:

"A patent troll is a person or entity who acquires ownership of a patent without the intention of actually using it to produce a product."

The term non-practising entity is more neutral than patent troll. The literature is ambiguous regarding whether an NPE is the same type of company as a patent troll. Magliocca (2007) states that an NPE is a troll:

"Some observers prefer to call these firms non-practicing-entities (NPE). This article uses the word troll because it is more colourful." (Magliocca, 2007).

"There is simply no way to subdivide NPE [Non-Practicing Entities] into 'good NPEs' and 'bad NPEs'. There is no judicially-manageable bright line between supposed 'patent trolls' and inventors who cannot practice their inventions because of resource limitations or managerial considerations." (Magliocca, 2007).

Other authors differentiate between NPEs and trolls (Layne-Farrar & Schmidt, 2009):

"This result leads us to reject the prevalent definition of a patent troll as any non-practicing or non-innovating entity. Indeed, NPEs are the least likely to exhibit troll behaviours. Instead, a better gauge is the presence of special conditions for a patent hold-up and the exploitation of irreversible investments, regardless of the business model of the patent holder."

From an extensive literature review, we identified the following criteria which are used to distinguish between trolls and non-trolls:

- Non-producing. A company is a patent troll if it gains revenue from licensing but does not produce goods or services – this leads to difficulties with the classification of single inventors, think tanks and universities.
- Products are not commercialised (Golden, 2007). This seems similar to non-producing, but many companies do not produce their products themselves. They are orchestrators that have outsourced their production and only take care of selected steps in the value chain, for example, Nike, Adidas and Apple.
- No own R&D (Rubin 2007). A company is a patent troll if it gains revenue from licensing but does not have its own R&D. This criterion clearly excludes think tanks, universities and inventors, as well as entities like intellectual ventures, as they have small think tanks.
- Acquires patents. A company is a patent troll if it buys patents instead of doing its own development. This includes many producing industry companies because buying patents is central for open innovation.
- Owns patents which do not cover the core business (Rubin, 2007). This is difficult for companies that have more business divisions, or small companies that are dependent on each single invention, and may hinder innovation.

The literature also defines trolls by analysing their behavioural patterns:

- A troll does not target ex ante licence revenue, but searches for infringements (Reitzig et al., 2007). This increases revenue, because companies may not have an alternative to pay, otherwise they would have to shut down production.
- A troll litigates low quality patents and gains overly licensed revenue (Fischer, Henkel, 2009).

The terms NPE and patent troll equally describe pure research companies and institutions that seek to license their technologies ex ante, i.e. before infringement occurs. In the following section, the term non-practising entity (NPE) is used to avoid a derogatory connotation. A company that fits the above definition may indeed behave like a proverbial malicious troll by deliberately hiding its patents, but it may also represent a serious inventor who failed to license inventions ex ante and years later finds them infringed (Fischer & Henkel, 2009).

The business model of non-practising entities

NPEs can be seen as opportunistic licensors that "flourish when there is a large gap between the cost of getting a patent and the value that can be captured with an infringement action" (Magliocca, 2007). Thus, NPEs may simply be seen as corporations that acquire undervalued patents in an attempt to profit through licensing and enforcement (Jones, 2007). According to Magliocca (2007), this "arbitrage" occurs in the following circumstances:

1. The costs of patents are low
2. Substituting the disputed technology is unreasonable
3. The outcome of infringement litigation is uncertain.

While these three elements are found in various industries, the deciding factor in determining whether trolling abounds is the pay-off. Profitability is always based on input-output reasoning, where higher costs have to be offset by higher rewards. Therefore, areas with high revenue will attract more NPEs than other comparable areas with lower revenue. NPEs often have the financial resources to amass patents and wait until they are inadvertently infringed, and then surface and threaten to sue (Henkel & Reitzig, 2007).

Their modus operandi can thus be separated into three distinct phases: growing patent portfolios, waiting for infringement to occur and suing the infringing company.

In the first phase, NPEs generate patents from their own inventions, licensing agreements or acquire patents from other, usually bankrupt, companies (Henkel & Reitzig, 2007). In the second phase, the NPE, as the plaintiff, waits until the defendant faces the highest substituting costs for the infringed technology. Even though it may have been easy to invent around, negotiate or acquire the required components during development, the troll often remains inactive until the manufacturer is "trapped" with the infringed invention (Henkel & Reitzig, 2007). As Henkel and Reitzig state, "when patents are hidden, companies unknowingly lack vital information when creating new products", which leads to inadvertent

infringement. The timing of the intervention is therefore of the utmost importance. The NPE will wait until market entry, when the costs of abandoning the product are at their highest and the defendant will be most susceptible to pressure. In the final phase, the NPE accuses the targeted company of patent infringement and offers a licence for the innovation. If the licence is declined, the troll sues. Often, patents are used as bargaining chips to avoid disputes by trading or cross-licensing them to other companies. Because trolls have no production, a legitimate business compromise is not a viable solution. This leaves the accused trespasser with only two courses of action: settle or litigate (Luman III & Dodson, 2006). The question for the defendant is whether the risk of litigation is worth the reward. Besides looming condemnation payments, the threat of injunction, as well as the litigation costs places the troll in a favourable position. The NPE consequently assesses the probability of success, the costs of litigation for the defendant, as well as the exposure and, accordingly, prices its settlement offer. The settlement will usually be more appealing than a long and uncertain patent dispute.

6.4.4.2 Evaluation of the situation of non-practising entities in an IPR (Financial) Market

Although abuse of the patent system should be prevented, the general situation around NPEs and their actions in Europe has to be analysed. In the following section, general facts regarding the impact of a (financial) market are collected, described and analysed.

NPEs are relevant players in the IPR Asset Market

Until now, the market for patents has been illiquid and faces the problem of information asymmetries (Lichtenthaler & Ernst, 2008). Only a few pioneering companies seem able to profit from this market. Many others have experienced major difficulties due to inefficiencies in the market and the lack of competencies to successfully utilise the market (Rivette & Kline, 2000). NPEs often procure their patents through acquisition. On the sell side, they always generate their revenue as licensors or sellers of patents. Hence, NPEs appear to be very active players in technology markets, as both buyers and sellers (Fischer & Henkel, 2009). McDonough (2006) even argues that they help to create an efficient market for patents by making them more liquid and by performing a market-clearing function. On the other hand, this rosy-eyed view of the market-making role of NPEs glosses over the possibility that they will exploit market imperfections to benefit themselves, and not the buyers and sellers of patents. The existence of asymmetric information regarding the value of patents may allow NPEs to set prices that are too low while buying patents from inventors and then subsequently licensing them for a hefty fee.

One interview partner confirmed that "the biggest part of the IPR marketplace right now is NPEs and patent licensing and enforcement companies".

In creating a functioning market, NPEs can probably not be excluded from the market for patents. If they are excluded, they would find a different business model to participate in an IPR Financial Market and in the patent market. As described above, NPEs have the

competencies to exploit patents externally and "beat the patent system". Exclusion would only lead to the creation of a different business model. The problem of NPEs possibly exploiting market imperfections is likely to abate over time, as buyers and sellers of patents gain experience and knowledge about pricing intellectual property assets. This could also be fostered by an IPR Financial Market.

One expert states that the disadvantage of NPEs being able to buy patents more easily is over-compensated by producing companies facing a functioning market with a higher level of transparency. He says: "There's no public market for this; we had no data, we had no idea. Following the creation of a public market this all of a sudden became public."

NPEs are only relevant in certain industries

NPEs' activity depends on the industry. Firstly, NPEs act mainly in industries in which they can generate significant revenue. Profitability is always based on input-output reasoning, with higher costs having to be offset by higher rewards. Areas with high revenue will therefore attract more trolls than comparable areas with lower revenue. As a result, NPEs mainly focus on the computing, telecommunication and mobile communication industries involving a great deal of money and where there are wealthy companies that can be targeted (Henkel & Reitzig, 2008).

Secondly, every industry is marked by different complexities and product life cycles. In the computer industry, companies strive to create a monopoly situation by attracting a large market share, and prioritise creating a de facto standard and minimising time to market. In this environment, infringements occur. Additionally, ITC products incorporate several (sometimes several hundred) patents. This leads to large patent portfolios and sometimes to patents with only small inventive steps. In the life sciences (pharmaceutical, biotech, chemistry) industry, the situation is markedly different (Reepmeyer, Gassmann & Rütter; 2011). The small molecules involved in drug development usually do not involve many patents and pharmaceutical products have long development periods and life cycles. Patent monitoring and screening are conducted more effectively and infringements do not occur as often as in ITC.

Careful consideration of and potential focus on the patents of specific industries may constitute an interesting way to reduce increased NPE activity. However, it should be considered that the industry is one of the main characteristics of successful patent exploitation. Because the ITC industry has patent portfolio structures and short development cycles, successful external exploitation of patents is possible. In the life sciences industry, on the other hand, the focus lies more on buying the entire company, including all tacit and explicit knowledge.

NPEs are interested in particular patents

As buyers of patents, trolls are solely interested in the exclusion right, not in the underlying knowledge. Similarly, when trolls sell or license patents, the transaction does not involve a technology transfer, since, by the very nature of the troll business model, the potential

licensee already uses the patented invention (Fischer & Henkel, 2009). Additionally, trolls sometimes purchase patents from struggling small businesses at bargain prices and then use these patents to extract high licensing amounts (Shrestha, 2010). NPEs also often buy infringed patents from an individual inventor who poses no real litigation threat due to a lack of funds. NPEs have ample funds to use to litigate (McDonough III, 2006)

Based on the knowledge of NPEs' demands, a potential IPR Market might be structured and offer trading in products related to patents, but not of interest to NPEs or companies which may use patents unfavourably. Creating a system and societal welfare-enhancing supply may reduce the misuse, or at least stabilise the numbers.

NPEs' business model works only partly in the European legal system

European patents seem less attractive for litigation by NPEs because contingency fees are not allowed, European countries take a loser-pay system; consequently, NPEs cannot file injunctions, and litigation costs are relatively small compared to the US. The lower litigation costs provide incentives for companies to fight against NPEs rather than pay royalties.

In Europe, NPEs also have to litigate separately in each country. On the one hand, this looks like a drawback for producing companies that want to enforce their patents. On the other hand, it makes things more difficult for NPEs with a strategy of taking a small amount from many different companies, because it is difficult and expensive to deal with the different systems in each country. One interview partner supported this view: "You cannot file one lawsuit like here in the US – in Europe you have to go to trial in every country. Each country has its own laws and rules, and you have to hire different attorneys. [...] That creates a lot of costs and risks, because you can get different decisions in different countries."

Another interview partner stated that NPEs seem to be less active in Europe due to its legal system differing from that in the US. In his view, "abusive" enforcement of IPR, as experienced in the US, is difficult to conduct or nearly impossible in Europe.

This leads to a relatively low involvement of NPEs in patent transactions. One interview partner stated: "Lawsuits are being filed and therefore they create the market. But that is different in Europe in several ways. You cannot file one lawsuit."

6.4.5 Consequences for the IPR Market

The business model of NPEs as described above indicates several weaknesses in the patent system, which are outlined below.

The lack of homogeneity across patenting systems in Europe causes uncertainty among the IPR Market participants. Investors will invest in a patent if they are sure about its quality and enforceability. It must not be (easily) revocable and patent litigation must be cost effective and time efficient.

The heterogeneity of EU member states' patent systems may constitute a barrier to establishing an IPR Market in Europe. Diverse patent granting and fragmentation of patent

litigation may result in the different pricing of patents, which is in turn made transparent by an IPR Market in Europe.

The existence of 27 patent systems in Europe could result in different patent pricings in an IPR Market in Europe. A patent's price will reflect the level of uncertainty that the market participants have about the patent system of the EU member state where the patent was granted. This could mean that patents originating in weaker patent systems could be priced lower.

Currently, the price of a patent originating in different EU member states is known only to the parties involved in the transaction. After a transparent IPR Market has been established in Europe, the uncertainty in Europe's patenting systems will become visible. This may result in different policy approaches regarding establishing an IPR Market in Europe in the EU member states.

The threat of different patent pricing may lead policymakers in EU member states with weaker patent systems to reject the establishment of an IPR Market in Europe. Member states that do not examine patents strictly or provide efficient court systems may want to prevent the uncertainty about their national patent systems from becoming obvious.

Rejecting the establishment of an IPR Market in Europe could also save such EU member states from having to improve their patent systems. They could be more actively pressurised into doing so by the EU as well as by the IPR Market participants who were dissatisfied with the pricing of their patents.

Many of our interview partners pointed out that although patenting in Europe is governed by too many national rules, national interest may prevent any changes to it. Countries wishing to be represented in the market might support easier patent granting processes and, thus, poorer quality; others may prefer fewer patents in the market, but ensure that the prior art is further developed.

Thus, countries that are not willing to improve their national patent systems may reject the establishment of the IPR Market in Europe and find other means to facilitate patent trading. Different pricing could be avoided if the IPR Market were opened for unitary EU patents of a certain quality. Most of our interview partners regarded a unitary EU patent and litigation system as a solution to the complexity and uncertainty of patenting in Europe. It was mentioned that only then would patenting in Europe become more attractive. On the other hand, listing only EU patents (and not national patents) on the IPR Market in Europe is questionable. Our interviewees expect European policymakers will avoid protectionism in Europe.

6.5 Supporting small and medium-sized enterprises

To be able to participate in the IPR Market, companies need to have a certain level of experience and financial liquidity. Especially start-up entrepreneurs with new technologies or ideas may be hampered by high patenting costs. High granting and maintenance fees, as

well as the possibility of being tied up in expensive infringement cases, may prevent an entrepreneur from commercialising the technology. This could impact the development of technology-orientated SMEs.

The high costs associated with an engagement in the IPR Market may deter overall innovation activity. Companies may tend to focus their innovation efforts on areas where strategic patenting is absent or only exists to a certain manageable degree.

In many industries, companies need to grow huge patent portfolios in order to circumvent costly infringement cases or have sufficient bargaining power when it comes to negotiating licensing arrangements. This increases the cost of market entry for newcomers.

It is a prevailing opinion that SMEs are important resources for innovation and employment (see, e.g., Friesike et al., 2009). In the case of wide industry acceptance and, therefore, the commercial success of an IPR Market, the use of the patent system will also increase. Not having access to qualified information and the high costs associated with issuing and enforcing patents are likely to put SMEs at a disadvantage against larger companies.

6.6 Patents as an asset class

Economic or business challenges related to the patent describe circumstances that are specifically linked to the IPR Asset Market. However, they are of relevance to both the IPR Asset Market and the IPR Financial Market as the patent serves as the underlying asset class for a potential financial market.

6.6.1 Patents properties

With this challenge, we refer to the premise that all actors have to understand the "underlying", i.e. the asset serving as a basis for financial products. Since patents are intangible and are understood differently, we see it as a challenge that actors from various industries, investors and bankers need to have a common understanding despite their possible different interests.

6.6.1.1 General awareness

Although most people in the business world have a basic understanding of patents, knowledge levels are still considered too low (Bader & Cuypers, 2008; Ullberg, 2010). IPR as an asset, as well as impersonal exchange markets for patents, is often unknown, because most people do not routinely work with IPR (Knight, 2001). Once a market has been established, possible investors could lack the necessary awareness to start trading patents.

Minoo (2006) states that patent information needs to be easily accessible to the public before the general awareness can be improved. In turn, Edfjäll (2007) postulates that "true patent information professionals may be in decline".

Several interview partners were of the opinion that patents are not yet a fully understood and accepted asset class. Some felt that a vast majority of potential investors do not understand patents' characteristics. One interview partner saw increased awareness from companies

and political institutions, but was not sure if this is a sustainable development or only a short-term phenomenon.

6.6.1.2 Liquidity of patents

Another challenge might be that patents are considered an illiquid asset class. Williamson (1988) defined liquid assets as assets that are redeployable. Patents, however, have no reasonable use other than the one for which they are designed. This may be a challenge in establishing an IPR market, because the technology that is protected by a patent is, in most cases, only valuable for a few companies. In addition, the only interested actors for a possible trade might be competitors.

Shleifer and Vishny (1992) summarise asset illiquidity:

"The principal reason for asset illiquidity [...] is the 'general equilibrium aspect of asset sales. When firms have trouble meeting debt payments and sell assets or are liquidated, the highest valuation potential buyers of these assets are likely to be other firms in the industry. But these firms are themselves likely to have trouble meeting their debt payments at the time assets are put up for sale as long as the shock that causes the seller's distress is industry- or economy-wide. When they themselves are hurting, these industry buyers are unlikely to be able to raise funds to buy the distressed firms' assets."

One interview partner mentioned that one of the drivers of the current state of the market for intellectual property rights is liquidity. Another interview partner saw liquidity as a main issue in market development. "Right now the major hurdle to developing a greater interest is liquidity. [...] True liquidity doesn't exist. You have to say you're willing to sell, find a willing buyer and have somebody who is willing to go ahead and mediate that exchange."

On the other hand, one of our interview partners saw a difference between countries. "It's a liquid market in the US, it's easy to get financing for acquiring patents or financing patent litigations. In Europe only a few players finance those or do deals with patents."

6.6.1.3 Asymmetric information

Akerlof (1970) developed the concept of asymmetric information in his elaboration on the "market for lemons". He postulated that a possible consequence of asymmetric information – where sellers have an advantage over buyers – is market failure. He pointed out that insecurity in terms of goods' quality prevents accurate valuation. Buyers then incorporate this insecurity in their expectations, thus leading to lower valuation results for all goods traded on the market. As a result, quality goods will disappear from the market as sellers cannot realise their estimated value in market transactions and only low quality goods will remain in the marketplace.

According to Lipfert and Loop (2006), market players need to gather and analyse a lot of information, although most of the crucial information is not accessible. For instance, a company does not want competitors to know how valuable a patent is or how important the underlying technology is or will be for the market. Hence, such information might not be

available to all players in the IPR Market, although that is crucial information for a transaction. This view was confirmed by our interview partners, one of whom stated that "it is very costly to get a decent assessment of each and every asset".

Included in this discussion is the general uncertainty and difficulty of forecasting technology and market mechanisms. Lipfert and Loop (2006) state that these mechanisms lead to higher transaction costs, which make various transactions appear unappealing. As a result, many transactions might not be realised, which could harm a market significantly.

An impartial third party could offer a solution (Lipfert & Loop, 2006), but might increase transaction costs. One of our interview partners did not think this would harm the market, because "the transaction costs are what you make them". In his opinion, decisions are no better if they are taken by 30 people instead of five. Hence, actors can decrease transactions costs by taking the risk that they run in any case.

6.6.1.4 Type of exploitation

Patents may be exploited in different ways, with the difference between carrot licensing and stick licensing being a major topic. According to Gassmann and Bader (2011), carrot licensing refers to the activity of searching for a potential licensee, who may be interested in using the licence, by using the licence commencing after the transaction. Stick licensing, on the other hand, describes the search for an actor who is already infringing one's patent. Use of the rights is therefore generally assumed to have commenced before the licensing transaction takes place.

The type of exploitation may constitute a challenge, since stick licensing may be associated with higher revenue. Smith (2001) states that carrot licensing leads to limited commercial success.

According to one of our interview partners, "enterprises infringe because they have no other choice". He is of the opinion that once a market is established, stick licensing loses importance due to more transparency. "[...] If we organise the possibility for enterprises to know what kind of IPR they need and give them the possibility to acquire them on a very transparent and fair basis, there will be no reason why they will take the risk of using the invention through infringement."

6.6.2 IPR Asset Market vehicle or financial product

The IPR Asset Market vehicle or financial product (hereafter called the "vehicle") itself faces several challenges that must be overcome before a functioning, organised marketplace for patents can be ensured.

6.6.2.1 Time horizon

According to one interview partner, a possible area of conflict lies in the structuring of, for example, patent funds with investment horizons of 3 to 5 years as demanded by investors, as opposed to longer value creation horizons of patents, especially in earlier stages of the life

cycle. Therefore, investors would have to accept longer investment periods, which would in turn lead to higher return requirements.

In order to match or prevent maturity issues, the investment time horizon of the vehicle has to be aligned with the underlying time horizon in value creation. This is particularly true if the vehicle is to be similar to incubating funds due to the discrepancy between patents' long-term development and commercialisation on the one hand and the short-term investment horizons of a portion of investors on the other hand. This was also confirmed by the interview partners. According to one of the experts, it is important that the structure follows the asset and not the other way around.

6.6.2.2 Business model

According to Fabozzi (2002), "CAPM (Capital Asset Pricing Model) asserts that the expected return on a security is equal to the risk free rate available in the market, plus a risk premium demanded by the market". Therefore, a challenge that arises (only) if privately owned capital must be raised, relates to the necessity of earning a return rate that covers the risk investors incur.

This raises the question of the choice of business models for potential vehicles. In order for a vehicle to attract privately owned capital, it needs to have a sustainable and profitable business model.

This challenge is linked to the type of exploitation of patents. According to one interview partner, R&D-intensive companies still prefer internally conducted R&D to external technology transfer (the "not invented here" syndrome). Therefore, litigation is still seen as the more plausible, profit-generating business model as mentioned in the section on the type of exploitation.

6.6.2.3 Delimitation of existing products

A further challenge related to the vehicle lies in existing or previous products' delimitation. Although official performance information on most patent-related financial products in Europe is not available, the interviewed experts doubted their positive returns. Therefore, a market that is to be newly established and its vehicles will need to be distinguished from negative experiences in the public view. The interview partners mentioned that it might be problematic to convince actors to invest in patent funds, especially in or shortly after a financial crisis.

6.6.3 Innovation paradigm

According to Lichtenthaler (2011), the strong trend towards active technology licensing observed in recent years follows the general trend of open innovation; the open innovation trend is increasingly discussed and implemented (Gassmann, Enkel & Chesbrough, 2010).

For instance, IBM, Solvay and BASF determine the inside-out process (referring to licensing IPR) as a core process in their open innovation strategy (Gassmann & Enkel, 2004).

Moreover, one interview partner explained that his company is in an important phase where licensing to exchange and share technologies is becoming increasingly important.

According to another interviewed expert, "open innovation has encouraged people to look outside their companies in the same way that Procter & Gamble does this from the point of view of trying to find new products; the intellectual property departments are also doing it [...]. And so people are now actively looking out for these kinds of patents to see if they can obtain some position on their IPR, as well as to defend their business in that field."

Consequently, a further set of challenges could lie behind the innovation paradigm companies choose. Licensing is difficult to conduct in closed innovation processes, i.e., if companies have not opened their innovation process to include other companies and allow a certain information flow or information spill-over. Hence, as the ruling paradigm, open innovation can increase licensing.

6.6.4 Industries

The value of patents (Giuri et al., 2007), the patenting behaviour of companies and the strategic use of patents differ across industries and technology classes (Bader, 2008; Levin, 1986; Griliches, 1990; Aurora, 1997; Ernst, 2001; Giummo, 2010).

As the role of patents differs substantially among industries, the suitability for an organised marketplace also differs. The experts' opinions were rather heterogeneous regarding the suitability and readiness of individual industries for an IPR Market. The following sections provide an overview of individual industries' suitability and reflect the most prominent industries represented in our quantitative survey (see chapter 4).

6.6.4.1 Automotive, construction and building

In 2009, the mechanical engineering industry (including automotive, construction and building) was responsible for the second highest number of patent applications in Europe (EPO, 2009a). With 23 415 patent applications, the industry is responsible for 17.4% of all applications. According to Gassmann and Bader (2011), most patent applications come from vehicles, machine elements and electrical parts. It is important to mention that it is not only mechanical engineering companies that are applying for patents, but in many cases their suppliers as well. They later use their patents in negotiations and leverage their own bargaining position. Arundel (2001) mentions that patents are most useful for companies in the mechanical equipment industry. This is because these companies sell products that are expensive to develop, but relatively cheap to imitate. However, as surveyed by Giuri et al. (2007), around 70% of patents in mechanical engineering generate less than 1 m. EUR, which indicates that patents in this industry are on average less valuable than in other industries, such as pharmaceuticals and chemistry. Giuri and Mariani (2005) disagree by stating that the literature underestimates the importance of patenting in process and mechanical engineering. They find that the share of unused patents in this industry is the lowest among all the industries assessed.

In respect of patent strategies, Blind et al. (2006) find that over 95% of companies regard the protection motive as highly important. Almost the same is true for the blocking motive (90%). The other strategies that were assessed, seem to be considerably less important: 40% of companies regard the exchange motive as highly important, 35% the incentive motive and 70% the reputation motive. Giuri and Mariani (2005) state that more than 50% of patents in process and mechanical engineering are used for internal purposes, which is very high compared to other industries.

Some interviewed experts regarded the automotive industry as suited for trade in IPR and for the creation of financial products based on IPR, due to the high number of patents per product (as opposed to, e.g., the pharmaceutical industry), implying that this is true for the mechanical engineering industry, including construction and building.

6.6.4.2 Healthcare, pharmaceuticals and chemicals

The literature generally agrees that patents in the chemical industry are an important and effective means of protecting innovations (e.g., Levin et al., 1987; Cohen, Nelson, & Walsh, 2000). For instance, Mazzoleni and Nelson (1998) determined that most high-tech industries (e.g., the computer, semiconductor and aircraft industries) rate other means of securing profits from R&D (e.g., a head start, establishing effective production sales and service facilities, and rapid movement down the learning curve) as much more effective than patents. However, chemical and pharmaceutical products are found to be an exception. Arundel (2001) argues that this is the case when the development of new products is expensive, but relatively cheap to imitate, which is especially true in respect of the chemical and pharmaceutical industries. Together with patents, secrecy is often mentioned as an effective means in this industry, especially for process innovations (Arora, 1997; Gassmann & Bader, 2011). Although it is known that in most industries a significant fraction of patentable inventions is not patented, this seems to be different in the chemical and pharmaceutical industries. Mansfield (1986) finds that in the chemical and pharmaceutical industries about 80% of patentable inventions are patented. Between 1993 and 1997, almost 60% of the granted patents were assigned to the chemical, pharmaceutical and mechanical engineering industries (Harhoff & Hoisl, 2007). These findings are consistent with other empirical research (e.g., Levin et al., 1987; Cohen, Nelson, & Walsh, 2000). According to a list of applicants the EPO published (2011), BASF was the dominant chemical patenting company in 2009 with 1 707 application, and was only surpassed by Philips and Siemens. In respect of the pharmaceutical industry, Bayer was the top applicant in 2009, with 838 applications.

In addition to the high value and use of patents in the chemical and pharmaceutical industries, it is said that chemical patents are validated in more countries and enforced longer than those in other industries (van Pottelsberghe de la Potterie & van Zeebroeck, 2008; Harhoff, Hoisl, & van Pottelsberghe de la Potterie, 2009). Furthermore, patents in the chemical industry contain more claims and fewer pages compared to the computer, telecommunication, audio, video and media industries. Industrial chemistry is said to have the strongest negative effect on the number of pages (van Zeebroeck, van Pottelsberghe de

la Potterie, & Guellec, 2009). Related to the importance of patents in these industries, individual firms tend to apply for a rather large number of patents (as stated above) in order to build protective walls (Cook, Doyle, & Jabbari, 1991). Especially in the case of a new chemical with an estimated significant value, companies try to secure returns by means of an active and offensive patent strategy and by blocking competitors. The findings of Giuri and Mariani (2005) support this statement: "About 50% of the patents in chemicals and pharmaceuticals are not used: 28.2% are 'blocking' patents and 22.3% are sleeping patents". The share of "blocking" patents is the highest among all industries evaluated. Cohen, Nelson and Walsh (2000) had a similar result. Moreover, Gassmann and Bader (2011) note that the chemical and pharmaceutical industry recently showed an increasing disposition to license. This statement is consistent with other literature, while Arora (1997) postulates that licensing is especially used to generate revenue from process innovations. An interesting fact could be that the "licensing of process technologies played a major role in enabling new firms to enter, and in turn, entry induced existing producers to increase licensing" (Arora, 1997).

"Licensing deals account for more than one third of all alliances in chemicals, but for only 18% and 24% in computers and electronics respectively. Further, almost 24% of licences within chemicals are signed prior to the development of the technology (...); in many of these, the licensee provides R&D financing to the licensor in exchange for future rights exclusive or otherwise to the resulting technologies. In contrast, fewer than 6% of contracts in computers and electronics involve ex-ante technology transfers." (Anand & Khanna, 2000) Moreover, "more than half of all transfers in chemicals involve some exclusivity clause, with worldwide exclusivity being granted in almost 40% of these. Conversely, only 12% of contracts are explicitly non-exclusive. Exclusive transfers are much less common in computers (18%) and electronics (16%)" (Anand & Khanna, 2000). Contracts may include various restrictions on the licensee's use of a technology. In addition, the authors find that, in the chemical industry, one can observe restrictions on the licensee's use of a technology in 40% of transfers. One finds substantial differences between the chemical and pharmaceutical industries in respect of litigation rates, since a case is filed for 20% of pharmaceutical patents, whereas the litigation rate for chemicals is very low.

Regarding the suitability of the healthcare, pharmaceutical and chemical industries for the creation of financial products based on patents, expert opinions differ, but show a tendency to believe that they are not suitable. Some experts regarded them to be well suited, whereas others doubted this. One expert stated that the chemical industry is not suited, since value creation takes place in the production phase. Another interview partner viewed all industries besides the pharmaceutical industry as suited. In addition, some experts mentioned that industries with few patents per product are not as well suited as those with many patents per product. Furthermore, it was stressed that the pharmaceutical industry still suffers from the "not invented here" syndrome, therefore hampering liquidity in the IPR Market and, consequently, preventing the creation of a financial market based on it. On the other hand, another interview partner saw, for example, healthcare as suited due to its nature as an "enabling technology".

6.6.4.3 High-tech industries

The computer industry applied for 6 259 patents in 2009, which is 4.7% of all applications in this year (EPO, 2009a). If only granted patents are considered, this share is only 2.5%, since only every fifth computer patent is granted (EPO, 2009b).

Anand and Khanna (2000) find that the probability of licensing between companies is about 46% in the computer industry, which is 4 percentage points higher than in electronics in general. Furthermore, only 18% of transfers in the computer technology field include some exclusivity clause, which is far below average. Hall and Ziedonis (2001) state that companies in the semiconductor industry do not depend heavily on patents in order to appropriate returns from R&D. However, the propensity of patenting in this industry has increased considerably since the mid-1980s. By differentiating between the manufacturing and design part of the industry, they identify two reasons for the rise in patenting per R&D dollar since that time, namely "increased patenting by capital intensive manufacturing firms and increased entry into the industry by design firms that need patents on their technology to secure financing".

In 2009, the semiconductor industry was responsible for 9.3% of the total patent applications in Europe (EPO, 2009a). This is 12 473 applications in total, of which more than every third application is granted (EPO, 2009b).

According to Anand and Khanna (2000), the above-mentioned importance of cross-licensing in electrical engineering is particularly true for companies in the semiconductor industry, since "most of these deals concern semiconductor technologies" (Anand and Khanna, 2000). "But these positive effects coincide with a process whereby firms amass vast patent portfolios simply as 'bargaining chips', leading to 'patent portfolio races'. In principle, such racing behaviour is not an inevitable outcome of strengthening patent rights in cumulative technological areas. If patent rights were strictly awarded to inventors of 'nonobvious', 'useful', and 'novel' inventions, then it should become increasingly difficult to obtain a patent when a thicket of prior art exists, and the number of successful patent applications should fall" (Hall & Ziedonis, 2001).

Considering a statistic of the most patenting companies from the EPO (2011) in 2011, seven of the first ten companies belong to electrical engineering. Philips and Siemens are ranked number one and two, with 2 135 and 1 765 respectively. The one point these industries have in common is the interdependence between companies that result from patents. No company can autonomously market new products anymore without being contingent on third-party patents (Blind et al., 2009; Gassmann & Bader, 2011). This results in cross-licensing actions, which are prevailing and inevitable for companies in this industry. As various researchers found, the share of cross-licensing in electrical engineering is above average (Anand & Khanna, 2000; Hall & Ziedonis, 2001; Giuri & Mariani, 2005). According to Giuri and Mariani (2005), 6.1% of patents are cross-licensed.

The experts were generally of the opinion that R&D-driven industries, like high-tech industries, will develop a strong patent market. One interview partner even stressed that the technology transfer market in these industries will be on a global scale. In addition, these industries were perceived as suited due to the high number of patents per product. On the other hand, one interview partner saw the high presence of litigation in the semiconductor industry as an obstacle to a marketplace evolving.

6.6.4.4 Consumer goods

In 2009, companies in the consumer goods industry applied for 12 922 patents (EPO, 2009a), which is 9.6% of the total applications. Of those, 4 868 patents were granted (EPO, 2009b).

Assessing the patent strategies of companies for different industries, Blind et al. (2006) find that 90% of companies in the consumer goods industry regard the protection motive as highly important. The importance of other motives is lower: 80% regard the blocking motive as highly important, 75% the reputation motive, 50% the exchange motive and around 35% the incentive motive.

Our expert interview partners did not express a certain view on the consumer goods industry. It was noted that the apparel industry may be suited to use IPR as a collateral since sales are separated from production. This refers to trademarks rather than patents, since they can be owned without owning the companies, which allows for collateralisation.

6.6.4.5 Telecommunication

In the telecommunication industry, the interdependence between companies is particularly distinctive (Gassmann & Bader, 2011). Leiponen and Byma (2009) state that companies in this industry are unlikely to find patents the most important mechanism for IPR protection. Nevertheless, in 2009 this industry applied for 8 193 patents, which is 6.1% of patent applications in all industries (EPO, 2009a).

Experts mentioned that the telecommunication industry is suited for the creation of financial products based on patents because there is already an active patent market.

6.6.4.6 Biotechnology

Although the biotechnology industry is closely related to the chemical industry, it differs in some points related to patent use and strategic behaviour.

Blind et al. (2006) find that over 90% of the responding companies regard patents as highly important. This is only higher in the rubber and plastic industry. "A reason why patents are so important in the biotechnology industry in particular is that, when one makes a biotech investment, fundamentally one is making an IP investment. Consequentially, the early-stage venture investors dig very deeply into the validity of that IP" (Graham, Merges & Sichelman 2010).

As published by the EPO (EPO, 2009a), institutions in biotechnology applied for 7 168 patents in 2009. Of those, 2 749 applications were granted, which is 5.3% of all granted patents in 2009 (EPO, 2009b).

According to Gassmann and Bader (2011), scientific institutions and universities are responsible for about half of the patent applications. Especially patents for process innovations have a negative impact on basic research, since these actors are unable to defray the costs incurred with licensing. In addition, Lerner (1995) indicates that small biotechnology firms do not possess as much capital as big pharmaceutical companies, while postulating that patent litigation costs influence young biotechnology companies' decision to patent. As already mentioned, van Pottelsberghe de la Potterie and van Zeebroeck (2008), as well as Harhoff, Hoisl and van Pottelsberghe de la Potterie (2009) note that biotechnological patents in the chemical and pharmaceutical industries are validated in more countries and enforced longer than in other industries. The effect on the size of patent applications is even higher, since "the biotechnology area has the most significant and one of the largest positive effects on the number of claims and pages. On average, a patent application in the biotechnology cluster holds one and a half more claims and more than four additional pages. Of course, genetic sequences included in biotech filings must also play a role in this oversized number of pages, but biotech applications also present more textual pages" (van Zeebroeck, van Pottelsberghe de la Potterie & Guellec, 2009). Assessing the motives for patenting across industries, Blind et al. (2006) find that in the case of the biotechnological industry over 95% of responding companies regard the exchange motive as highly important, which is the highest response rate compared to all other assessed industries. This means that licensing income, exchange potential and improved access to the capital market play an important role in this industry. Gambardella, Giuri and Luzzi (2007) come to a similar finding: "the rise of technology markets has encouraged many smaller firms and start-ups to follow a licensing business model whereby they choose strategically not to become downstream producers, but focus on technology licensing without investing in the complementary assets. Examples include the so-called fab-less or chip-less companies in semiconductors, or the small research-intensive firms in the biotech industry".

The experts generally believed that the biotechnology industry is not well-suited for the creation of financial products. They mentioned that, similar to the pharmaceutical industry, the "not invented here" syndrome currently hinders the creation of a proper patent market. Two other experts saw the biotechnological industry as a critical environment for the success of a patent market, which has yet to be proven.

6.6.5 Risks resulting from the patent as an underlying asset

6.6.5.1 Economic life risk

The upper limit of the economic life of patents is marked by legal regulations regarding the patent duration (often 20 years). The legal life restricts the maximum duration for which the patent holder is granted protection. At the end of the legal life, the underlying invention

becomes accessible to everyone. Therefore, patents, similar to bonds, are rights that possess a defined maturity.

The economic life of a patent can be shorter than the legal or contractual life when the underlying invention becomes substituted by newer technologies (Gassmann & Bader, 2011). Thus, the maturity of a patent is subject to uncertainty. Although the patent is valid until the legal life ends, the investor will struggle to generate income from the patented right on an outdated invention. The investor therefore faces the risk of a potential decline in the value of the patent due to technological substitution of the underlying invention. For instance, in Royalty Purchase Agreements or licensing agreements, payment streams could default as a consequence of technological progress and of licensees switching to newer technologies. Economic life risk could be compared to loans or bonds' credit risk.

One interview partner linked the economic life to value: "A patent can be worth a million dollars today and zero tomorrow. It all depends on the trends in the market; what's hot, what's not."

Another interviewed expert agreed: "To me, the biggest risk to invest in, if you were one of those public investors, is the remaining life, the actual economic life of what you are investing in. It can change so quickly with technology that it is superseded."

6.6.5.2 Legal risk

Legal risks embody all risks which are dependent on legal authorities or legal systems. They embody the risks of changes in a country's patent regime that might affect the economic value of a patent or patent portfolio. One such change would be the reduction in remedies with regard to patent enforcement, as is currently being discussed in the US Congress (Kuester & Bartel, 2009). The value of a patent is thus directly linked to the enforcement of the patent protection.

Legal risks also represent the risk of a patent being declared invalid. Patents are subject to invalidity challenges or re-examination procedures by patent offices (Gassmann & Bader, 2011). Consequently, an investor bears the risk of losing the entire value of the patent when it is annulled. Even if the patent is affirmed by the patent office, its patent protection can be restricted, which also reduces its value (Gassmann & Bader, 2011).

One interview partner saw legal uncertainties in the European system as a major risk when investing in patents. He described extended periods until patents are granted and appeals as "poison" for financial markets.

Patent quality is often mentioned together with uncertainty. One of the interviewed experts stated: "It may help to improve patent quality because of the greater scrutiny that will go into each patent if it is on the exchange."

6.7 Economics of creating a new market

The challenges in the following section are associated with financial markets in general, but especially need to be overcome when the relevant field is the establishment of an IPR Market.

6.7.1 Market creation

Since the concept of establishing a financial IPR Market in Europe implies the formation of new entities and possibly authorities (or at least the expansion of existing ones), the institutions' reputation has to be considered. This is particularly true when the concept of investor confidence is borne in mind (see section 6.7.5).

According to some interviewed experts, it may be difficult to source and select suitable people, as there may be a shortage in the pool of people in Europe who are available to conduct this business.

6.7.2 Transaction costs

Transaction costs are defined as the costs that occur when an asset changes its owner. It is a central goal of a capital market to keep transaction costs as low as possible (Bosch, 2001; Coase, 1937; Neumann, 2007). There are two kinds of transaction costs. *Explicit transaction costs* occur when an order is placed and are manifested in the form of fees that represent the execution cost of a certain trade (Spremann & Gantenbein, 2005). *Implicit transaction costs* are known under the term of bid-ask spread, which represents the searching cost for a potential contract partner and for negotiation (Spremann & Gantenbein, 2005). Remarkable implicit transaction costs occur when the market is illiquid (Bosch, 2001) (also depicted in section 6.7.3).

In the IPR Asset Market and the IPR Financial Market, the current implicit transaction costs are very high due to the lack of transparency and insufficient market breadth (see also sections 6.6.1 and 6.7.3). These costs lead to inefficient and illiquid technology transfer (Kuester & Bartel, 2009).

The concept of transaction costs is closely linked to the challenge arising from "actors and liquidity", which is described in the following subsection.

6.7.3 Actors and liquidity

Roth (2008) emphasises liquidity as an essential prerequisite for a market to perform optimally. He argues that failures have historically led to changes in market organisations. Roth calls his first principle "market thickness" (2008). A market has to attract enough participants who are willing to trade with one another. A functioning market is dependent on a large number of "customers". Bosch (2001) also emphasises that liquidity is "a central quality criterion for stock markets". It describes how well a market is able to react to any buying or selling order without influencing the actual price level (Bosch, 2001). Both authors see liquidity as one of the most important factors of a capital market.

Because there are many kinds of participants in financial markets, the term "liquidity" is viewed inconsistently. Based on Schwartz's (1993) approach, according to which liquidity "refers to the ability of individuals to trade quickly at prices that are reasonable in light of underlying demand/supply conditions", Bosch (2001) illustrates four dimensions to measure and evaluate liquidity.

- *Market depth*: "A market is deep if orders exist at an array of prices in the close neighbourhood above and below the price at which shares are currently trading" (Schwartz, 1993). In other words, the smaller the bid-ask spread, the deeper the market.
- *Market breadth*: When the transaction interest (volume) at a given price is sufficiently large, the market is broad. This means that high volumes can be traded without resulting in a remarkable change in the current market price.
- *Market resiliency*: A resilient market has the ability to attract new orders if there are temporary order imbalances to regain its depth and breadth.
- *Immediacy*: "A market is immediate when it is possible to transact new orders without delay given a certain level of market depth and breadth" (Bosch, 2001).

A market can also be regarded as liquid when the frequency of trades is sufficiently high. The less liquid a market is, the larger the bid-ask spreads becomes, which results in rising transaction costs. In other words, illiquidity makes markets unattractive due to price concessions for the quick execution of a trade (Schwartz, 1993). Therefore, market participants lose interest in trading on illiquid markets, because of the risk of high discounts if they want to sell their financial assets again. Mörmann (2008) argues that "liquidity attracts more liquidity" – the better the liquidity of a market, the more attractive it is to investors, and vice versa. If a market is perceived as illiquid, actors refuse to trade on it and liquidity deteriorates further.

6.7.4 Institutions and intermediaries

Leland and Pye (1977) and Chan (1983) stress the importance of financial intermediaries in overcoming information asymmetry between capital providers and capital seekers in financial markets. As Leland and Pye (1977) showed, investors are unable to differentiate between investment opportunities' quality in situations where information is not publicly available, leading to a demand for higher return requirements. The authors see the evolvement of intermediaries as a direct consequence.

Therefore, one of the interviewed experts stressed the necessity for large banks to be involved in structuring and placing patent-based financial contracts to enhance investors' confidence (see also the subsection on awareness and investors' confidence). This view is confirmed by Ellis and Jarboe (2010): "IA-based finance will only develop [...] if a number of mainstream financial firms get involved."

A potential challenge lies in the willingness and interest of major banks to engage in an IPR Financial Market. One of the interviewed experts was concerned that patents are still associated with a risk that is too high for the wider public, as these investors tend to prefer investments associated with low risk.

As another interview partner mentioned, an "ecosystem" has to evolve which enables the market to operate properly. This ecosystem involves both intermediaries on the IPR Asset Market and on the IPR Financial Market. However, he regards these as considerably less evolved in Europe. This view was confirmed by Monk (2009), who indicated that 72% of the patent intermediaries were based in the United States.

6.7.5 Awareness and investors' confidence

In addition to the challenges linked to theoretical concepts of financial markets as mentioned above, there is a potential challenge to investors' confidence. As experienced in rapid stock market movements, investors' behaviour is not always linked to rational decisions. In general, the better the challenges in the previous sections are addressed, the more likely the market participants will be to perceive a potential IPR Financial Market positively. Currently, when it comes to IPR as an investment, the market is still sceptical. Especially banks are still not comfortable with IPR, particularly due to the lack of valuation and risk uncertainties (Jarboe & Furrow, 2008; interviewed experts).

Before a financial market can be set up, market participants have to accept IPR as an asset in which to invest (Longauer, 2009; Jarboe & Furrow, 2008). This view was confirmed by the interview partners, who stated that one of the main problems in Europe is that IPR is not commonly perceived as a potential investment possibility.

In their elaboration on bank runs, Diamond and Dybvig (1983) describe the concept of investors' confidence well. Investors' confidence ensures that the market works continuously. Weak investor confidence results in instability and market failure. Irrational behaviour by market participants due to a lack of investor confidence begins with their suddenly shifting expectations regarding the market stability. Once market participants lose trust in its stability and start to leave the market, it is likely to crash.

Thus, a potential IPR Financial Market needs the market participants' trust. Market participants especially need to understand financial products, as mentioned by the interview partners, who consider investor confidence as crucial.

6.7.6 IPR Financial Market requires an IPR Asset Market

Our expert interview partners consistently stressed the importance of the IPR Asset Market for an IPR Financial Market to evolve. Therefore, a financial market based on IPR can only work if there is a functioning market for the underlying asset. The more liquid this market for the underlying assets, the more attractive the financial investment possibilities (Jarboe & Furrow, 2008). The basis in this case is the IPR Asset Market. There must be a market for trading patents, licences and know-how. These assets are highly heterogeneous, difficult to

value and usually involve high transaction costs. To license a technology in the IPR Asset Market today, the negotiation period between the licensor and the licensee can take up to 18 months (Malackowski, 2006). According to Jarboe (2008), “deals are few and far between [and] each transaction seems to be unique.”

Nevertheless, the market exists and is gaining in importance for companies, since their value currently depends highly on intangible assets, of which patents are a significant part. Therefore, the demand for a well-functioning patent transfer to optimise patent portfolios increases. The assets of this market are the property and legal rights of patents.

Several interviewed experts emphasised that an IPR Financial Market cannot be developed without having a more transparent and efficient IPR Asset Market. They generally considered three steps to be important in the development of an IPR Market. Firstly, there needs to be an efficient patent/licence transfer. Secondly, financial products will be created based on the more efficient patent/licence transfer. Thirdly, financial investors/speculators will gain access to the market.

One interview partner mentioned that a financial market would not work without the involvement of financial investors/speculators, as creators of certain financial products and liquidity providers, from the start.

6.8 Economic challenges related to potential risks

From the literature survey and expert interviews, we identified several risks that could affect actors, specifically investors, on an IPR Market. We analysed the literature on financial and other markets and on patents themselves. Based on this, we divide potential risks into two categories: risks that are known from financial markets, and risks that occur in selected markets. Both categories will be examined and evaluated in the following sections.

6.8.1 Risks known from financial markets

6.8.1.1 Systemic risk

A market-orientated systemic crisis typically manifests itself as a breakdown in the functioning of financial markets for traded assets such as stocks and bonds. It may develop in response to a sharp decline in the value of a particular asset (Hendricks, Kambhu, & Mosser, 2007), for example, the financial crisis of 2007 to 2009¹⁵ or the 9/11 attacks on the World Trade Centre¹⁶.

A market-orientated, systemic risk or "market gridlock crisis" typically starts with an ongoing decline in the price of a specific asset, which over time reinforces itself. This self-reinforcing process can be described as a run on the asset class when investors or financial intermediaries try to reduce their losses and sell their assets first.

The unwillingness of investors to step in on the buying side leads to illiquidity of the asset market. The breakdown of an overall asset market can again cause the collapse of individual institutions, thus reinforcing the systemic crisis.

Systemic risk can be broken down into the three dimensions of cause, spill-over effect and contagion effect (herding behaviour, animal spirit) (Lee, Lee, & Lee, 2010).

Actual causes that trigger the collapse of an institution or an entire asset market can be manifold. Typically, sudden and unexpected events are seen as the release of systemic risk. Macro-economic shocks and their effects on the financial sector are especially seen as the major cause of systemic risk. Furthermore, systemic risks arise from the financial infrastructure, especially from payment, clearance and settlement systems (compare settlement risk and operational risk). Systemic risk can therefore also be attributed to individual risk. The risk of failure of distinct settlement systems as well as the credit risk of an individual institution can be transmitted to the wider financial sector by the collapse of that

¹⁵ The collapse of the subprime mortgage sector in the USA and the resulting breakdown of financial markets for collateral debt obligations and mortgage-backed securities is an example of a market-orientated systemic crisis. In the aftermath of the breakdown of these markets, Bear Stearns and Lehman Brothers collapsed, causing a widespread threat to the overall financial sector. The Lehman Brothers case particularly shows the systemic risk resulting from the collapse of an institution. The triggering event of the financial crisis, however, is to be seen in the meltdown of the MBS market.

¹⁶ The attacks on the World Trade Centre show the vulnerability of the financial infrastructure. The clearance and settlement of US government securities are concentrated in two commercial banks. One of these banks suffered severe operational interruptions after the attacks, causing a slow-down in the transactions it settled.

institution. Therefore, the transmission effects (i.e. spill-over and contagion effect) must be considered.

Since financial institutions' balance sheets are interconnected, the failure of one institution directly affects other institutions' balance sheets and profit and loss accounts. This is the precondition for the spread of individual risks across the entire financial sector. This effect is also sometimes referred to as fundamental-based spill-over effect. Different asset markets and derivative markets are also closely connected. Thus the breakdown in a particular market can spread to other markets.

The contagion effect, meaning herding behaviour or animal spirit, refers to the propagation of financial distress, although there is no direct interconnection or contractual obligation among financial institutions. This results from the herding behaviour of market participants who do not distinguish between assets or institutions' different risk exposures to the triggering event or cause.

Systemic risk is inherent to any kind of system, whether it is a financial, economic or any other organisation. A collapse or malfunction of an institution in a financial market for patents, or the whole market for patents, would affect the broader economy in the sense of reducing or eliminating technology transfer and reducing innovation speed. It should be mentioned that the collapse of an entire asset market is mostly the result of speculative exuberances and macro-economic conditions (Hendricks et al., 2007). This is much more difficult to address. A central function by a central institution could be assumed to prevent an IPR Market being the next bubble.

6.8.1.2 Liquidity risk

Liquidity risk is typically understood in two distinct ways: from an asset side and from a liability side perspective.

Funding liquidity is based on the asset-liability structure of an institution's balance sheet. Funding liquidity risk refers to an institution's default risk when it fails to meet its payment obligations (liabilities) or, in less drastic cases, to the risk of losses in the event that positions are liquidated in order to meet funding obligations.

Asset liquidity is defined by "the time and costs associated with the transformation of a given asset position into cash and vice versa". In other words, asset liquidity refers to the ability to unwind a position at short notice without influencing the market price (Jorion, 2009). A definition of asset liquidity should therefore encompass three components (Murphy, 2008):

1. The time that is required to sell an asset
2. The transaction costs incurred when selling an asset
3. The degree of uncertainty in the asset's liquidation value

Therefore, asset liquidity risk can be described as the risk of a loss because an asset cannot be efficiently exchanged for its fair value. This means that an assets holder incurs costs when converting an asset to cash.

Liquidity is important for all markets. This includes either an IPR Financial Market where financial products based on patents are traded, or the IPR Asset Market for the underlying (patent). Liquidity in the asset market is a prerequisite for a financial market; therefore, it is analysed in section 6.7.3.

One interview partner mentioned that a low number of participants increase the risk of pricing diversions. Not only must the market settle down with regard to pricing, but liquidity must also be created to some extent.

Because liquidity risk is linked to the fair value of the underlying, liquidity risk in a market for IPR has to be seriously considered and can be directly linked to valuation issues.

6.8.1.3 Credit risk

Credit risk primarily refers to potential loss due to the counterparty's failure to fully fulfil its contractual obligation. Credit risk, therefore, implies the loss resulting from the unwillingness or inability of a counterparty to make a payment. This event is called default, or a default event. The counterparty can be any financial or non-financial company, government or individual. When applying mark-to-market accounting instead of accrual accounting, credit risk also encompasses an obligation's loss in market value due to the deterioration of the counterparty's credit standing and the book loss resulting from the deterioration of the collateral's value.

This view refers to the classical understanding of the credit risk of different forms of debt. The financial literature distinguishes between lending risk¹⁷ (Gregory, 2010), issuer risks¹⁸ (Murphy, 2008), counterparty risk¹⁹ (Bhatia, 2006), and country/sovereign risk²⁰ (Saunders & Cornett, 2011) as different types of credit risk.

¹⁷ Typically understood as lending risk and applies to any form of debt that has not been securitised, like loans, mortgages and credit cards (Gregory, 2010; Picoult, 2002). Thus lending risk subsumes all losses due to a borrower's default or the deterioration of a borrower's credit worthiness.

¹⁸ Includes the risk that the issuer of a debt security will default, or that the debt security's market value will decline as the credit quality deteriorates. According to Picoult, the default of an equity securities issuer is also part of issuer risk (2002). Their unilater character is common to both lending and issuer risk. This means that only one party bears the risk, which is the creditor. Regulators typically do not consider issuer risk as part of credit risk, but of specific market risk (Murphy, 2008).

¹⁹ Describes the possibility of losses due to a counterparty's default on a trade. Therefore, counterparty risk does not only include debt transactions, but also any financial transaction involving a counterparty. The counterparty risk in respect of derivative contracts, such as options, futures and swaps, is of major importance. Therefore, counterparty risk is also often considered as "credit risk between derivatives counterparties" (Gregory, 2010). Since it refers to derivatives' contracts, counterparty risk has a bilateral nature. Both parties are exposed to the risk. (Gregory, 2010). Counterparty risk appears in two forms (Picoult, 2002, p. 31/32; Bhatia, 2006, p. 11). Pre-settlement risk refers to the potential that a counterparty to a trade defaults before fulfilling its obligation in the final settlement. Settlement risk, which is short-term, subsumes failures during the process of exchanging cash flows. While one party performs its contractual obligation, the counterparty fails to

Overall credit risk has no upside risk or potential for profit; there is only a downside risk. In the best case, the interest rate and credit value are repaid (Bhatia, 2006)

Credit risk is predominantly found in debt markets such as bond markets. However, in the last decade, the financial sector developed mechanisms to transfer credit risk to other financial actors who are willing to bear the risk. Therefore, a completely new market for trading credit risks has arisen.

Counterparty risk also includes other forms of financial transactions and is imminent in any transaction involving counterparties.

Credit risk can also be relevant for IPR Markets. Especially in the case of licensing agreements or royalty purchase agreements, the patent holder is exposed to the risk of the counterparty's default, thus potentially incurring a loss of income streams.

6.8.1.4 Market risk

Market risk refers to potential losses in a portfolio's value due to unexpected changes in market risk factors. Risk factors are basic market prices in terms of which contracts are valued, such as exchange rates²¹, interest rates²², stock price indices²³ and commodity

perform (Picoult, 2002). This type of risk typically arises due to a time lag between initial payment and offsetting payment in an exchange of cash flows. Settlement risk can result from the default of the counterparty, but also from liquidity or operational problems during the transaction process (Jorion, 2009).

²⁰ Results from foreign investments, and is realised in two possible ways. If the counterparty is the foreign country itself, the sovereign risk implies the defaults or the deterioration of that country's creditworthiness. If the counterparty is any company in a foreign country, sovereign risk implies losses due to restriction imposed on debt payments by the government. In the latter case, the counterparty does not actually default and could be willing to perform its obligation. Nevertheless, a loss is incurred due to the imposed restrictions. (Bhatia, 2006; Saunders & Cornett, 2011).

²¹ Currency risk describes the risk that a portfolio's value will decrease due to floating exchange rates' movements or due to revaluation of fixed exchange rates. It arises from the volatilities and correlations between floating currencies and the risk of a fixed exchange rate's devaluation.

Each investment in an asset denominated in foreign currency is subject to currency risk. Accordingly, an investor needs to exchange future cash flows generated from the asset for the reference currency at a point in time. The value of the assets in terms of the investor's reference currency will change in line with fluctuations in the exchange rate.

²² The value of a fixed-income instrument largely depends on the interest rate. Interest rate risk thus refers to changes in the value of a fixed-income instrument due to general changes in the term structure. Here, the most important determinants of the term structure are macro-economic fundamentals like expected inflation and the central bank's monetary policy. Each bond is subject to interest rate movement. The exposure of different kinds of bonds may vary according to sensitivity (duration and convexity). Thus, the interest rate risk is the market risk of fixed-income instruments. Beside the general risk of movements in the term structure, fixed-income instruments incur specific risks, similar to that of individual equities. Specific risk factors only affect a particular fixed-income instrument. Fixed-income instruments run the specific risk that the issuer of the instrument may default (see issuer risk).

²³ To some extent, movements in stock indices are reflected in movements in individual stock prices. The risk of a loss due to movements in the overall stock market when holding stocks, is equity instruments' market risk. The market risk of equities results from the overall information regarding macro-economic conditions that affect all listed companies. No individual stock, and thus no investor, can avoid exposure to the overall market movements. The exposure may vary among different stocks. Depending on their exposure to the market movements, investors obtain a premium for investing in

prices²⁴. Movement in these factors will generally affect the value of the respective asset class and. Thus, the value of the portfolio (Brealey & Myers, 2008; Carey & Stulz, 2006; Saunders & Cornett, 2011).

All these factors are part of a potential IPR Market and could therefore affect the actors.

6.8.1.5 Operational risk

According to the Basel Committee of the Bank for International Settlement, operational risk is "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events" (Jorion, 2009).

Operational risk is therefore a wide-ranging category subsuming several risks related to a marketplace or financial institutions' operational reliability and functional efficiency. It includes technical risks such as errors in the clearing system. Additionally, this category contains risks regarding modelling errors, such as valuation errors, risks related to the market participants' malpractice, i.e. "behavioural risks" such as fraud and also legal and regulatory risks, for example, law amendments and infringement (Bader & Gassmann, 2011).

According to the definition of the Basel Committee, operational risk can be subdivided into the sources of the risk: people, processes, systems, external and physical risk (see Table 8).

the asset (asset pricing theory or CAPM). The effect of changes in these factors on the value of portfolios is also understood as systematic or undiversifiable risk according to modern portfolio theory. Additional to the market-wide movements, individual stocks prices show movements that are uncorrelated to other stock prices. The idiosyncratic movements relate to the listed company's firm-specific information, such as its business prospects. The risk of the issuer's insolvency or bankruptcy (see credit risk and issuer risk) is also considered a specific equity risk. Since idiosyncratic stocks movements are uncorrelated, an investor can diversify away from these risks.

²⁴ Commodity prices on the spot market are highly volatile due to their exposure to event risks, which affect supply and demand conditions. In the long run, however, commodity prices follow a trend that depends on production capacities and costs. Thus, investors who are directly invested in the spot markets or hold derivatives based on commodities as an underlying (forwards, futures and options) are especially subject to adverse movements in market prices.

Table 8: Operational risk.

Internal risks			External risks	
<i>People</i>	<i>Processes</i>	<i>Systems</i>	<i>External</i>	<i>Physical</i>
Employee fraud	Accounting error	Data quality	Legal	Fire
Employee error	Capacity risk	Programming errors	Money laundering	Natural disaster
Employee misdeed	Contract risk	System capacity	Outsourcing	Physical security
Employer liability	Product complexity	System compatibility	Political	Terrorism
Employment law	Project risk	System delivery	Regulatory	Theft
Health and safety	Reporting error	System failure	Supplier risk	
Industrial action	Settlement error	System suitability	Tax	
Lack of knowledge/skills	Transaction error	Security breach		
Loss of key personnel	Valuation error			
	Misselling			

Source: Jorion, 2009, Saunders & Cornett, 2011.

Operational risks are inherent to any market (financial and non-financial) or institution participating in a market. They refer to the operations of a marketplace rather than structural risks. Examples are the Flash Crash at the New York Stock Exchange on 6 May 2010²⁵ and Société Générale, the case of Jerome Kerviel, in January 2008²⁶.

Operational risks are inherent to any market or institution participating in a market. Consequently, a potential IPR Market will also be subject to operational risks in any of the listed categories. Avoidance of operational risks is practically impossible since the risks arise from the operations themselves. However, there will be several possible measures to mitigate such risks, primarily legal requirements or industry standards in the fields of employment, processes or systems.

²⁵ The Flash Crash was the biggest decline in the Dow Jones Industrial Index within one day. The index plunged by about 900 points, but recovered within minutes. Some early theories made the computer system responsible for the stock market crash.

²⁶ Jerome Kerviel was a trader at Société Générale who lost about about 5 bn. EUR in speculative trades on the bank's own account in 2008. During his time at Société Générale, he built up speculative positions of about 50 bn. EUR. It is an example of internal risk resulting from the misbehaviour of employees.

6.8.1.6 Other risks

Reputational risk

"Reputational risk is the risk that the bank's action will be perceived by clients, regulators or others to damage its reputation and hence lead to regulatory action, diminutions of franchise or other adverse effects" (Murphy, 2008).

Reputational risk is essential to the relationship between enterprises and stakeholders. However, reputational risk is not particularly finance-specific. Any sort of institution or corporation is subject to reputational risks resulting from its activities. Nevertheless, there have been various examples of reputational damages to financial institutions in recent years, such as Goldman Sachs and the ABACUS deal, AIG and its bailout, the US Treasury Department and its role in the financial crisis. It could be argued that financial institutions are especially exposed to reputational risks due to their reliance on investors and other stakeholders' trust. Although reputational risk is hard to quantify, it can have severe consequences for an institution. If realised, the damage to reputational capital can cause opportunity losses such as replacement costs for lost partners and costs for retaining and recruiting talented employees.

Reputational risk appears to be a kind of derivative risk. It occurs when other types of risk, such as credit risk or operational risk, have been realised, and an institution incurs damages to its reputation as a result. Reputational risks can also be seen as a subcategory of a wider definition of operational risk.

Specific institutions, not overall markets, are subject to reputational risks. However, it is possible that specific asset classes are also exposed to reputational damages. In the course of the financial crisis, for instance, small investors lost confidence in derivative financial products such as certificates due to significant losses after Lehman Brothers' collapse. Another example is stocks. After the speculative excesses in stock markets in the 1920s, small investors were reluctant to invest in stocks after the Great Depression.

Reputational risk is closely connected to (investor) confidence. Investors and other market participants need to trust the asset class and its institutions for a functioning IPR Market, as depicted in section 6.7.5.

Strategic and management risks

Management risk implies errors by management in business or financial decisions.

Business risk covers variations in a company's net income, resulting from business operations (Lee et al., 2010). Strategic risk is closely related to business risk, but focuses on potential losses resulting from incorrect strategic decisions by management, such as acquisitions (Ryser, 2003).

Financial risk relates to risks from a company's capital structure, for example, leverage ratio, and its impact on returns (Lee et al., 2010).

As in all financial markets, financial products based on patents could be exposed to strategic and management risks in two ways. The first happens when management decides to abandon the underlying patent even if the cash flow from it is stable. The second is only relevant for financial products based on licence agreements. In this case, a misleading management decision regarding the duration or amount of a licence could affect the financial product's performance.

6.8.2 Risks from alternative markets

The risks in the following section are associated with markets other than the financial market. In the last years, investors gained additional access to the diversification of their portfolios by selecting financial instruments based on, for example, electricity trading, real estate or the arts. The creation of the alternative investment market enabled this development. We have selected these markets either because the market is fairly new and comprises the latest experiences (power exchanges and electricity trading), or because the underlying shows similarities to patents (real estate and art).

6.8.2.1 Power exchanges and electricity trading

The liberalisation of the electricity market and the resulting development of exchange trading mechanisms for electricity in Europe could offer interesting characteristics that are potentially relevant for an IPR Market.

The predominant transaction mechanism is based on a long-term, bilateral contract. Owing to liberalisation, different power exchanges were set up and attracted a wider range of market participants. These power exchanges built up a liquid market for trading electricity (Aeschimann, 2007).

Similar to different laws and regulations for IPR, there are significant differences in the regulation of electricity markets. This has presumably led to the development of different power exchanges for the national market (Zenke & Schäfer, 2009).

Therefore, we analysed the markets and the predominant risks associated with them.

Electricity as a commodity shows high price volatility in spot markets (Bergschneider, Karasz & Schumacher, 2001). In contrast to primary commodities like crude oil, electricity is a non-storable commodity. Furthermore, the transmission and distribution of electricity is conduction-bound. In order to stabilise the electricity grid and prevent outages, generation and consumption of electricity need to occur simultaneously. Furthermore, the demand for electricity is relatively price-inelastic. Consumers can hardly substitute their electricity consumption with other energy sources. Additionally, demand is highly volatile, depending on daily, weekly and seasonal factors, such as the weather. In turn, supply also varies and depends on various factors, such as the generation system (hydro versus nuclear power). Another important characteristic is the homogenous quality of electricity. Each distinct unit of electricity does not differ in quality from any other. This is a major precondition for its tradability or fungibility (Hünerwadel, 2007).

Today, electricity is traded in three distinct ways: long-term delivery contracts between utilities, wholesale customers and retail customers²⁷, OTC trading (bilateral trading, where supplier and recipient agree in individually composed contracts on the terms of trade and the procurement quantity) and exchange trading (which allows the market participants to optimise their short-term demand or sales for the next day at the day-ahead market)²⁸.

In Europe, a number of exchanges were established after the liberalisation of the national electricity markets. Therefore, different power exchanges cover different regions or electricity markets.

The main difference is that the electricity market is based on units that do not differ in quality from any other. Therefore, the main risks, like market²⁹, liquidity³⁰ or credit risks³¹, also affect the actors in the electricity markets (Bergschneider et al., 2001), but only minor insights can be gained for an IPR Market. The electricity markets' situation resulting from the different characteristics of the underlying and also a regular (although volatile) demand and supply, which is guaranteed in developed countries, is not directly comparable to that of an IPR Market.

²⁷ The delivery contracts are largely standardised and vary only with respect to delivery quantity. They serve to match long-term demand and supply.

Nevertheless, this transaction form has been criticised by regulatory authorities due to concerns about constraints to the market's competitive structure. The liberalisation of electricity markets across Europe has fostered the development of two alternative transaction forms: OTC trading and exchange trading.

²⁸ Both transaction forms provide spot markets as well as forward markets. Spot markets allow short-term sourcing optimisation as well as short-term sales optimisation. Forward markets offer derivatives (options, futures, forwards) to hedge the high price volatility in the spot market. Thus, trading power exchanges integrates trading a physical commodity and trading purely financial products.

²⁹ In electricity trading, a utility company's relevant risk position is the net position, the sum of the delivery commitments (short positions) and the supply positions (long position). The net position describes the aggregation of the sales portfolio (including sales to retail and wholesale customers, forwards, futures and options) and the supply portfolio (including generation capacity, procurement contracts, forwards futures and options) at a given point in time. Since utilities are market participants acting on both trading sides, the net position describes their net exposure to market price volatilities based on positions on the demand side and on the supply side.

The valuation of the net position follows the mark-to-market principle. Therefore, the net position is subject to the risk of unfavourable movements in market prices due to high price volatilities. The risk depends on the exposure, which is the size of the net position and the price volatility. Since the net position and the market price change continuously, the value of the net position changes as well.

³⁰ The market liquidity risk generally refers to illiquidity's negative impact on the market participants. It can generally be equated with the liquidity risks in financial markets.

³¹ Similar to financial markets, credit risk in electricity markets refers to the risk that a counterparty could fail to fulfill its contractual obligations. Here, the obligation consists either of delivering financial payments or the physical delivery of the commodity. Therefore, there are two forms of credit risk: default on financial payments and replacement costs. Concerning the commodity's physical transaction, the default of a counterparty causes replacement costs for the trading partner. If the buyer defaults, the contractor (typically a utility company) incurs costs regarding reselling the commodity. If the contractor defaults, the buyer incurs replacement costs in respect of repurchasing the desired amount of the commodity.

The credit risk has become very important in the electricity market due to the shift from long-term, bilateral contracts to short-term transactions, like OTC trading or exchange trading. New market participants without an adequate capital base or the necessary know-how have entered the market.

6.8.2.2 Carbon emission trading

The principle of carbon emission trading arises from the concept of externalities. When polluting, actors create external costs to society for which they do not pay. The goal is to charge polluters a price that matches the marginal societal damage they cause by emitting. This price is the present value of the societal damage their emission causes (International Monetary Fund, 2008). "Faced with such a 'carbon price' – an addition to the price paid for the underlying resource itself (such as coal) – they will not emit beyond the point at which the marginal cost of reducing ('abating' or 'mitigating') their emission is less than that price. In this way, the marginal cost of abatement is equated to its marginal social benefit (from reduced damage)" (International Monetary Fund, 2008).

The origins of CO₂ emission trading are described in the Kyoto Protocol, which defines the "binding emission targets [for] industrialised countries" (Butzengeiger & Michaelowa, 2004)³². The emission trading system was established to fulfil the goals of this protocol (Umwelt Bundesamt, 2009; Butzengeiger & Michaelowa, 2004). The idea of emission trading is based on the cap and trade principle. The traded products are referred to as CO₂ emission rights or CO₂ emission allowances, which give the owner the right to emit one ton of CO₂ per allowance per year (Garnaut, 2008; Bundesamt für Umwelt, 2008). These emission rights are limited (to ensure that the global sum of emissions decreases over time) and traded freely on the market. Each participating country (127 so far) receives as much emission allowances as it was allowed to emit according to the Kyoto Protocol targets. In the European Union, for example, heavily emitting industries are legally forced to participate in the emission trading market (Umwelt Bundesamt, 2009). In Switzerland, on the other hand, politicians work with tax exemptions. If a company participates in emission trading, it does not have to pay emission tax, but it has to cover its emissions with allowances (Bundesamt für Umwelt, 2008).

There are several emission exchanges in the world. Prominent examples are the:

- CCX (Chicago Climate Exchange) in Chicago (Chicago Climate Exchange, 2011)
- CTX (Carbon Trade Exchange) in London, Australia and New York (Carbon Trade Exchange, 2011)
- Asia Carbon Global in Singapore (Asia Carbon Global, 2011)
- CO₂ Emission Trading in Switzerland (Bundesamt für Umwelt, 2008)
- EEX (European Energy Exchange) in Frankfurt/Leipzig (European Energy Exchange, 2011)

The carbon exchanges all trade CO₂ emission allowances. One of these allowances is equal to one ton of CO₂ emissions. If a market participant does not have enough allowances to cover its own CO₂ emissions at the end of a year, it has to buy additional certificates from

³² For further information regarding the Kyoto Protocol and its content, see the home page of the UNFCCC – United Nations Framework Convention on Climate Change (2011).

other market participants. In this way, companies that would have had to invest a limited amount of money in their emission reduction are willing to sell their allowances on the market (as long as the market price is higher than the investment per ton of CO₂ emission reduction). Companies that would have had to invest more funds in an emission reduction, are more likely to buy allowances on the market. As a consequence, the emissions will be reduced cost-effectively (Bundesamt für Umwelt, 2008). A company is thus forced to buy emission allowances to cover its total amount of emissions in order to avoid financial punishment such as taxes or surcharges (Umwelt Bundesamt, 2009).

The CO₂ emission allowances are totally homogeneous, as one allowance is equal to the right to emit one ton of emission. The structure is very easy for the market participants to understand (Umwelt Bundesamt, 2009). In addition to the spot market, there is a derivative market for carbon emission rights. As an example, there is the possibility to trade carbon emission rights options and futures on the EEX (European Energy Exchange, 2011).

Since carbon emissions are completely homogeneous and interchangeable, the market faces the general risks associated with financial markets, such as market, liquidity and credit risks. Compared to electricity trading, carbon emission rights show lower price volatility, as a fixed number of emission rights are traded and carbon emission rights do not have to be consumed instantly (as electricity cannot be stored). The idea for a patent market derived from the emission trading market would be to trade allowances to produce a certain amount of products using a certain technology. The patent itself cannot be split into sub-rights. Licences, on the other hand, can be multiplied, as long as they are non-exclusive. Every licence contract is usually unique and bilaterally shaped. However, based on the carbon exchange market design, the licensee would not pay a percentage of its revenue, but for the amount of products it produces using the technology. This means the producer has to buy an allowance for every product it produces, similar to the CO₂ emission allowances, where an emitter has to buy allowances for every ton it emits. These units would be completely homogeneous and no longer dependent on the negotiations between the two parties; this would be a step in the direction of standardisation. The IPXI, for example, is based on the same principle.

6.8.2.3 Real estate market

Real estate is a highly heterogeneous asset, meaning that each unit is distinct from another in terms of, for example, size or geographic/economic regions (Seiler, Webb, & Myer, 1999). Focusing only on financial investors' interest, the ability of real estate to generate cash flow and store value is important; the consumption purpose for holding real estate can be ignored. In addition to heterogeneity, real estate has other physical characteristics, such as immobility, long production times, long life cycles (it has virtually no maturity), and restricted convertibility. The characteristics of heterogeneity, long production times, long life cycles and restricted convertibility are similar to the characteristics of patents and provide an interesting market for comparison. Additionally, the market for real estate is relatively illiquid compared

to other assets. This is similar to the market for patents. Illiquidity results from the indivisibility of real estate prices (Seiler et al., 1999).

While direct investment is settled largely in bilateral, individually negotiated contracts, indirect investments, for example, open-ended funds, closed-end funds or real estate investment trusts (REIT)³³, are subject to formalised transactions in OTC markets or exchanges (Seiler, Webb, Myer, p172).

Investors in real estate mainly face object risk³⁴, rental risk³⁵, performance risk³⁶, financing risk³⁷, conceptual risk³⁸ and prospectus risk³⁹ (Schäfer & Conzen, 2010).

Similar to real estate, investments in patents incur considerable administrative and maintenance costs. Since patents are a right to enforce exclusion from using a technology, a patent is only valuable as long as it is enforced. Therefore, costs are incurred to enforce and extend the patent claim¹. These costs reduce the investors' return and could pose a barrier to attracting new investors to the market. Additionally, rental risk could occur in IPR Markets. If a licensee is unable (or unwilling) to pay the licence fees, the patent does not generate a cash flow. Financing risks can be compared to a lack of funding, for example, the development of a prototype or the in-licensing of a necessary third party patent to produce a good. Financial products based on patents are in an early stage of development, therefore conceptual risks could occur when constructing financial vehicles. The same is true of prospectus risks, which is a general risk in indirect financing.

³³ In order to overcome the disadvantages of traditional investment in real estate, alternative vehicles have been developed for indirect investments in real estate. Indirect investments allow investments that can be divided; therefore, investors can participate in the real estate market without large upfront investments. Transaction costs are also lower (Schäfer & Conzen, 2010). All these points help to attract a wider range of investors, which improves the investment vehicles' liquidity.

³⁴ Refers to risks to the physical condition of the property. It includes catastrophic risks such as earthquakes, but also quality defects that can reduce the property value. Object risk can be mitigated by, for example, insurance.

³⁵ Includes traditional credit risks that the tenant may default on payments. It also includes the risk that after a rental agreement's expiration, no new tenant will be found and, thus, no cash flow will be generated from the particular real estate.

³⁶ Refers to the downside risk of changes in the real estate value. In this context, important risk drivers are location as well as long-term economic and short-term cyclical developments. Performance risk can be seen as a portfolio of real estate's market risk or a particular property's idiosyncratic risk.

³⁷ Refers principally to the risk that a particular investment in real estate is not covered by the necessary funding. Investments in funds are subject to the risk that the fund cannot attract the necessary funding for the planned investment.

³⁸ Only affects indirect investments in funds and involves failures in funds' conceptual design with respect to legal and fiscal issues.

³⁹ Refers to potential mistakes or flaws in the issue prospectus. This is, on the one hand, relevant to funds' managers since they guarantee the given information. On the other hand, investors have to rely on the information in the prospectus and are therefore subject to the risk of faulty information about the fund.

6.8.2.4 Art market

The pivotal characteristic of an artwork is its dual use for the owners. On the one hand, artwork is held for consumption purposes and non-monetary benefits such as collecting. On the other hand, artwork represents financial assets that store value and reap capital gains (McAndrew, 2010). Therefore, the value of artworks has a subjective and a financial component. Artwork is unique because of its aesthetic and artistic quality. There are no close substitutes for a specific work of art. Artwork is generally defined by its heterogeneity and the absence of substitutes (McAndrew, 2010). The uniqueness also implies that artwork cannot be duplicated. The duplicate will not possess the same immaterial characteristics, for example, originality. Therefore, its authenticity is of major importance (Landwehr, 1998). Additional characteristics that make artwork a favourable asset class are its international marketability, although it can be restricted by legal regulation in some cases, for example, export legislation. Additionally, art markets are illiquid. Artwork is traded infrequently, due to the consumptive purpose of holding it. Transaction costs such as auction fees or commission can also add up to a significant amount and reduce the investor's return (McAndrew, 2010). The uniqueness and idiosyncratic value of art, the exclusion of other users and the illiquid market are similar to patents and their markets. Based on these similarities, the risks of the art market are analysed and compared with a potential financial market for patents.

The primary market for artwork is the transaction of new artwork either directly from the artist to collectors or through intermediaries like brokers or dealers. The primary market manifests itself in artists' studios, art fairs, festivals and galleries (McAndrew, 2010). The secondary market is the place where artwork is resold. The dominant actors in the secondary market are auction houses and dealers.

Generally speaking, no homogenous market for artwork exists; instead, one has to think of "a conglomeration of distinct markets". The art market consists of fragmented submarkets along geographic, objective (e.g., genre) and temporal means. This already shows that the art market is subject to market imperfections and does not fulfil the perfect market paradigm's basic assumptions (Landwehr, 1998). This market is characterised by a lack of transparency and efficiency, which increases the transaction costs.

Besides traditional risks that financial assets incur, artwork is subject to particular risks, namely authenticity, provenance⁴⁰ and physical risk⁴¹. These risks can be regarded as subcategories of the specific risk (see market risk).

⁴⁰ Artwork is unique due to its specific artistic and aesthetic characteristics. No duplicate can have exactly the same characteristics. Artwork is therefore particularly subject to forgery, theft and illegal trade on black markets. An important risk to investors in art markets is the risk of forgery and fakes. For potential buyers in the market, it is often difficult to judge the authenticity themselves. The risk of forgery makes extensive enquiry by experts necessary, thus increasing the transaction costs. However, expert errors are also possible (Goodwin, 2009).

Another risk factor is the provenance of artworks. When investors acquire an authentic artwork in the market, they must ensure that the work was not stolen. If this is the case, the purchaser is not actually granted ownership and can be subject to lawsuits by the original owner (Danziger & Danziger, 2010, p. 287).

Similar to patents, artwork can be seen as an exotic or alternative asset class. Art has already attracted new investors pursuing purely financial motives due to the development of vehicles that allow indirect investments, such as art investment trusts and open-ended funds (Eckstein, 2008). It shows that art has characteristics similar to those of patents. A major difference is that cash flow generated from patents is based on technical innovation and marketable products, and not only on individuals' taste or passion. Therefore, the problems in the markets are the same⁴², but the main risks, as described above, are not transferable.

6.9 Patent (e)valuation

6.9.1 Definition of value and its determinants

As an introduction to valuation, the concepts of value, price and costs need to be delimited to define the targeted parameter of the valuation process, i.e. its result.

6.9.1.1 Value as opposed to price and cost

Contrary to customary uses, economic terminology differentiates between the concepts of value, price and cost. As Fishman, Pratt and Morrison (2007) state, the two latter terms relate to the transaction processes' results, whereas value does not necessarily result from a transaction agreed upon by two parties.

Price is a synonym for the exchange ratio in goods defined in a transaction, whereas value defines an individual's preference in a decision-making process; therefore, the two concepts may appear formally equivalent at first glance, even though they are not (Bartsch, 2005).

Costs are delimited from value, due to their nature as the input in goods used in production, as defined by Wurzer and Reinhardt (2010). They argue that a transaction is only conducted if the good's value as determined by the buyer lies above its costs.

Value is in general determined by each actor's individual preferences, since it is derived from "all future benefits of ownership, compressed into a single payment" (Smith & Parr, 2000). More precisely, Pitkethly (1997) defines value as "the direct financial value of a patent or patent application per se, must be the value of the potential extra profits obtainable from fully exploiting the invention defined by the patent's claims in the patent's presence compared

Auction houses act as clearing and settlement bodies to eliminate these risks by examining and verifying the provenance and authenticity of artworks(McAndrew,2010, p12).

⁴¹ Physical risk describes the risk of the loss of or damage to the artwork due to fire, theft or other events. This type of risk is inherent to any material asset. However, physical risk is much more relevant in the case of art, since a specific work of art cannot be replaced due to its uniqueness. Only the financial value can be recovered through insurance.

⁴² Investors hesitate to invest in artwork, although it is seen as an attractive asset class. Firstly, the art market is unregulated, which poses a risk to investors when they invest in art funds. Secondly, the lack of efficiency and transparency in the market makes art less attractive compared to other asset classes. Thirdly, high transaction costs can reduce the investors' return significantly. Fourthly, there is no long-established performance record of funds managers, who, traditionally, play an important role in investors' investment decisions (Eckstein, 2008).

with those obtainable without patent protection." Therefore, value is a parameter specific to the individual actor and there is no objective value (Wurzer & Reinhardt, 2010).

6.9.1.2 Determinants of value

Patent value is highly dependent on the patent's context and ownership. According to Moser and Goddar (2007), determinants of value can be grouped into three dimensions, as outlined below.

The technological dimension describes a technology's uniqueness, novelty and innovation level or its current location in the life cycle (Moser & Goddar, 2010). Patent value is influenced by, for example, an existing product's qualitative improvement or by decreasing production costs due to the use of a technology covered by the patent (Gassmann & Bader, 2011).

The economic dimension describes the product's market covered by the patent. According to Gassmann and Bader (2011), the influencing factors are market potential, market volume, market growth, industry structure or product life cycle.

The legal dimension enables owners to extract value from their patents and therefore has considerable influence on the patent value. This is determined by the validity, scope of protection, dependence on other patents and the remaining legal life of the patent (Gassmann & Bader, 2011; Moser & Goddar, 2007).

6.9.2 Methods to derive patent value

After the definition of the term "value" and the identification of its main drivers, methods to determine patents' value will be examined. The following section provides an overview of evaluation (commonly referred to as qualitative methods) and valuation (quantitative methods). The focus is on the latter, as these aim to assign monetary values to patents. This is more appropriate in the context of (financial) market transactions, whereas qualitative methods are generally viewed as management tools in companies. Table 9 provides an overview of evaluation and valuation methods' strengths and weaknesses.

Table 9: Strengths and weaknesses of evaluation and valuation methods.

Valuation approach	Strengths	Weaknesses
Monetary	<ul style="list-style-type: none"> • Can be used for all valuation occasions • Has the potential to be standardised and is comparable in different companies • Can fundamentally be aligned to the needs of both the capital market and the company 	<ul style="list-style-type: none"> • Many different methods • Standardisation and comparability not yet fully developed
Non-monetary	<ul style="list-style-type: none"> • Often tailored to the circumstances of the particular company • Can easily be adjusted to changes in requirements 	<ul style="list-style-type: none"> • Not suitable for capital markets or accounting purposes • Isolated solution

Source: Bader et al. (2008).

6.9.2.1 Evaluation (qualitative methods)

According to Gassmann and Bader (2011), the aim of patent evaluation is to identify the strengths and weaknesses of patents. These methods serve as tools in decision-making processes in patent management. They do not derive a monetary value as a result, but rather a statement of the patent's importance.

Patent evaluation can be conducted on a mono-, bi- or tri-dimensional basis. Mono-dimensional evaluations constitute a stand-alone analysis of patents or patent portfolios. Patents are assigned valuation numbers or ratings for predefined criteria; (weighted) averages then allow for comparability with other patents or patent portfolios. Criteria may be objective or subjective; subjective criteria are, for example, user attractiveness or inventing around, whereas frequency in citation or geographic scope constitutes objective criteria (Gassmann & Bader, 2011; Hall, Jaffe & Trajtenberg, 2005; Reitzig, 2002). The latter group of criteria generally forms the basis of patent rating methodologies as developed by, for example, PatentRatings or 1790 Analytics.

In contrast, bi- and tri-dimensional evaluation methods are typically used for comparison in cross-licensing negotiations (bi-dimensional) or to determine the position of a patent portfolio, depicting more variables simultaneously (tri-dimensional). For example, Brockhoff's (1999) methodology considers technologies or patent portfolios according to their simultaneous relative patent position, technology attractiveness and technology importance and positions them in a matrix (Brockhoff, 1999; Gassmann & Bader, 2011).

Evaluation methods can be viewed as useful tools in patent management, as they allow a comprehensive assessment of patents and patent portfolios. Their main advantages lie in the resulting strategic recommendations and that they can be communicated well due to their systematic scales and/or graphic representations. In addition, subjective indicators can help to assess patent value more realistically.

The result strongly depends on the criteria selected and whether objective or subjective criteria dominate the assessment. With subjective criteria, individuals' opinions may differ substantially, making it difficult to harmonise evaluations. Therefore, comprehensive evaluation is generally associated with high costs, since a sufficient number of qualified individuals with expert knowledge are needed to obtain comparable results. Objective criteria, on the other hand, are regarded as less cost-intensive, since, for example, geographic scope and forward citations can be obtained from databases via standardised processes. According to Amram (2005), the latter is regarded as a representative parameter for patent value.

Since patent evaluation offers an assessment of patents without resulting in figures represented by currency units, it may be important for potential market actors in the patent selection process. However, it is of no use in generating figures that lead to determining potential transaction prices.

6.9.2.2 Valuation (quantitative methods)

This section describes the patent valuation approaches that are currently available, and their suitability in the context of a potential IPR Market in Europe. Even though there are many approaches, they can be grouped into three generic models which differ in terms of the value's source (Smith & Parr, 2005). Table 10 provides an overview of these models.

Table 10: Valuation approaches and methods.

Approaches	Cost approach	Market approach	Income approach
Methods	Reproduction cost method	Market prices in active markets	Direct cash flow prognosis
	Replacement cost method	Analogous method	Relief-from-royalty method
			Multi-period excess earning method
			Incremental cash flow method

Source: Gassmann & Bader (2011), IDW S 5 (2008), Smith & Parr (2005).

The strengths and weaknesses of the three approaches are summarised in Table 11; they are described in the following section.

Table 11: Strengths and weaknesses of monetary valuation approaches.

Valuation approach	Strengths	Weaknesses
Cost-based	<ul style="list-style-type: none"> • Relatively easy to apply • Results can be understood easily • Relatively little scope for interpretation 	<ul style="list-style-type: none"> • No statement possible about the future financial benefit • Often based on historic data
Market approach	<ul style="list-style-type: none"> • Very easy to apply when there are suitable active markets • Reflects the market assessment 	<ul style="list-style-type: none"> • There are few active markets for patents • Limited range of comparable transactions • High fluctuations in volatile markets
Income-based	<ul style="list-style-type: none"> • Reflects the expected future financial benefit • Corresponds to both (external) capital market requirements and (internal) requirements of patent management • Can be used for all occasions • It is possible to identify the factors that determine value and model them transparently • Changing future expectations can be modelled in subsequent valuations 	<ul style="list-style-type: none"> • Relatively high expenditure in terms of time and information processing • Large scope for interpretation

Source: Bader et al. (2008).

6.9.2.2.1 Cost-based approach

According to Wurzer and Reinhardt (2010), the cost-based approach assumes that the costs incurred when creating the patent determines its value. The two most prominent methods for calculation are the historic cost method and the replacement cost method, which are outlined below.

Reproduction cost method

The historic cost method determines patent value by summarising all costs which were incurred when the patent was created. This includes, for example, the cost of scientists, engineers, input factors for prototypes, laboratory rent and patent filing expenses (Smith & Parr, 2000). Turner (2000) includes the time value of money in the patent value calculation in order to arrive at a result comparable to current figures.

Replacement cost method

Rather than summarising historic inputs, the replacement cost method aims to calculate all the input factors that will be necessary to rebuild the patent at present conditions. This is not necessarily a 1:1 copy of the patent to be valued, but needs to ensure that the same objectives, as reached with the original patent, are met. These may also be achieved with newer technologies. Although these costs are purely virtual, they have to consider the depreciation and potential obsolescence of parts of the patent (Gassmann & Bader, 2011; Smith & Parr, 2000).

Assessment of the cost-based approach

The simplicity and (generally) low costs associated with calculation are the major advantages of the cost-based approach when calculating patent value. However, calculation is only simple and inexpensive if the data are reliable and easily available. As Razgaitis (2009) states, R&D costs are usually specifically hard to delimitate. Inception and completion of research projects are rarely exactly defined and expenses cannot easily be allocated to specific patents.

Some authors argue that the future economic benefit, and therefore, the economic value of a patent for a user do not correlate with the R&D costs incurred (Bertolotti, 1996; Anson, Suchy & Ahya, 2005; Sullivan & Wurzer, 2009). The cost-based approach may even undervalue patents with a high future economic benefit and overvalue those with a low future economic benefit (Loop, von Scheffer & Lipfert, 2005).

Since the cost-based approach is a purely backward-looking one, it may only be applicable from the perspective of potential sellers in a marketplace, as a potential buyer is only interested in future benefits (see, e.g., the definition of value by Pitkethly, 1997).

6.9.2.2.2 Market-based approach

The market-based approach aims to determine patent value by drawing conclusions from price-building mechanisms on the market.

Market prices in active markets

According to Moser and Goddar (2010), a simple method of determining value is to offer the patent in a market and determine potential buyers' value via their offers. This method takes an active market with enough potential buyers to receive suitable offers for granted.

Analogous method

The analogous method aims to identify patent value by using market prices for similar patents as an indication (Lianyuan, 2000). According to Smith and Parr (2005), four prerequisites are necessary for the analogous method to deliver a meaningful result:

1. The objects must be similar
2. The objects must be traded on an active public market
3. The transactions have to be close in time
4. The transacting parties must act at arm's length

This valuation method clearly depends on the availability of comparable patent transactions. However, comparability is limited because patents are unique. To ensure comparability and obtain a meaningful valuation, Rings (2000) emphasises the following characteristics:

- Range of application
- Degree of novelty
- Competition in applicable market(s)
- Remaining life
- Legal protection
- Market and industry characteristics
- Potential for follow-on inventions

If individual transactions are not used to derive patent value but the transactions' average, the methodology applied is called the "multiplier method". This method considers groups of similar transactions and corrects discrepancies by applying a correction factor (Wurzer & Reinhardt, 2010).

As market prices are not only be observed in patent sale transactions, but also in licensing agreements, the latter can also be used for value determination, leading to the concept of the relief-from-royalty method. According to Burr, Stephan, Soppe and Weisheit (2007), this method combines the market-based and the income-based approach. It will be discussed in section 6.9.2.2.3, where it takes patent-specific risk in the discount rate into account.

Assessment of the market-based approach

The market-based approach offers a simple and inexpensive valuation technique, given that its assumptions are fulfilled. In addition, it derives the monetary figure that market participants are willing to pay and takes into account expectations of the future economic benefit to the buyer (Gassmann & Bader, 2011).

On the other hand, the underlying assumptions of an active public market, the comparability of patents and the frequency of transactions are not yet fulfilled (Parr, 1998).

Consequently, the market-based approach may not yet be considered an appropriate valuation technique. However, if a potential IPR Market emerges, it can gain importance and acceptance as one valuation approach among others which gives a quick and simple first impression of potential patent value at little cost.

6.9.2.2.3 Income-based approach

In the income-based approach, the net present value of the future cash flow arising from the patent, defines the patent value (Günther, 2009). In the following section, the common methods of calculation are presented, which differ in definition and identification of cash flows attributable to patents. It must be noted that patent-specific cash flow may sometimes be hard to identify, as patents may be part of a portfolio or require complementary assets for value creation (Wurzer & Reinhardt, 2006).

Direct cash flow prognosis

According to Razgaitis (2003), this method estimates future cash flow and discounts it at an appropriate rate. The cash flow is defined by what can be directly attributed to the patent itself. It is a direct method of calculating patent value, as cash inflow can change via, for example, premium pricing, and cash outflow can change due to, for example, cost savings (Smith & Parr, 2005).

The discount factor serves two purposes: it represents the time value of money, while ensuring comparability of cash flows in different time periods, and it embodies the risk associated with the ownership of the patent. Burr, Stephan, Soppe and Weisheit (2007) adapt the calculation by introducing different phases represented by different discount factors, therefore considering variable patent-specific risk.

Incremental cash flow method

When valuing patents according to the incremental cash flow method, a fictitious comparable company, which does not own or make use of the respective patent, is introduced. The company's future cash flow is compared to that of the fictitious company. The difference is considered to be attributable to the patent and serves as the patent value after being discounted at an appropriate rate (Gassmann & Bader, 2011).

Multi-period excess-earning method

The excess-earning method treats the patent value as a residual parameter resulting from the patent's cash inflow after deduction of all the cash flows that can be attributed to supporting assets. These assets are viewed as necessary for creating the cash inflow, and fictitious rent is calculated for their use (Wurzer & Reinhardt, 2010). The resulting cash flow is considered attributable to the patent and serves as the patent value after being discounted at an appropriate discount rate (Gassmann & Bader, 2011).

Relief-from-royalty method

The relief-from-royalty method includes both market-based and income-based characteristics. It is considered the most widely used patent valuation method in business practice, as it is easy to use and comparatively good data are available (Koller & Hentschel, 2006; Bader et al., 2008).

This method assumes that the patent owner saves on paying licence fees due to patent ownership. After deriving the appropriate licence fee from comparable patents, the revenue generated by the patent are multiplied by the licence fee rate in order to forecast future licence fee payments over the remaining life. These payments are then discounted by an appropriate discount rate to allow for patent-specific risk and the time value of money, and to derive the patent value (Gassmann & Bader, 2011).

Assessment of the income-based approach

The income-based approach offers advantages over the previously mentioned approaches in terms of detailed analyses and a forward-looking valuation. It can therefore be considered appropriate for both potential buyers' and potential sellers' interests.

On the other hand, the detailed forecasting of several parameters is time-consuming and requires substantial resources. In addition, detailed forecasting implies a situation that is more error-prone since many parameters have to be determined (Gallandi & Kratz, 2010), which is even worse in the multi-period excess earning method, where all other assets have to be valued, too (Moser & Goddar, 2010). Furthermore, the relief-from-royalty method does not account for differences between patent ownership and licence-taking, therefore missing the value of decision-making (Nestler, 2006; Kasperzak & Witte, 2009).

In summary, the income-based approach has its shortcomings in terms of resources and errors but still appears to be the most applicable and applied model at the moment. Over time, it may be accompanied by more market-based methods.

6.9.2.2.4 Other approaches

Having characterised the three generic approaches in patent valuation, two further approaches are depicted as they enhance patent value by considering managerial decisions. The flexibility inherent to these models creates additional value, since the patent owner has the additional opportunity to act after specified uncertainties have been resolved (Baecker, 2007).

Real options method

According to Wurzer and Reinhardt (2010), the real options method enhances the income-based approach by including options for decisions and determines patent value by means of option pricing models, for example, Black-Scholes, for stock options. As patents are generally associated with uncertainty regarding future economic revenue, options can carry

considerable value; in case of certainty, options would be worthless, as depicted by Bittelmayer (2007). He considers the following as the most important options:

1. The investment option, which enables the owner to observe the market and enter a market without competitors
2. The divestment option, which provides the opportunity to cancel a project early to save costs
3. The expansion option, which, for example, allows the owner to expand the geographic scope of the patent

The real options method is more useful for valuing younger patents, as they carry higher uncertainty, than for older patents. This context usually shows a higher difference in valuation between the real options method and the income-based approach (Reitzig, 2002).

However, the method carries the same drawbacks as the income-based approach. In addition, option pricing currently faces the problem that neither the underlying nor the option are traded (Pitkethly, 1993).

Therefore, the real option method may serve as a useful tool after the market for patents has become more liquid, but is not expected to play a prominent role in the current state.

Decision tree method

Similar to the real options method, the decision tree method also considers options for decisions and allows managerial flexibility. This method is usually applied in the pharmaceutical industry, where decision milestones are often determined by clinic phases' results (Gassmann & Bader, 2011). More generally, the nodes of the decision tree are determined by all significant decisions in the commercialisation process (Razgaitis, 2003b) and each event needs to be assigned a probability of realisation.

The decision tree method faces largely similar advantages and disadvantages as the real options method and the income-based approaches. In addition, determination of probabilities makes this method more difficult to apply, as it adds another potential source of forecasting error.

6.9.2.2.5 Approaches from applications

This section enhances the theoretical methods of patent valuation with approaches encountered in practical applications.

UK IPO

The UK IPO does not have specific licensing rates (unlike the German Patent and Trademark Office, as will be shown in the next section), but provides a "royalty calculator" on its website (UK IPO, 2011). According to the guidelines, several factors are relevant when determining the licensing rate:

- the type of IP that is licensed,

- the range of granted usage,
- the way of usage,
- the duration of usage,
- the termination of the licensing contract.

For example, the range of granted usage can vary from one individual eligible to use the IPR to an entire company. Another important determining factor is the way of usage. The licensing rate might vary, depending on conditions like the exclusivity, sub-licensing or the restriction of distribution channels.

German Patent and Trademark Office

The arbitration board of the German Patent and Trademark Office offers documented licensing rates for all kinds of inventions, based on the International Patent Classification (IPC). The licensing rates in this documentation are recommendations based on historical licensing rates. The main objective is to support negotiating parties to find a licensing rate for their licensing contracts. In the simplified process of determining a licensing rate for a specific patent, the invention's IPC first needs to be determined, after which the historical licensing rates for that specific IPC can be looked up in the documentation. Of course, there are complex rules and guidelines, for example, regarding maximum licensing rates. The licensing rate is always taken from the patent's reference value, which usually equals the net price of the product. For example, the licensing rate for a disk saw would be 4% of its reference value (Hellebrand, Kaube & Falckenstein, 2007).

Online transaction databases

An example of online databases is RoyaltySource, which provides actors with information to support their valuation of IPR. The company AUS inc. provides an online service which uses databases to help its paying customers receive information regarding valuation, negotiation and licensing of IPR. The services offered include data on royalty rates for transactions, help with negotiation of IPR transactions and information on recent IPR transactions and litigations (RoyaltySource, 2011).

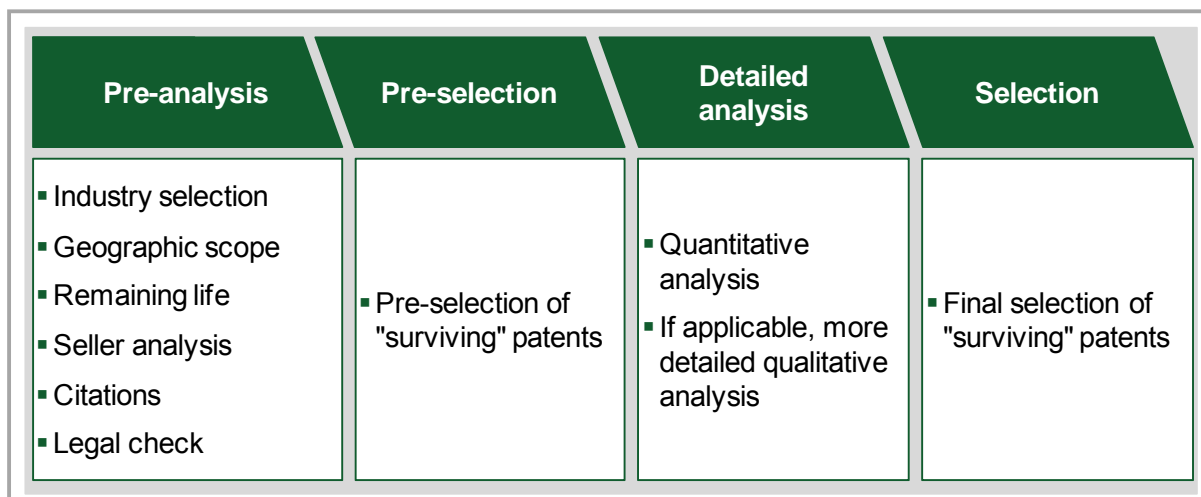
6.9.3 Patent selection

In the course of establishing an IPR Financial Market, the active vehicles in this market need to be able to select appropriate assets, i.e. patents. Therefore, a potential generic selection process which enables vehicles to identify patents that are worth being acquired, is shown.

6.9.3.1 Exemplary selection process

This section draws on the findings regarding patent evaluation and valuation; characteristics of these methods are combined with the opinions of experts interviewed for this chapter. An exemplary selection process was derived from the experts' views on evaluation and valuation methods, and is shown in Figure 67.

Figure 67: Exemplary patent selection process.



Source: Own illustration.

6.9.3.1.1 Pre-selection criteria (qualitative methods)

The selection process resulting from the expert interviews is grouped into pre-selection and selection phases. The examination of the parameters in the pre-selection phase generally requires fewer resources than the analysis in the second phase, and helps to reduce the number of targets in a structured way.

Industry selection

As patent selection requires specialist knowledge, the interviewed experts were of the opinion that target industries constitute a good first selection criterion for a vehicle. They argued that the allocation of resources is perceived more efficiently if vehicles' experts can use their industry expertise. However, the expert opinions on suitable industries differed widely.

Geographic scope

A second criterion, which can be easily, quickly and inexpensively examined, is the patent's geographic scope. In addition, geographic scope is a strong influencing factor in patent valuation. Generally, experts were of the opinion that patents should cover at least Europe, while the US and Japan were also mentioned as desirable regions.

Patent creation

The interviewed experts considered the previous owner (likely the inventor) of the patent as a potential indicator of the patent value and quality. Private inventors, universities and SMEs were viewed as less stable providers of patents, even though they are sources of blockbuster patents with a high value potential. Large companies tend to provide higher quality patents – especially in legal terms. In sum, the experts viewed the inventor as a valuable indicator but

were of the opinion that exploitation options regarding the patent are more crucial than the patent's source.

Citations

Although the number of citations is widely used in practice to prove the importance and value of a patent, the opinions of the interviewed experts differed widely on this topic. If a patent is not cited by others, it is generally perceived that it either covers a very innovative field or is of low importance to other parties. However, frequent citations do not necessarily indicate high patent value or quality. The experts viewed citations as an easily obtainable indicator in pre-selection, but generally doubted their value in the later stages of the selection process.

Remaining life

With regards to the patent's age, experts viewed the remaining economic life as the most valuable indicator. The remaining economic life is also of special importance to the income-based approach in patent valuation, as it determines the length of the forecasted cash flow. Not surprisingly, the experts favoured patents with long remaining economic lives, for example, determined by the underlying product life cycle.

Legal aspects

All the interviewed experts stressed the importance of a patent's legal aspects. In their view, at least a superficial legal check should be part of the pre-selection process. However, detailed legal examinations are part of the selection process thereafter, as they usually require more resources.

Technologic and economic parameters

Since technologic and economic parameters are not perceived to be well standardisable and depend on their individual context, the experts mentioned that other criteria are better suited for pre-selection and these parameters could be predefined. For instance, target industries and markets can be defined, after which patents fulfilling these requirements could be screened according to their technological and economic aspects.

6.9.3.1.2 Selection (quantitative methods)

Even the experts from the field of patent valuation and selection had different opinions on the applicability of quantitative methods, i.e. patent valuation, thereby confirming the finding that valuation constitutes a major challenge.

All the experts perceived the cost-based approach as an inappropriate tool for patent selection, mainly because it is a backward-looking method that does not provide figures on future implications.

The market-based methods were also not perceived well – at least for the present situation. The main drawback lies in the price mechanism's current opacity in the patent market and the lack of comparable transactions.

For the selection process of potential patent market vehicles such as patent funds, the interviewed experts regarded the income-based approach as the best alternative for the time being, although it has disadvantages. The analogous method was mentioned most often as the most appropriate technique.

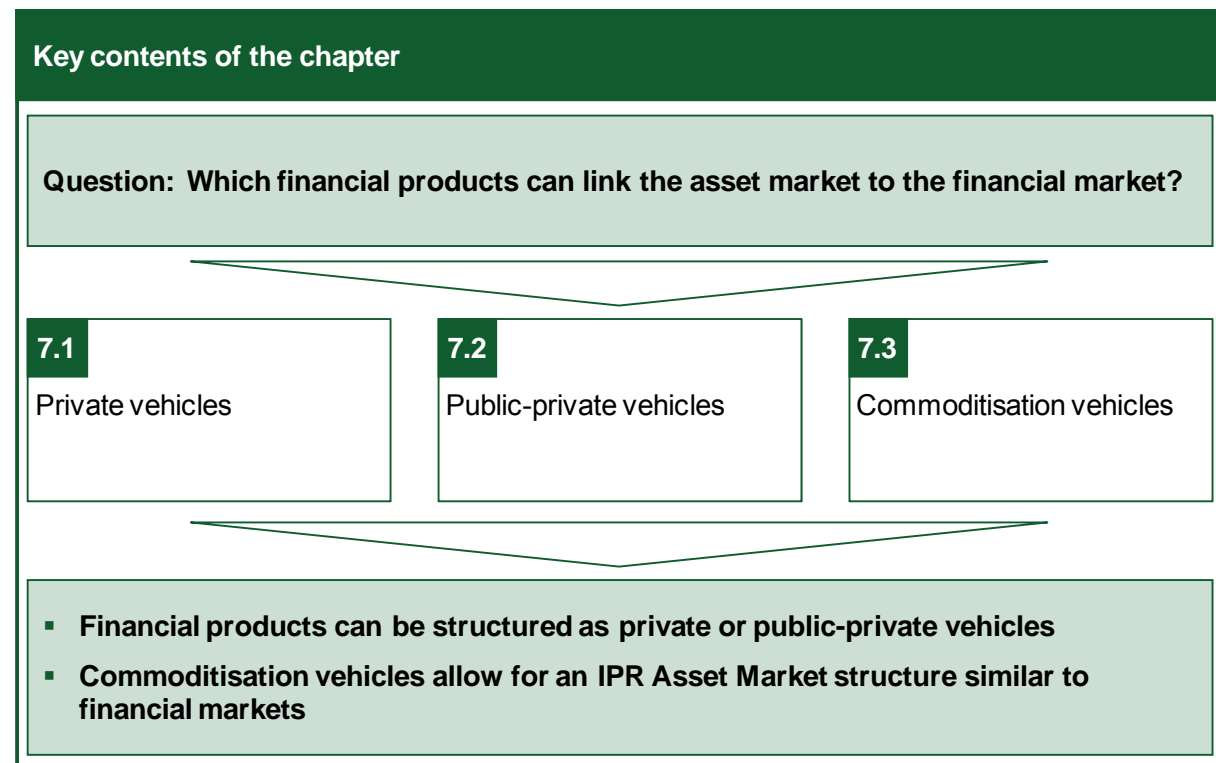
Other valuation approaches were generally not judged to be appropriate for the selection process.

6.10 Main findings

Main findings of the chapter

- Several challenges have to be overcome before an IPR Financial Market can be established and function properly
- Challenges arising from the EU's position towards foreign IPR Markets address the geostrategic perspective and global environment the EU faces
- Challenges linked to the alignment of interests include access to and funding of IPR, the location of the marketplace as well as taxation issues
- Challenges referring to optimisation variables in innovation are the trade-off between competition and innovation policy, the long-term objectives of the research system, the diffusion of innovations as well as the trade-off between private investor return and societal welfare
- Legal challenges comprise the observable increase in patenting, the current uncertainty and the complexity of patenting, patent quality as well as the potential non-constructive use of patents
- Since SMEs are perceived as important resources for innovation and employment in the EU, a further challenge lies in the accessibility of the IPR Market for these companies
- The acceptance and usability of patents as an asset class pose challenges in the form of the patent's properties (e.g., illiquidity and asymmetric information), the business model of asset market vehicles (e.g., the investment time horizon), the innovation paradigm adopted by companies, industry-specific characteristics and risks resulting from the patent's nature itself
- Economic challenges in market creation include set-up procedures, the reduction of transaction costs, attraction of liquidity, the establishment of institutions, ensuring investors' confidence and a properly working asset market for patents
- Risks from existing financial markets and comparable asset markets have to be borne in mind, for example, systemic, liquidity, credit, market and operational risks
- A further challenge lies in the differing valuation methods that are applied by different actors, leading to (sometimes substantially) diverging viewpoints on individual patent values
- The most important challenge extracted from the expert interviews lies therein that an IPR Financial Market requires a well functioning IPR Asset Market

7 Financial products related to IPR Markets



This chapter presents potential financial products linked to the financial market structures discussed in chapter 5. These financial products connect the IPR Financial Market with the IPR Asset Market and their characteristics influence the trade in assets, i.e. patents and licences.

7.1 Private vehicles

Private vehicles are financial instruments funded by investors from the private sector (as opposed to the public sector). According to International Accounting Standards (IAS), there are two instrument types: equity-based instruments, for example, patent funds and their shares, and debt-based instruments, for example, IP securitisation and related financial products. Our interview partners also stressed these categories, of which an illustration with examples is given in Table 12.

Table 12: Illustration of debt and equity instruments.

Instrument	Cash obligation for principal	Cash obligation for coupon/dividends	Settlement in fixed number of shares	Classification
Ordinary shares	No	No	n/a	Equity
Redeemable preference shares (x% fixed dividend each year)	Yes	Yes	No	Liability
Redeemable preference shares (discretionary dividends)	Yes	Yes	No	Principal: liability Dividends: equity
Convertible bond (converts into fixed number of shares)	Yes	Yes	Yes	Principal: liability Conversion option: equity
Convertible bond (converts into shares to value of liability)	Yes	Yes	No	Liability

Source: PricewaterhouseCoopers (2006).

When classifying financial instruments, multiple features need to be considered. According to Wallace (2006), these include whether the issuer will be forced to redeem the instrument, if the issuer has an unconditional right to avoid settlement, or if the issuer has the option to exchange the rights in the instruments against a financial asset, for example, cash.

In the following section, the types of private vehicles are described in more detail and characterised separately.

7.1.1 Equity-based vehicles

In addition to equity-based vehicles, this section discusses a privately financed patent fund as an example, after which equity-based vehicles are analysed.

According to the International Financial Reporting Standards (IFRS), a financial instrument "is classified as an equity [instrument] when it represents a residual interest in the net asset of the issuer" (Wallace, 2006). This can, for example, be an ordinary share of a company's common stock, or a claim on the assets and the return from a fund. As described in chapter 5, types of equity-based vehicles include:

- Shares of common stock
- Open-end funds
- Closed-end funds
- Exchange-traded funds (ETFs)

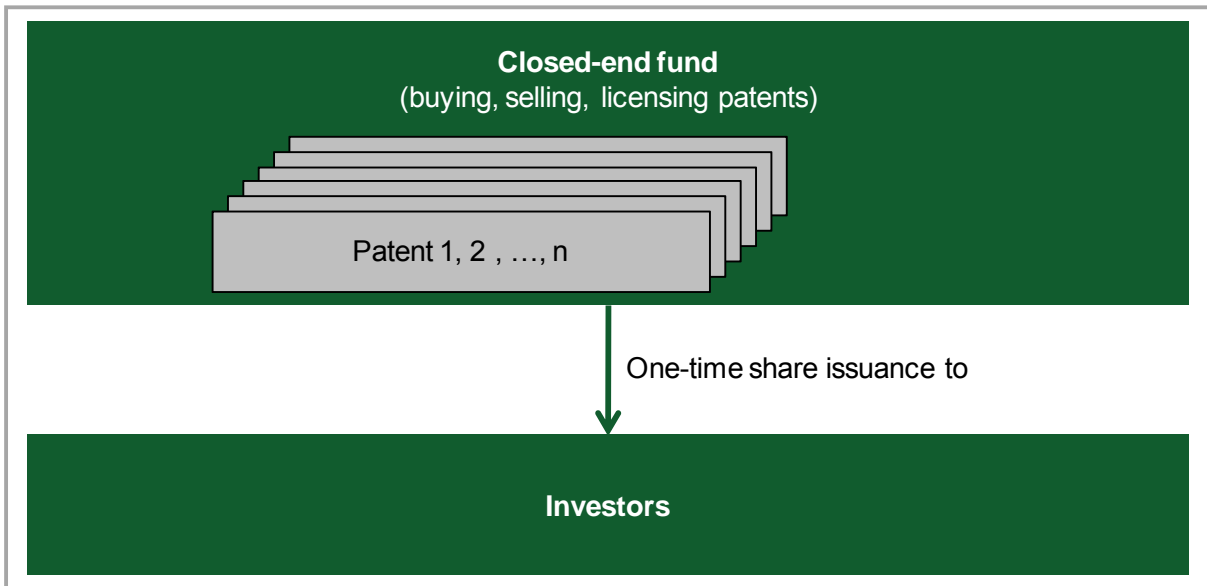
Contrary to other equity instruments, shares in funds allow for a more tailored approach when investing in the underlying asset. Therefore, patent funds are used as an example when analysing equity-based instruments.

If patents are the investment target, the question arises which structure is most suitable. Generally, open-end funds are obliged to take back shares in return for the initial investment. Usually, cash reserves are held to finance such payouts. However, redemption demands in excess of reserves require the liquidation of assets. This would mean that patents have to be sold within a relatively short time to meet liabilities. As outlined in section 5.3.2, patents have characteristics which complicate reliable valuation and fast disposal. An open-end patent fund would therefore have difficulty maintaining its promise of redemption, while efficiently managing its portfolio. These factors point to closed-end funds as a more suitable model. In this case, shares cannot be redeemed, meaning that the initial investment is not affected by subsequent share transactions. The patent portfolio could be exclusively directed at achieving the desired results, for example, in terms of return. Haslem (2003) agrees that closed-end funds are better suited for assets which cannot be sold easily, such as patents. Similarly, Glaus (1997) states that they are superior if the long-term availability of capital plays a role. In the case of patents, this is clearly the case. A closed-end structure may consequently be considered more suitable for patent funds than the open-end variety.

Considerable drawbacks still have to be accepted. Above all, the price determined by market forces can deviate considerably from the patent portfolio's actual value. This issue points to exchange-traded funds (ETFs) as a potential solution. While legal and transparency issues still have to be addressed, the fundamental structure of ETFs could theoretically be applied to patent funds. Firstly, this structure ensures that the price of fund shares is in line with the patent portfolio value by offering the possibility of redemption and arbitrage gains. At the same time, the option to transfer assets instead of cash in the case of redemption means that the issues associated with open-end funds do not apply as strongly. If demands for redemption exceed the cash reserves, the fund could theoretically compensate investors with patents of the same monetary value. The overall portfolio would be changed, but not unnecessarily diminished by the forced short-term liquidation of patents. However, it remains questionable if investors would be interested in this structuring approach.

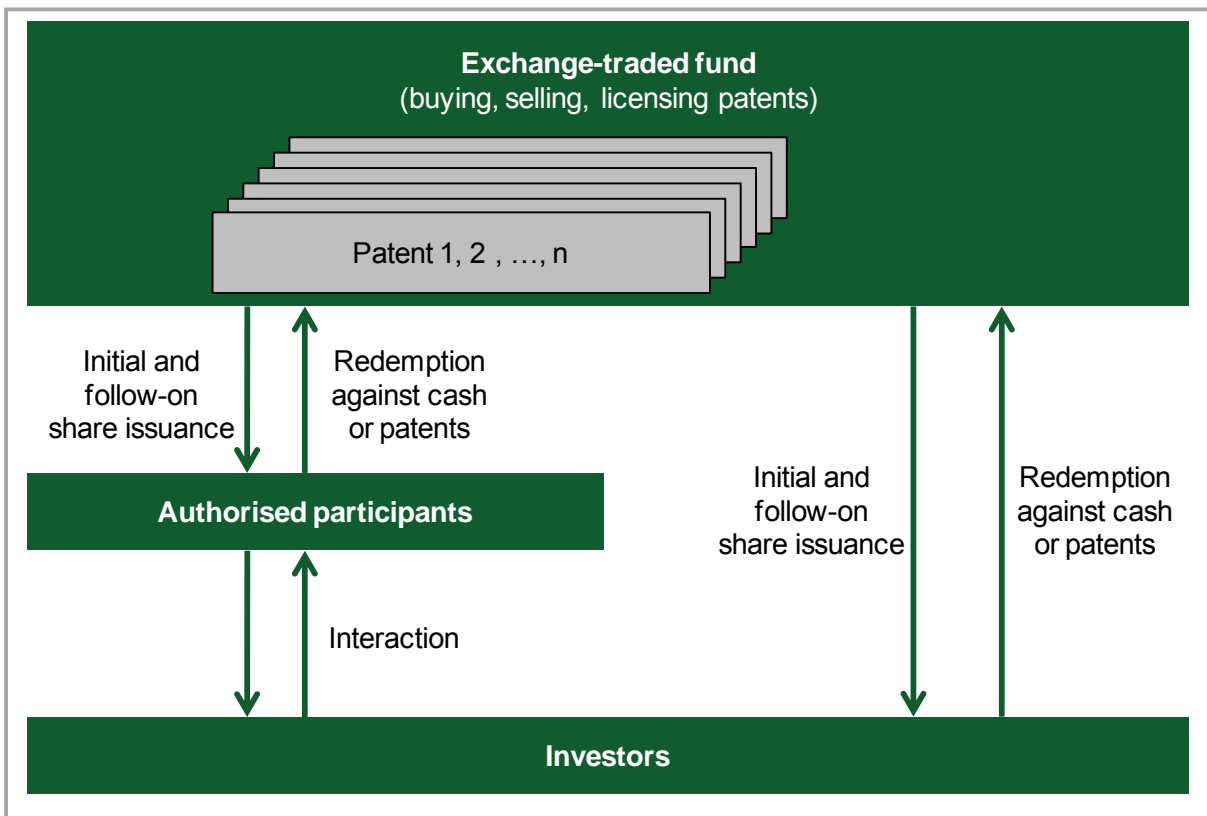
For illustration purposes, Figure 68 and Figure 69 show the structures of closed-end funds and exchange-traded funds.

Figure 68: Structure of a closed-end patent fund.



Source: Own illustration in accordance with Kirsch, 2008.

Figure 69: Structure of an exchange-traded patent fund.



Source. Own illustration.

As outlined, there are several business models for funds, ranging from trading funds, which buy patent rights to either resell or license them, and acquisition funds, which do not buy the

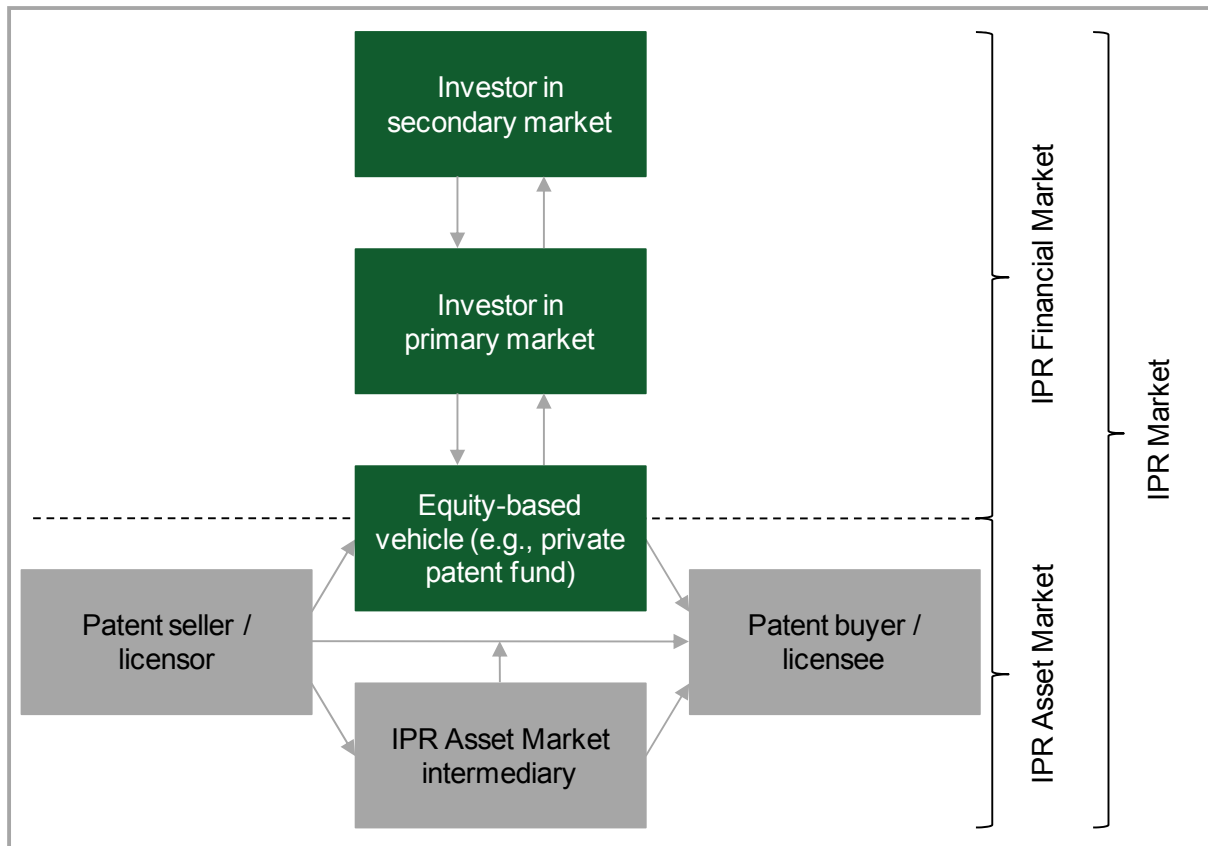
patent right but the patent itself, to patent enforcement funds, which adopt a similar business model as NPEs. They all have three characteristics in common, on which we will focus when evaluating this vehicle category:

They (1) either buy the patent or the right in order to (2) create a positive cash flow (by selling, licensing, litigating or developing products, etc.) or to (3) provide the fund members with protection (Allied Security Trust, 2011).

In practice, a number of patent funds have been initiated (see section 5.3.1.4). Precise information on how these funds are progressing is not yet available, which means that their success cannot be evaluated properly. Several interviewed experts doubted the achievement of their return objectives. Nevertheless, these vehicles may help to diversify investors' portfolios. One of our interview partners believes that patent funds may encounter a "maturity problem". He argued that three to five years are not enough to realise financial performance with patents. However, a longer maturity time-frame would hold back the invested money for a longer period, reducing the return with potentially the same risk and therefore downgrading the risk return profile. Another interviewed expert emphasised that the risk arising from patents depends on the development phase. The earlier the patent is acquired, the higher the risk.

The indicative structure for the IPR Market elaborated on in section 2.4 can be applied to the example of equity-based vehicles, as shown in Figure 70.

Figure 70: Equity-based vehicle structure.



Source: Own illustration.

The green highlighted actors are directly involved with the equity-based vehicle. The vehicle is located at the crossroads of the IPR Financial Market and the IPR Asset Market, connecting the financially motivated investors with the patent market. During this process, the investors only interact with the vehicle itself, whereas the patent vehicle buys, sells, licenses, etc. patents with the money the investors provide, aiming to deliver a promised return.

The equity-based vehicle may be structured as a company dealing with patents. This means that investors hold shares in that company's common stock. The value of the shares is defined by the investors' expectations of the company's performance. Investors can sell their shares on a secondary market to other investors.

The equity-based vehicle can also be structured as a patent fund. In this case, investors invest directly in the fund and fund managers use this money to generate returns for the investors. If it is an open-end fund, investors have the possibility of redeeming their money. If it is a closed-end fund, investors do not have that possibility and need to wait until the agreed time to recoup their investment and any potential return. In either case, investors who do not

wish to be involved in the fund anymore, can sell their "commitment to invest" to new investors, who buy the old investors out via transactions on the secondary market.

A third possibility, which is a mixed form of shares and funds, are ETFs. In this case, investors hold shares in a fund. From a technical viewpoint, this is the same as holding shares in a company. They can also resell the shares on a secondary market, which can be organised as an exchange platform (all the major exchanges in the world offer ETF trading, e.g., the London Stock Exchange and the Deutsche Börse) or as an OTC market.

7.1.2 Debt-based vehicles

Debt-based (or liability) instruments have the possibility to require the issuer to deliver a financial asset to the instrument owner (Wallace, 2006). Examples are products like bonds or asset-backed securitisation, which are further described in the following section. As listed in chapter 5, types of debt-based vehicles contain:

- Bonds (issued by private entities or by public authorities)
- Loans (bank loans, company loans, etc.)
- Asset-backed securities (direct and indirect)

The following section will use patent-backed securities as a specific type of asset-backed security as an example, as they are a suitable role model of a debt-based vehicle to use in connection with patents. Asset-backed securitisation allows a company to monetise the cash flow assets generated.

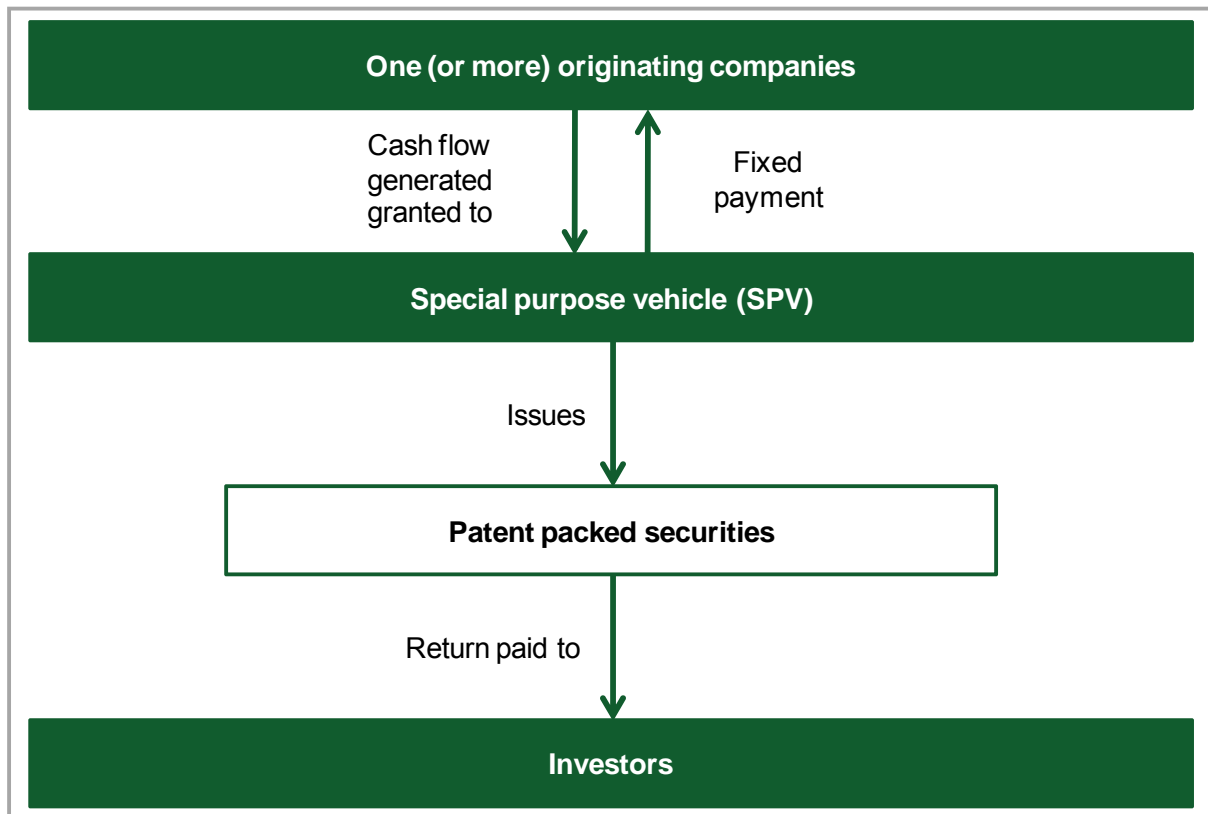
In respect of patents, Kirsch (2007) outlines several possible structures, which can be divided into direct and indirect securitisation. In the first case, the originating company transfers entire patents to a special purpose vehicle (SPV). The associated returns serve as a source of cash flow. Indirect securitisation, on the other hand, means that the SPV only receives the right to a share of the generated returns. The patents themselves remain at the originating company.

The following analysis focuses on indirect securitisation as directly securitised instruments resemble closed-end patent fund shares, which have already been discussed. Indirect securitisation has greater practical relevance. In an analysis, Kirsch (2007) found that this model constitutes almost two-thirds of the volume of deals in the intellectual property area. These factors point to a reasonable focus on indirect securitisation.

In terms of specific structure, the following analysis discusses the indirect model of "conditional assignment" as proposed by Kirsch (2007). Figure 71 illustrates the design. The SPV holds claims to the cash flow that patents generate. However, the return on the issued securities would then depend on the ability of the originating company to manage the patents successfully, i.e. it is connected to the business risk associated with the company. This would contradict one of the defining characteristics of securitisation, namely that investors are only exposed to asset-related risk. In order to solve this issue, Kirsch (2007) suggests

that once certain conditions have been met, the patents in question should be automatically transferred to the SPV. A third party subsequently takes care of the management and servicing. If the originating company does not deliver the promised returns on patents, such a measure ensures that the structure is essentially converted into a direct securitisation. Investors are thus protected from exposure to business risk.

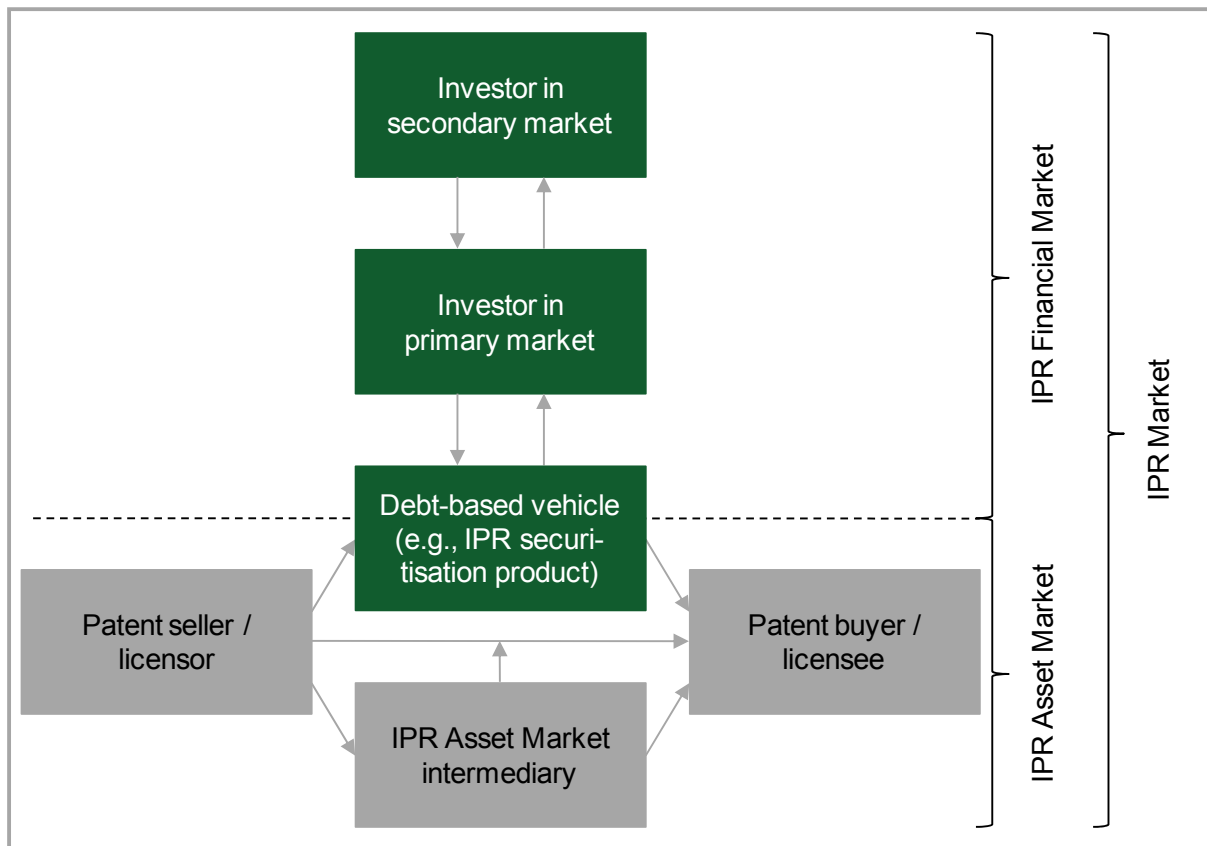
Figure 71: Structure of patent-backed securities.



Source: Own illustration in accordance with Kirsch (2007).

Figure 72 shows the indicative market structure applied to debt-based private vehicles.

Figure 72: Debt-based vehicle structure



Source: Own illustration

Similar to the equity-based vehicle structure, the green highlighted boxes represent actors involved in a debt-based vehicle. Investors invest in the debt-based vehicle and receive a return on that investment. Contrary to equity-based vehicles, investors in debt-based vehicles do not own part (share) of the vehicle, but from their perspective it is actually a liability. This means the return they receive on their investment is (basically) not dependent on the performance of the vehicle, but may be, for example, a percentage of the money they invested. In the example of the IP securitisation, the agreement could be that investors receive a share of the licensing revenue. The advantage is that this structure can be fitted to the patent's time horizon and the cash flow may be more frequent, predictable and stable.

On the IPR Asset Market side, the debt-based vehicle interacts with the patent market participants in buying, selling, licensing, etc. patents or other IP rights in order to provide the investors with the revenue that was agreed upon at the beginning of the contract.

An IP securitisation product is similar to a bond's structure: Investors provide money, receive continuous payments to compensate for the risks taken and, in the end, receive their principal investment back. Therefore, an IP securitisation product can be considered tradable on a secondary market, for example, on existing exchanges or OTC. Through this, the

product receives a valuation (price), which depends on factors like its remaining life and the size of the income.

Having outlined the structure of the financial product, a last point that deserves to be mentioned is the nature of the securitised cash flow. Jung and Tamisiea (2009) describe two possibilities: "royalty interest" and "revenue interest" deals. The first term refers to a situation in which the royalties generated by an existing licensing agreement are securitised. The past experience mitigates the associated risk to a certain degree. In the second case, the security is based on returns from possible future licensing deals. Consequently, revenue interest transactions exhibit higher expected risk and therefore attract different investors with different risk-return objectives.

7.2 Public-private vehicles

Public-private vehicles are financial instruments that are fully or partially funded by public money. They are analysed because they may be structured as a financial product suitable for trading on an IPR Financial Market. Current examples are still limited to predominantly publicly financed funds as listed below.

- In August 2010, the Innovation Network Corporation of Japan (INCJ) and the Intellectual Property Strategy Network (IPSN) announced the establishment of Japan's first intellectual property fund (LSIP),⁴³ intended for investments in the life science domain. It aims to collect intellectual property from universities, the Japan Science and Technology Agency (JST), other public research institutions and companies in order to bundle it in manageable units. INCJ (which is sourced by public and private money) will invest up to one billion JPY (around 9 million EUR, which is 0.06 EUR per capita) in LSIP.
- The Korean Intellectual Property Office (KIPO) announced the establishment of the South Korea Inventions Capital Fund in 2011, with capital from government organisations as well as private companies, which will be used to purchase and commercialise ideas from local inventors, laboratories and schools.⁴⁴ KIPO stresses that the fund will be used to help local businesses fight against threats from foreign non-practising entities (NEPs) that buy patents solely with the purpose of demanding royalty payments from manufacturers. The capitalisation should be 500 billion KRW (around 330 million EUR, which is 6.90 EUR per capita).
- Taiwan is planning to set up a similar defensive construct in 2011, an intellectual property bank under the supervision of Taiwan's Industrial Research Institute⁴⁵. It was announced that this bank should provide a "protective shield" for Taiwan-based firms by building patent portfolios and by providing legal advice. The bank is intended to be

⁴³ Press release available at: http://www.ipsn.co.jp/100806_LSIPEN.pdf

⁴⁴ Press release available at: http://news.xinhuanet.com/english/2009-07/29/content_11792399.htm

⁴⁵ Article in Taipei Times (April 11, 2011) at:
<http://www.taipeitimes.com/News/biz/archives/2011/04/11/2003500416>

privately owned, with initial capital of around 500 million TWD (around 12 million EUR, which is 0.50 EUR per capita) and less than 30% of public funding.

- In response to these public national endeavours, a public European patent fund is under discussion.⁴⁶ This fund could invest in European IPR from universities, public research bodies and private sector firms to form clusters, bundles or pools of patents, easily licensed or sublicensed. Considering the population in Europe and compared with the Japanese effort, the fund might have a capitalisation of 30 million EUR. In proportion to the French funds, a European solution might be stocked with 800 million EUR, and in proportion to the (planned) Korean fund a European solution might be stocked with 3,5 billion EUR. In comparison, the SEEP.IP Fund Feasibility Study (Buchtela et al. 2010) proposes a revolving financing volume of about 50 million EUR for five years, with South-Eastern European countries as the target group.
- Our interview partners (mainly from the private sector) were skeptical about public, non-profit funds as promising options for increasing IPR in Europe. They think these entities might attract unprofitable investments. One interview partner understood defensive national IPR funds as consumption of public money for guarding national industries against the dysfunctionality of the patent system. It was argued that politics have to "repair" or adjust the IPR system, instead of fighting the symptoms with public money.

In theory, public or public-private vehicles are partly aligned with national and supranational political interests. These vehicles are either funded fully by one or more public bodies, or include public as well as private funding. Such vehicles are often structured as funds and may have diverse objectives.

Although the aims pursued might sound advantageous and value-adding, for example, enabling national entities to exploit their patents effectively and providing advantages in terms of technology and knowledge, efficiency arguments have to be considered due to the funds' potential non-profit-orientated structure and public sector influence. From a purely theoretical point of view, economic efficiency is achieved in a perfectly competitive system by relying on the actors' self-interest and by using information in equilibrium prices. However, theoretical conditions may not be taken for granted in a real-world business environment. This means that public bodies' laissez-faire attitudes do not necessarily lead to market efficiency (Nicholson, et al., 2008) and government intervention needs to be well-balanced.

⁴⁶ http://www.socialistsanddemocrats.eu/gpes/media3/documents/3599_EN_European%20Parliament%20janv%202011-%20Patrick%20Terroir%20Caisse%20des%20depots.pdf

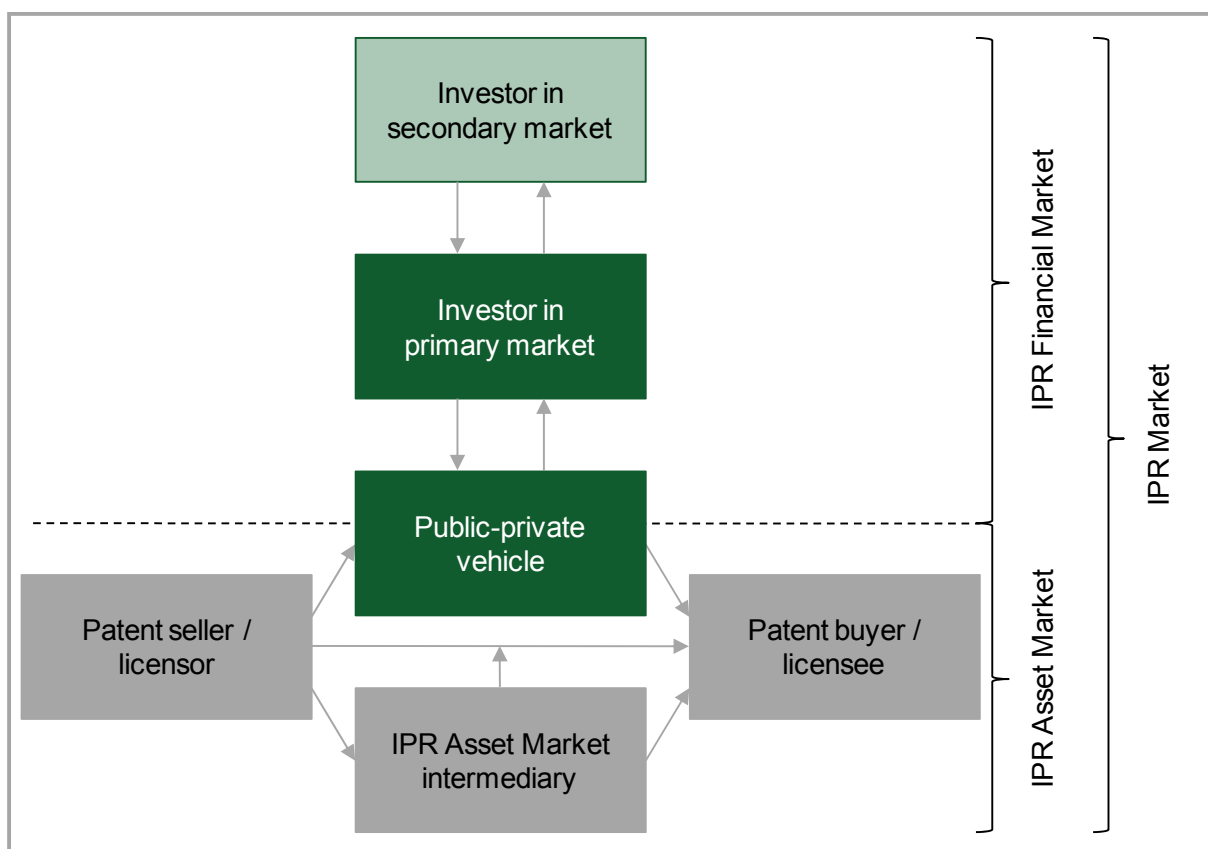
Actors interested in public and public-private funds may include:

- Universities,
- Medical faculties,
- Public sector research bodies,
- Private firms, especially SMEs and mid-cap companies,
- The international market, particularly in order to complete technological clusters,
- European companies that need licences in order to consolidate their innovation or guarantee their freedom to exploit it,
- Economies with which Europe cooperates and has formed partnerships.

In respect of activities, public-private funds' business model also consists of patent sale and/or licensing transactions. Their goals might not be solely profit-orientated, but can include socially and politically desirable goals, for example, the protection of domestic companies or the diffusion of innovation. This may create a trade-off between return and public goals.

Like the private patent vehicles in the previous chapter, the public-private vehicle interacts in the same way with actors, potentially connecting financial investors to the IPR Asset Market, which will depend on their structure and target investors (see Figure 73).

Figure 73: Public-private vehicle structure.



Source: Own illustration.

In this figure, the boxes "Investor in primary market" and "Public-private vehicle" are highlighted green. The box "Investor in secondary market" is highlighted in a lighter green, because the existence of a secondary market is not that obvious and may be rather unlikely in practice compared to such a market for purely private vehicles.

In this structure, the public-private vehicle serves as a connector between the IPR Asset Market and the IPR Financial Market. Basically, it invests investors' money in activities related to the patent market. This might entail buying and selling, or only buying, or buying and licensing patents. It is important to note that public-private vehicles are not necessarily committed to a monetary return, but might follow socially motivated goals. As mentioned, these could be protecting national companies or fostering the domestic economy by speeding up innovation. These goals could be supplemented by achieving monetary returns, especially when private investors are involved, and to cover administrative and management costs.

7.3 Commoditisation vehicles

This section describes commoditisation vehicles which allow for a potential IPR Asset Market structure that exhibits characteristics similar to financial markets. This structure focuses on the trade of the asset itself. This continuous trading exchange model is, for example, pursued by the Intellectual Property Exchange International (IPXI), which was introduced in chapter 5.

The continuous trading exchange model aims at the continuous trading of the asset, and is therefore suitable for license rights rather than patents, as the latter are unlikely to be traded continuously. The IPXI serves as a role model for analysing the continuous trading exchange model.

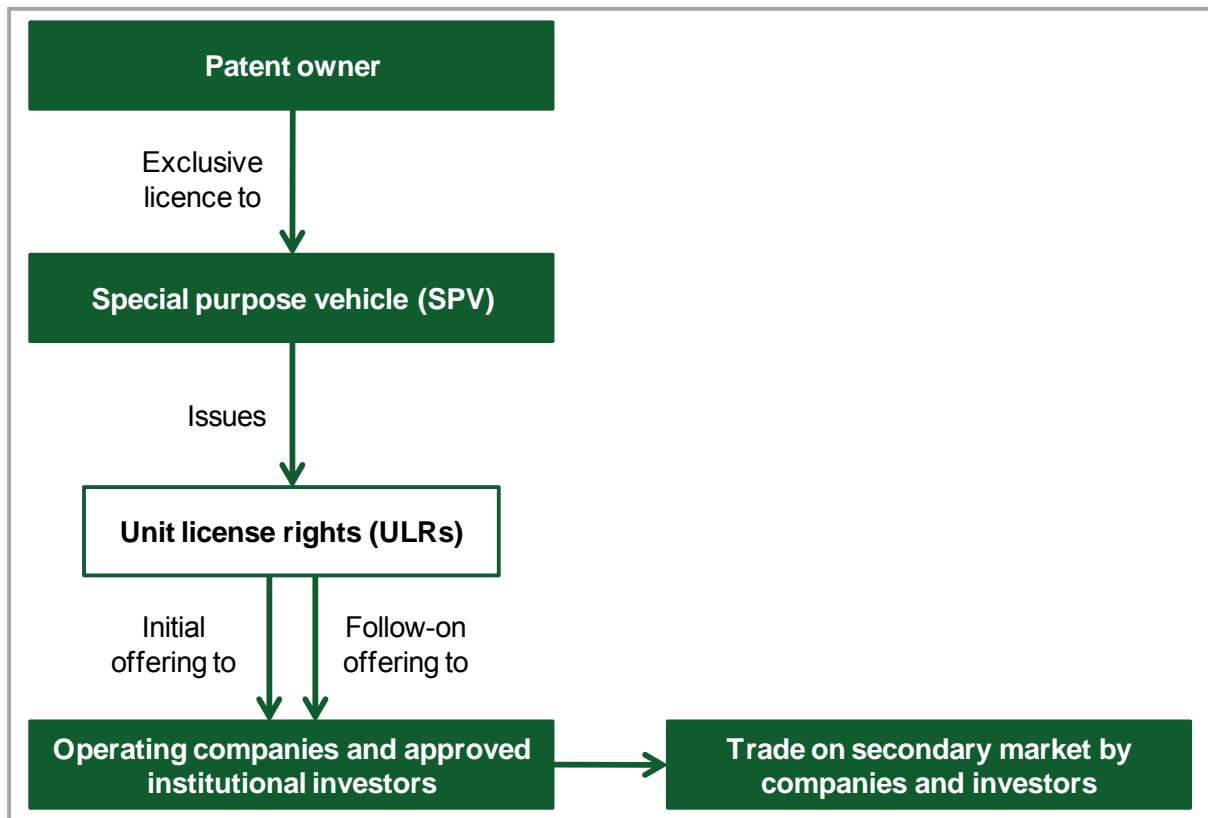
The traded asset, i.e. license rights, are contracts which allow the owner to use a certain technology a predetermined number of times. These contracts constitute rights of use, not rights to receive cash flow or of purchase or sale. They are analysed according to the requirements for patent-related financial products for three reasons. Firstly, licence rights can be traded on markets in the same way that financial instruments are. Secondly, from an investor's perspective, they have attributes that are similar to those of other financial investments. Lastly, considerable progress has been made in making the theoretical idea of a market for licence rights a reality, which turns it into a highly relevant subject for patent-related financial assets' near future.

Much of the recent change is owed to the IPXI, founded by Ocean Tomo LLC. Although the exchange has not yet started operations, its business model provides a detailed proposal of the structuring of licence rights and the accompanying market. Patent owners offer technologies they are willing to license through the exchange. The IPXI then performs an assessment according to a set of quality criteria (IPXI, 2011b). If the technology is deemed suitable, the patent owners grant a special structure connected to the exchange an exclusive licence (IPXI, 2011c). Originating from this vehicle, "unit licence right contracts" (ULRs) are issued (IPXI, 2011d). Each of these licence rights allows the owner to use a technology for

one product unit, after which the right has been consumed and is nullified (IPXI, 2011e). ULRs are initially offered to approved operating companies and institutional investors with experience in the field of intellectual property. Follow-on offerings are contingent on the sale and consumption of previously issued rights and include price bands (IPXI, 2011f).

From an investor perspective, the crucial point is the trade of issued ULRs on a secondary market (IPXI, 2011f). At the same time, a single participant's ownership of ULRs is limited to a part of the issued total to ensure a diversified distribution (IPXI, 2011f). These detailed rules demonstrate that the IPXI is a first serious attempt to establish a trade in licence rights in a form that is similar to conventional financial markets. Figure 74 summarises the structure, while the following section analyses the proposed ULRs with respect to their compliance with the indicative market structure.

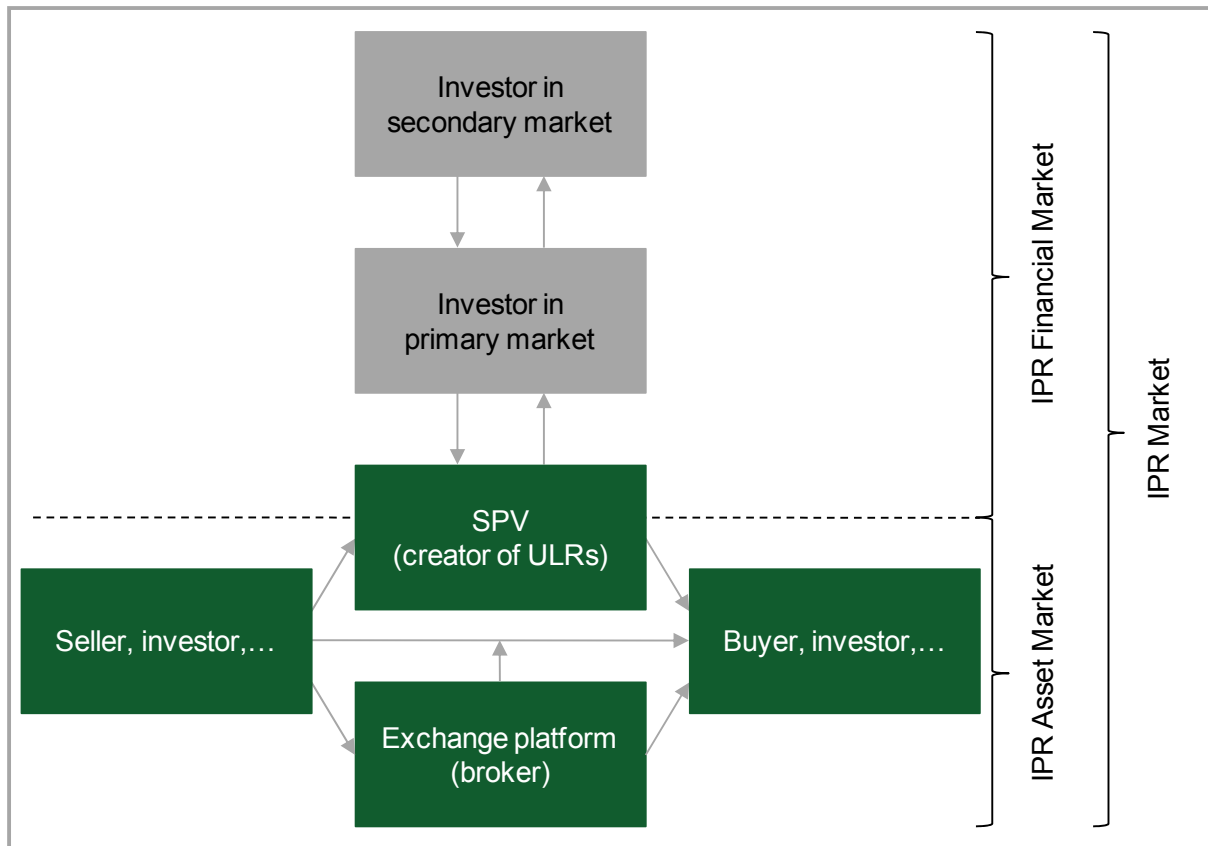
Figure 74: Structure of unit licence rights (ULRs).



Source: IPXI (2011d).

The indicative market structure can also be applied to illustrate the role of commoditisation vehicles in the two markets (see Figure 75):

Figure 75: Commoditisation vehicle structure.



Source: Own illustration.

In contrast to private and public-private vehicles, which mainly work on the IPR Financial Market level of the indicative market structure, the commoditisation vehicles for IPR are located on the IPR Asset Market level. Nevertheless, investors are involved in the IPR Asset Market as sellers and buyers of the assets themselves, moving them to the IPR Asset Market level. To illustrate the trading-based model, the IPXI serves as an example. The IPXI acts as a broker on the IPR Asset Market. The SPVs connect the sellers and buyers in the primary market (at issuance). Investors are located in the same box as licence right buyers and sellers because, in the case of ULRs, this distinction cannot be made. For example, URL buyers might be only financially motivated, meaning they only buy the rights in order to sell them later to make a profit (similar to certain investors in public company shares). On the other hand, URL buyers might also want to buy the rights in order to produce the licenced technology, or to use the licenced process, etc. From a conceptual view, it is impossible to make this distinction. This becomes even more complicated if the buyer, or investor, changes the initial intention. For example, a buyer with the intention to produce might decide not to produce the product, but rather sell it and pursue only financial goals. If we look at a possible

secondary market, we face the same problem: It is impossible to tell whether a buyer buys rights to produce or to realise a financial profit by reselling the ULR.

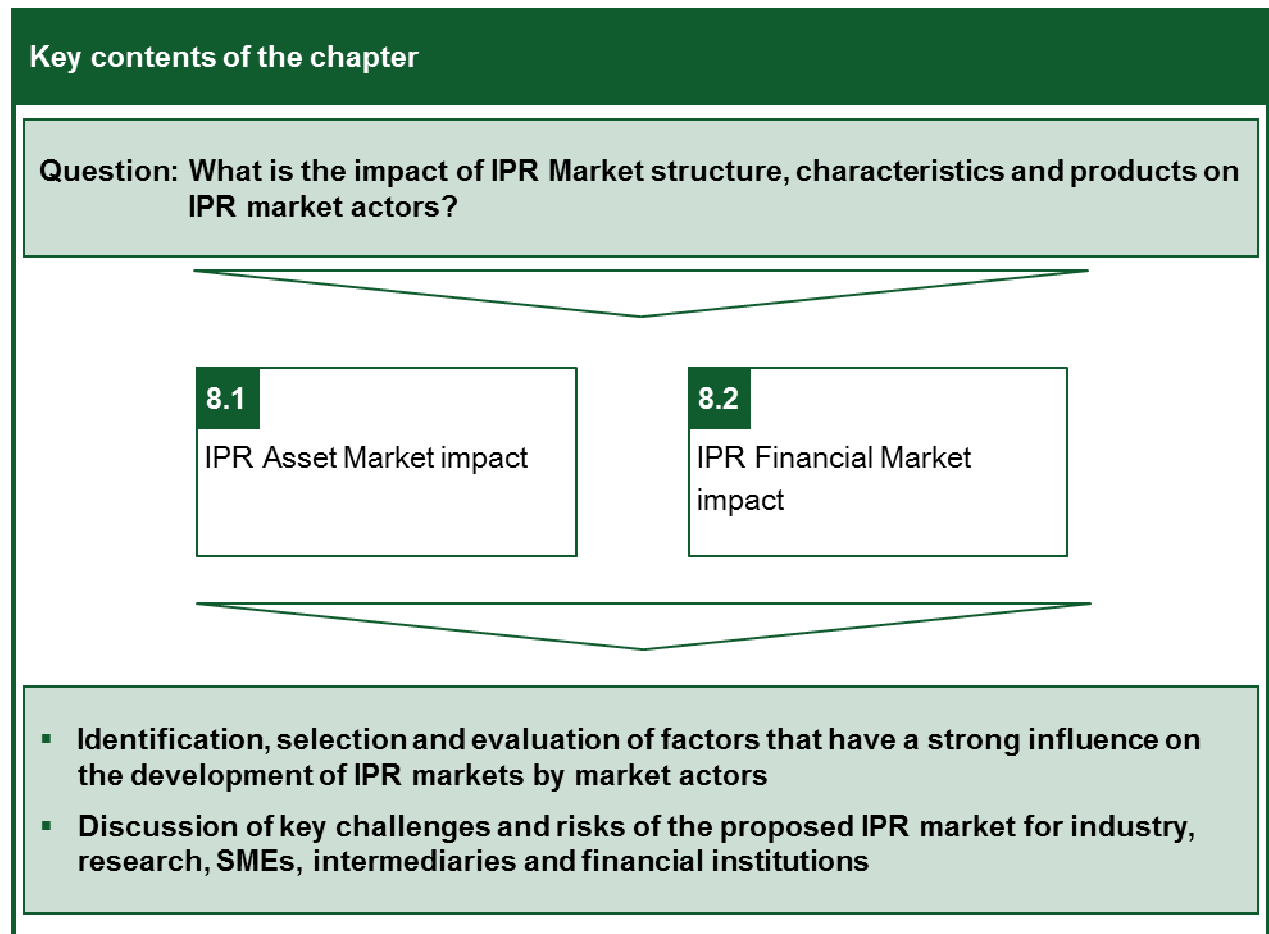
The commoditisation vehicle's main achievement is its potential to enhance liquidity in the IPR Asset Market by making it similar to a financial market. The advantages associated with these characteristics include the attraction of a wider buyer and seller audience and the potential for more price transparency through continuous trading. However, a drawback associated with a more liquid IPR Asset Market is the potential for higher volatility since continuous trading is expected to set prices more often.

7.4 Main findings

Main findings of the chapter

- **Financial products (vehicles)** are analysed according to their characteristics and suitability for financial markets
 - **Private** vehicles are privately funded (as opposed to public sector funding)
 - Equity-based vehicles can be shares in the common stock of a company, open-end funds, closed-end funds or exchange traded funds (ETFs)
 - Equity-based vehicles may invest in both early-stage and mature technologies, depending on the risk-return profile of targeted investors
 - Debt-based vehicles include bonds, loans and asset-backed securities
 - Debt-based vehicles tend to be more appropriate for technologies which already generate stable revenues
 - **Public-private** vehicles are at least partly funded by public bodies and may be used as a tool to foster early-stage technologies
- **Commoditisation** vehicles allow for an IPR Asset Market structure which is similar to financial markets
 - ✓ Higher liquidity and transparency for IPR Asset Market, lowering transaction costs
 - ✗ Higher volatility potential

8 Impact Assessment



This section discusses the currently expected impact of selected IPR Market features on the different market actors. These actors are technology-intensive SMEs, research institutions, industry, intermediaries, and financial institutions.

The impact analysis represents expert opinions gathered in our interviews with experts from TTOs, universities, industry, SME associations and financial institutions. The findings are the result of our conducted interviews.

The structure of the chapter reflects the features of IPR Asset Markets and IPR Financial Markets discussed in chapter 5:

IPR Asset Market

1. Liquidity
2. Homogeneity
3. Value awareness

IPR Financial Market

4. Understanding of the IPR product - divided into two subtopics
 - Engagement in the IPR Financial Market requires technical expertise

- Engagement in the IPR Financial Market requires financial intelligence
5. Cash flow predictions
 6. An electronic platform as a centralised reference point
 7. Hybrid IPR Financial Market design - divided into three subtopics
 - Exchange models
 - Debt products
 - Equity products

The impacts are categorised into the following three categories:

∅ impact cannot be clearly estimated

+ positive impact

- negative impact

The complete matrix and a list of interview partners can be found in the appendix.

8.1 IPR Asset Market

During our interviews, all the IPR Market stakeholders emphasised the importance of a well-developed and well-organised IPR Asset Market. An established IPR Asset Market is a precondition for a functioning IPR Financial Market. The table shows that a functioning IPR Asset Market, characterised by sufficient liquidity, homogeneity in quality and IPR value awareness, was considered to have a positive effect on all the actors interviewed. Only the impact of increased homogeneity in patent quality on intermediaries could not be determined clearly.

Table 13: Impact of IPR Asset Market.

		SMEs	Research	Industry	Intermediaries	Financial
IPR Asset Market	Liquidity	+	+	+	+	+
	Homogeneity in quality	+	+	+	∅	+
	IPR value awareness	+	+	+	+	+

Source: Own illustration based on qualitative study.

8.1.1 Liquidity

The IPR Market actors would appreciate the opportunity to sell or buy IPR assets on an on-going basis as this reduces the risks related or inherent to IPR trading.

According to our survey, a liquid IPR Asset Market would provide the market actors with better access to technologies since acquiring IPR would become easier. Our interview partners argued that a simple listing of the buyers and sellers present in the IPR Market would not create liquidity. Instead, they recommended relying on existing IPR trading mechanisms and developing these mechanisms further.

Industries with mass markets and highly standardised technologies would benefit strongly from easier trading, which liquid IPR assets would facilitate. Niche market technologies would also be traded more easily.

- **SMEs** could gain from the IPR Asset Market liquidity because they could access technology more easily and obtain missing pieces of technology to advance their innovation. However, they might still lack the necessary funds to purchase IPR. Furthermore, according to our survey, SMEs currently face difficulties with liquidating their IPR due to their limited size and lack of reputation. A liquid IPR Market is expected to allow technology-intensive SMEs to sell or licence their IPR better.
- **Research institutions** could sell their IPR more easily in a liquid market. Additional revenues from IPR sales or licensing could enable research institutions to increase their research activity.
- **Industry** may not be strongly interested in selling IPR because large companies can easily access capital markets. However, our interview partners indicated that large companies would appreciate the opportunity to access technologies more easily on an organised IPR Asset Market.
- **Intermediaries** can already access capital via private investors. However, they sometimes build their business model solely on monetarily orientated IPR transactions. IPR asset liquidity would increase their operations on the supply and the demand sides.
- **Financial institutions** are interested in setting up exchange structures, equity, and debt vehicles, and in selling advisory services in the field of IPR. Merchant banks strive to develop arbitrage models to profit from arbitrage gains. A liquid IPR Asset Market would foster opportunities to develop successful IPR arbitrage models. Access to new technologies does not, however, play a crucial role for financial institutions.

8.1.2 Homogeneity in patent quality

Our interviewees stressed that clear quality guarantees regarding IPR have strong positive effects. A unified European patent and litigation system would improve the basis for IPR asset homogeneity since uncertainty in respect of patent quality and enforcement would decrease. All market actors would thus gain from a unified European patent. In addition, an increase in patent quality would benefit innovation.

- **SMEs** could benefit strongly. Litigation processes can harm SMEs severely as their limited size and their capacity constraints make them vulnerable. High-quality patents

are important for technology intensive SMEs, since the probability of litigation is decreased and they are not obliged to allocate resources into strengthening their patents. Instead, they can concentrate on technology, innovation and business development.

- **Research institutions** also expect a positive impact. High-quality patents could either be sold more easily to the market, or they could be an input into research projects.
- **Industry** would benefit from higher patent quality as well, but not to the same extent as SMEs and research institutes. High litigation costs are not as big a problem for industries as for SMEs. They can afford the money, but they cannot afford to lose time. According to our interview partners, time to market is crucial in technology development. High-quality patents would reduce the probability of technology development getting stuck (due to litigation).
- **Intermediaries** – due to their activity in different aspects of IPR management, no uniform impact on intermediaries could be identified.
- **Financial institutions** currently face the problem of holding IPR portfolios consisting mainly of patents with no commercial value, which therefore do not contribute to economic growth. These institutions typically lack specialised technology know-how and therefore find selecting IPR for their patent portfolios challenging, as having to deal with legal aspects complicates their task even more. Their problems would be reduced if they could be more certain of their patents' quality.

8.1.3 Value awareness

There is a lack of common understanding among market participants with regard to determining the overall economic value of IPR.

Companies have no clear idea of the value of early-stage technologies; this is particularly challenging since these technologies are far from market applicability and their future is uncertain.

- **SMEs**, also those in our survey sample, often lack awareness of IPR usability and economic value. IPR rank way below working capital or customer relationship management in an SME's priority list, although they have the same relevance for a company's long-term success. A clear understanding of IPR value is therefore considered to have a positive effect on SMEs.
- **Research institutions** are interested in producing high-quality publications and valuable research. They could obtain access to new information related to IPR value and would thus be positively affected.

- **Industry** already seems to be aware of the potential of IPR. Recent transactions in the field of ICT (the Nortel patent portfolio and the acquisition of Motorola by Google) amounted to billions of dollars, thus demonstrating high awareness of IPR’s (strategic) value for industry.
- **Intermediaries** sometimes base their business models on arbitrage trades with existing IPR. To some extent, intermediaries are thus already aware of the economic value of IPR. Nevertheless, there is a great deal of uncertainty and, according to our survey, increased IPR awareness is likely to benefit them.
- **Financial institutions** face difficulties in assessing the economic value of technologies in the absence of cash flows and appropriate technological know-how. Since financial institutions base their business solely on the assessment of values, an increase in certainty of IPR value would benefit them a great deal.

8.2 IPR Financial Market

An IPR Financial Market needs to play a dual role. Firstly, it constitutes a platform for transactions that create monetary value. Secondly, it plays the role of an information distributor. Our interviews revealed that the expected benefits of an IPR Financial Market vary across industries. The market itself is considered to be best suited for mass-market technologies with a high degree of standardisation. These industries may benefit from a large number of offers and a reduction in R&D spending.

For institutions with large commercially utilised IPR portfolios, like industry firms and intermediaries, the IPR Market as a whole could be a tool for IPR strategy execution.

Table 14: Impact of IPR Financial Market.

		SMEs	Research	Industry	Intermediaries	Financial
IPR Financial Market	Engagement demands technical expertise	-	+	+	∅	-
	Engagement demands financial expertise	-	-	+	∅	+
	Cash-flow predictability	+	+	+	+	+
	Central reference point	+	+	-	+	+
	Exchange models	+	+	+	+	+
	Debt-based products	-	+	+	+	+
	Equity-based products	+	+	+	+	+

Source: Own illustration based on qualitative study

8.2.1 Understanding of the IPR product

Our interviews revealed that most market actors lack the necessary know-how to engage in the IPR Financial Market. The less knowledge there is, the greater the uncertainty about IPR value and the greater the scepticism regarding participation in the IPR Financial Market.

Having sufficient knowledge on the usability as well as the economic value of an IPR product is important for trading it on IPR Financial Market.

The interviewees observed that successful engagement in the IPR Financial Market demands a high degree of specialised technological and financial know-how.

8.2.1.1 Technical expertise

It is essential to have a thorough understanding of technology and the market opportunity in a specific technological area to make successful IPR investments. Investing in a non-cash flow market requires specialised knowledge and the ability to estimate a product's future value. The challenge is to select IPR with a future economic potential.

- **SMEs** that are technology-intensive claim to have some technical know-how, especially in their field of practice. However, they lack market screening possibilities and knowledge of similar or related technologies on the market. The levels of experience and technological know-how differ across enterprises. Having no clear overview of the technology market reduces companies' opportunities to disseminate their IPR. Therefore, the overall impact is slightly negative.
- **Research institutions** are believed to have the necessary technological expertise to participate on IPR Financial Markets.
- **Industry** has some technical know-how as well as some experience on financial markets. However, the levels of experience and technological know-how differ across industries and company sizes. In general, however, industry has the technological know-how thus being positively impacted.
- **Intermediaries** - an overall impact estimation is not possible. Some intermediaries have technology-related know-how and lack financial knowledge, or vice versa.
- **Financial institutions** usually lack the necessary technical expertise. This expertise needs to be developed to engage successfully on the IPR Market. A lack of technical expertise has a negative impact on financial institutions.

8.2.1.2 Financial intelligence

In order to engage in an IPR Financial Market, actors need to develop an understanding of financial products.

- **SMEs** usually have no or little experience of engaging in financial markets or with financial products, according to our interviews. A lack of experience and of financial knowledge has a negative impact on SME engagement in IPR Financial Markets. SMEs therefore need to develop a deep understanding of financial products and markets before engaging in financial markets.

- **Research institutions** typically have no or little experience with engaging in financial markets or with financial products. According to our interviewees, research institutions, like technology-intensive SMEs, first need to develop a deep understanding of financial products and markets before engaging in them.
- **Industry** typically already has some experience with being an actor on financial markets. Nevertheless, an engagement would demand developing additional or specialised know-how of IPR finance. Overall effect was estimated to be positive.
- **Intermediaries** usually have the necessary experience with engaging in financial markets and are therefore not affected. An overall impact estimation cannot be made since some intermediaries have technology-related know-how and lack financial knowledge, or vice versa.
- **Financial institutions** have the necessary experience with financial products and markets. Having the financial knowledge to engage is one of their advantages and has a positive impact.

8.2.2 Cash-flow predictability

It was discussed with our interview partners that investors, in general, rely on fact-based information like cash flows and key performance indicators. They focus on reliable, comprehensible information. IPR currently lack this kind of reliable, comprehensible information. The most trusted information on IPR value is the reputation of the IPR developer. The IPR value is mostly derived from future expectations. Our interview partners believe that the exact IPR cash flows can mostly not be predicted.

From an investor's perspective, IPR investments are thus considered very risky. Furthermore, investors face difficulties with activating IPR investments as equity positions on their balance sheets.

In order to make the IPR Financial Market feasible, IPR investors need to adapt their investment criteria to the specifics of IPR finance. This implies that IPR investors need to develop new methods to quantify the risk and return prospects of IPR investments.

- **SMEs** are likely to benefit from having predictable future IPR cash flows, since our interviewees believe they expect to attract more funds for their business.
- **Research institutions** would gain a better understanding of the monetary value of their research efforts.
- **Industry** is perceived to be able to monetise its IPR. Having predictable future cash flows would provide it with more clarity about IPR value and would thus benefit it.
- **Intermediaries** are likely to benefit since they would be able to monetise their IPR more easily. However, our interviews disclosed that intermediaries seem to benefit economically already today.
- **Financial institutions** build their IPR business strategy on future IPR value speculations. Having clear IPR future value estimates would force financial institutions to drastically change their investment logic. They would need to rethink

their measurement of risk and return on their investments in IPR products. Nevertheless, they would clearly benefit from IPR value measurement methods because they could base their investment decisions on these.

8.2.3 Central reference point

IPR value estimation and contractualisation are likely to be improved by creating a single trading platform, since transactional data will become available. A single transparent electronic platform would help SMEs to obtain better access to IPR dissemination. A common European IPR trading platform could also facilitate a better matching of the IPR supply side with IPR Market demand.

In general, the trading platform would function as a centralised reference point. It would improve the existing situation "where everybody knows that things happen, but not what happens". Furthermore, it would lower the barriers associated with disseminating IPR to a wider public.

- **SMEs**, according to our interviews, often lack the necessary commercialisation know-how and the resources to screen the market. On the demand side, SMEs will gain the opportunity to buy, build or extend their IPR portfolio via the market. On the supply side, ways will be opened up to disseminate IPR at comparably low costs. Owing to the increased transparency and a higher number of transaction partners, the bargaining position of SMEs could be improved more than with bilateral negotiations. Establishing a commonly accessible trading platform is thus expected to have a positive impact on the engagement of SMEs in IPR transactions.
- **Research institutions** often lack the necessary commercialisation know-how and the necessary resources to screen the market. Establishing a commonly accessible reference point that fills this gap is expected to have a large-scale positive impact on their engagement in IPR transactions.
- **Industry**, according to our interviews, seems to be satisfied with the existing situation. It was pointed out that increased transparency and openness of IPR Markets would allow competitors to discover companies' confidential business strategies. This could be considered a negative impact on the industry.
- **Intermediaries** seem to be satisfied with the existing situation as well. However, our interviewees estimated that the overall impact of establishing a centralised reference point would be positive. Having a centralised reference point would bring more clarity to the current situation and would therefore, on average, benefit intermediaries.
- **Financial institutions** face difficulties with assessing a technology's future potential. Our interviews established that a market providing the necessary information would benefit them greatly.

8.2.4 Hybrid IPR Market design

The needs of all IPR Market actors should be considered when designing an IPR Financial Market. In order to satisfy these needs, an IPR Financial Market design will have to serve

several goals. According to our interview partners, an IPR Financial Market design should offer ways to access technologies and raise money for IPR Market actors. An IPR Financial Market design that only emphasises monetary value creation would not necessarily support the implementation of new innovations on the market.

The structure, strategy and governance mechanisms of vehicles and products strongly influence their impact on innovation. Matchmaking between technological challenges and solutions is important for a positive impact on innovation. IPR products must be easy to understand and designed to meet the needs and demands of the market actors.

Our interview partners require different types of transactions. The necessary transactions range from the sale of IPR to licensing transactions. Single IPR, but also complementary IPR, should be available. As one of our interview partners pointed out: "In many technologies I cannot do anything with a single patent in order to be active in this market. I need a whole set of patents to do so."

8.2.4.1 Exchange models

The basics of exchange models such as auctions or continuous trading models are easy to understand and can be considered user-friendly. In general, the transactions follow a transparent bidding process.

Auctions or continuous trading models for IPR financial market means unit licence rights (ULR) trading as proposed by Ocean Tomo. Each ULR contract gives the respective buyer the right to make or sell an established quantity of products covered by the patents in the contract. ULR fit mass-market technologies with a high degree of standardisation the best.

Fee structures and the regulatory environment can influence the access to and success of IPR exchange mechanisms.

- **SMEs** were estimated to obtain easier access to IPR. Certain niche market technologies (e.g., inspection robots for gas pipelines that have a low but valuable production output per year) are attracted to ULR exchange models.
- **Research institutions** would benefit from an additional channel for IPR distribution. Our interviews revealed that research institutions rely mostly on institutional relations for IPR dissemination.
- **Industry** partners expected to benefit from exchange models. Mass-market technologies with standard characteristics are typically developed and utilised by industries. Essential IPR can be easily transferred via these mechanisms. It is important for industry to have the ability to evaluate the capabilities of certain technologies. Industry firms seem to be better equipped for such tasks than other market participants.
- **Intermediaries** could, according to our survey, benefit the same way that industry does. By using such platforms, they could obtain access to more offers and buyers of IPR. Furthermore, additional ways of valorising IPR would open up. Nevertheless, the intermediaries in our sample seem to be well adapted to the current situation.

- **Financial Institutions** will benefit from models like the trading of unit licence rights. Unit licence rights could ensure engagement in auctions or continuous trading models.

8.2.4.2 Debt products

In general, bonds and structured finance products are highly standardised. The basic idea of a debt-based product is to transfer future cash flows to the present, based on a certain discount rate.

Issuing bonds requires future cash flow streams to be predictable. IPR lack cash flows that can be clearly predicted. An understanding is required of the technology and the formal requirements of structuring and issuing debt-based products on capital markets. The standardisation of debt products depends strongly on a well-established IPR Asset Market.

On capital markets, debt products usually have large monetary volumes. The same might be necessary for IPR-based debt products. Debt-based products may be introduced in respect of particular institutions' entire IPR production. An engagement in debt-based IPR products demands a high degree of specialised know-how.

- **SMEs** could be confronted with scepticism towards the debt model. One interview partner stated: "I've never seen an SME engaging on the futures market". Furthermore, large formal efforts are associated with engaging with these types of products, which is considered to be costly. SMEs would face access barriers.
- **Research institutions** would benefit. The future potential of institutions' research programmes may be a promising investment opportunity for the capital markets. As with SMEs, the necessary formal efforts are associated with high cost. Our interview partners felt that research institutions might consider expensive debt products an access barrier to IPR Financial Markets.
- **Industry** is perceived as experiencing a positive impact. The future potential of industries' research projects might be a promising investment opportunity for the capital markets. Furthermore, industry already has experience with the issuance of bonds and other structured finance products.
- **Financial institutions** would probably compare the risky IPR investments with equity investments. IPR investments are associated with much greater risk. Investors would thus demand high-risk premiums in order to be attractive as an alternative to equity. This logic needs to be adopted in order to engage in debt products in IPR financing. On the other hand, financial institutions such as banks would be well-suited to issue debt-based products since they already have experience in structuring and placing debt products on the capital markets.

8.2.4.3 Equity products

IPR equity products are typically special-purpose vehicles for IPR. They are patent portfolios in a specific technology area that is expected to be valuable in future. There are already IPR

private equity funds on the financial markets (e.g., Intellectual Ventures). At the moment, IPR private equity funds may be more attractive to IPR experts than to a wider public since the prediction of the future value of technologies is challenging.

Our interview partners stated that investing in IPR private equity funds requires patience. Experience shows long investment and liquidation periods in respect of existing IPR vehicles. Whether a vehicle has a beneficial impact on innovation is largely dependent on its strategy.

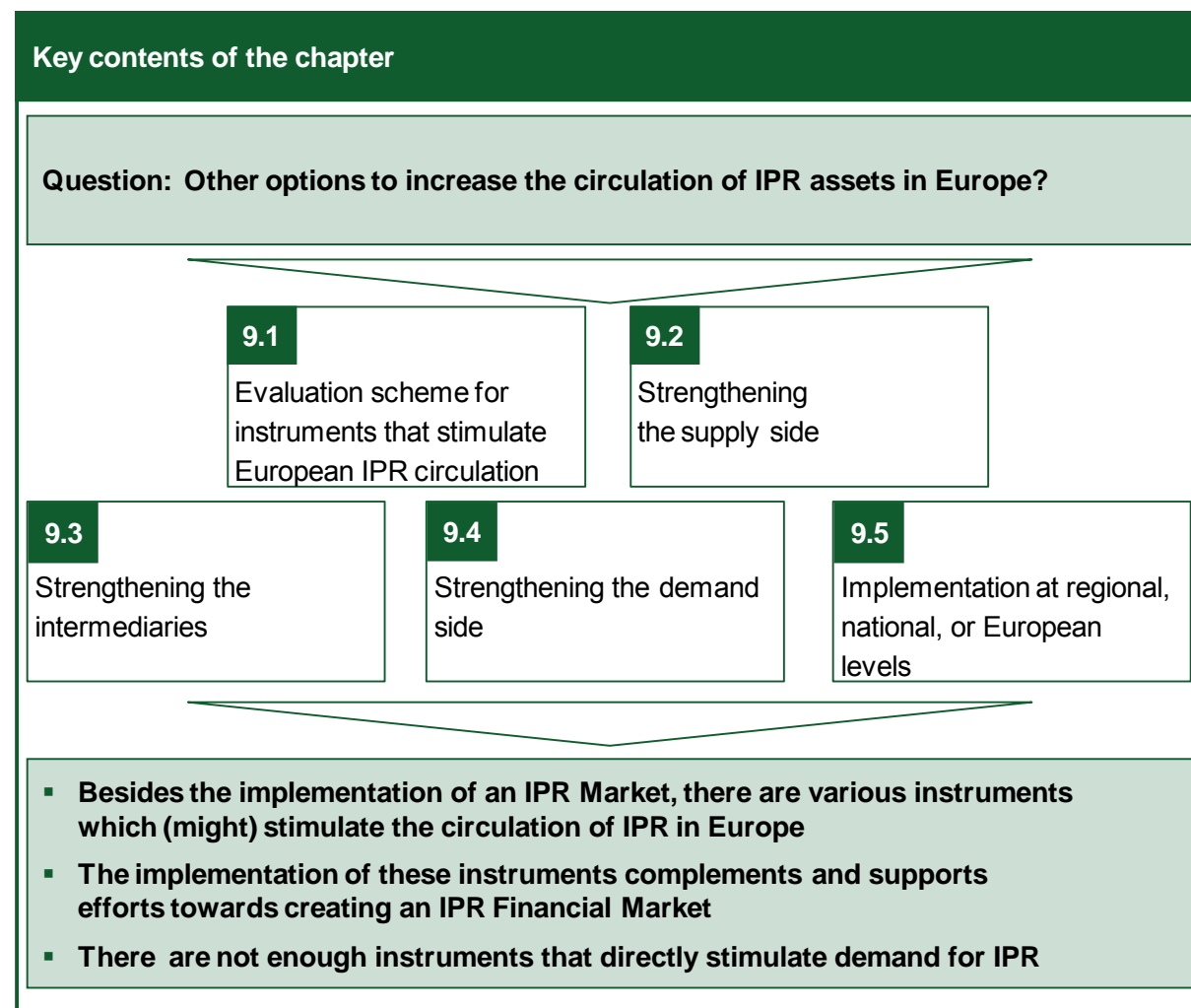
- **SMEs and research institutions** could be particularly interested in special-purpose IPR vehicles that focus on the incubation of young technologies. IPR private equity funds that deal with the commercialisation of an idea could attract capital to innovation. On the other hand, our interview partners believe that the contractualisation of such transactions might be a challenging task.
- **Industry**, according to our survey, is believed to be positively impacted by vehicles aimed at extending large-scale IPR management programmes.
- **Intermediaries** are likely to benefit by attracting liquidity to their business models. Furthermore, additional ways of commercialising and accessing IPR would emerge if they were to use equity products.
- **Financial institutions** have experience in setting up equity products and equity funds. Therefore, they are estimated to benefit from these vehicles. Besides being engaged in the development of innovation-orientated equity products, vehicles might emerge that focus more on arbitrage gains.

8.3 Main findings

Main findings of the chapter

- **IPR Market structure and products** of the proposed IPR Market were discussed with experts from TTOs, Universities, Industry, SME associations and financial institutions. Identification, selection and evaluation of factors that have a strong influence on the development of IPR Markets by market actors was made
- **The IPR Asset Market** is the underlying for the IPR Financial Market and all associated products and structures
 - The IPR Asset Market needs to be well developed and organised
 - IPR Asset Market liquidity needs to be assured in order to avoid the risks associated with IPR valorisation
- **Establishment of an IPR Asset Market** that combines the existing European initiatives is recommended. **SMEs** will benefit the most from a well developed IPR Asset Market
- **Dominance of market design** - appropriate design has a strong impact on the rationale of the market
 - Proper design is in line with organisational missions of all the market actors
 - Appropriate design gives access to technology and/or creates monetary value
- **Specialised knowhow** – shared market intelligence is necessary for successful IPR trading. IPR trading could be motivated by information gathering and/or monetary reasons
- **Investment decisions** – IPR investments are ambiguous and involve risks. Investors focus on fact based comprehensible information when making investment decisions. All market actors would benefit from central and transparent market metrics and valuation systems because it will make investing into IPR more feasible

9 Alternatives to an IPR Market



Besides the implementation of a European IPR Market, there are various other options to increase IPR circulation in Europe. These instruments do not work against the establishment of a European IPR Market, but rather complement and support efforts to create a more structured IPR asset exchange in Europe. The implementation of these instruments is a precondition for a liquid and vital IPR Asset Market in Europe.

The following section investigates the supply, intermediary and demand side of the IPR exchange to collect and assess established and innovative, European, and non-European, instruments to stimulate IPR circulation. This collection is framed by a broad sample of best practice cases.

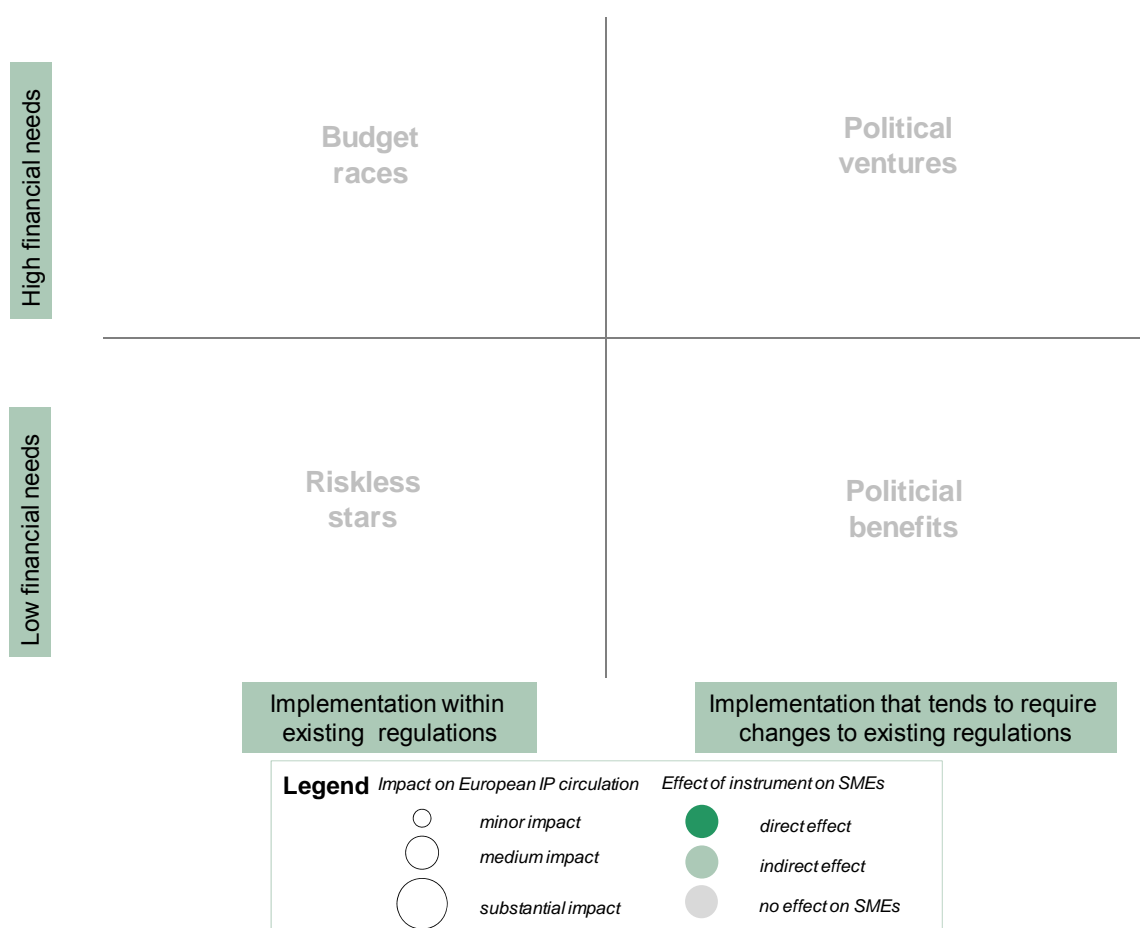
The assessment of the collected instruments reveals European feasibility as well as the engagement and risks that European policymakers need to anticipate during the implementation of these instruments.

9.1 Evaluation scheme for instruments that stimulate European IPR circulation

The objective of this chapter is to discover and investigate other options (instruments) to increase the IPR circulation in Europe, besides creating an IPR Financial Market. In this chapter, we do not recommend the implementation of any instrument; recommendations are provided in chapter 10. Here, we simply assess the instruments in the context of their possible European impact and feasibility.

The conceptual framework used here is the indicative IPR Market structure already introduced in previous chapters in this study. This framework differentiates between the three sides of any IPR exchange structures: the supply side (IPR producers acting as patent sellers or licensors), the demand side (IPR adopters acting as patent buyers or licensees), and, in the case of intermediated markets, the intermediaries’ side (any actor who is actively involved in the exchange for catalysis purposes). It is obvious that instruments which lower barriers at one of these three sides can have positive effects on the circulation of IPR in Europe.

Figure 76: Basic structure of the evaluation scheme for this chapter.



Source: Own illustration.

In this chapter, the supply, intermediary and demand sides of an IPR exchange are investigated to collect and assess established and innovative, European and non-European instruments to stimulate IPR circulation. This research is framed by a broad sample of best practice cases.

The main outcome of this chapter is the assessment of all collected instruments from the perspective of helping policymakers to identify reasonable and implementable measures for increased IPR circulation in Europe, regardless of the existence of an IPR Financial Market. Figure 76 depicts the basic structure that was developed to evaluate these instruments. The main perspectives of this evaluation are political feasibility and effectiveness.

The evaluation scheme introduced in Figure 76 has the following four dimensions:

- The X-axis describes whether an instrument can be implemented within the existing regulations, or whether such an implementation tends to require changes to existing regulations.
- The Y-axis describes whether the implementation of an instrument requires substantial financial needs. In the assessment, only the need for direct public financial means or resources, which have to be activated through public engagement, was considered.
- The size of the instrument bubbles indicates whether a minor, medium or substantial impact on European IPR circulation can be expected if the instrument is implemented. Obviously, this can only be a raw estimation that depends heavily on the concrete implementation of the instrument.
- The colour of the bubbles indicates whether a direct, indirect or no effect can be expected on European SMEs if the instruments are implemented. For European competitiveness, direct effects on European SMEs are favourable.

The first two dimensions (financial needs and regulation) allow the categorisation of the instruments into four fields of political feasibility. This category reveals the engagement and risks that policymakers need to anticipate when the instrument is implemented:

- Riskless stars are instruments which can mainly be implemented within existing regulations and only require affordable financial support. Once successfully set on the political agenda, their implementation can be fast-tracked. Policymakers could initiate or support these instruments through modest and riskless engagement.
- Budget races are instruments which do not require significant changes to the current regulations, but need substantial financial resources. Consequently, besides the agenda-setting challenge, policymakers have to engage in significant budget negotiations.
- Political benefits are instruments that can only be implemented after substantial regulation adjustments. They provide direct pay-offs out of political processes. Policymakers therefore have to engage significantly in agenda setting.

- Political ventures are instruments which need substantial adjustments to regulations and significant budgets. These instruments are feasible for the long-term agenda and will mainly be implemented stepwise. Policymakers have to significantly engage in agenda setting and budget negotiations and hence face several risks.

The effectiveness of the instruments is mainly illustrated by the bubbles’ size and colour. The bigger and the darker (greener) an instrument is, the larger the impact it has on IPR circulation and European SMEs.

To qualify the feasibility and effectiveness assessment, a set of challenges has been described for each side of the IPR exchange scheme. These challenges are the outcome of the previous work in the study and mostly represent barriers to strengthening IPR circulation. We assume that instruments targeting these challenges will help to stimulate IPR circulation. We mention the targeted challenges for each instrument and describe the expected impact.

In a last step, each instrument is assessed regarding whether reasonable policy actions for its implementation are imaginable or not. If they are, a distinction is made between the scopes of the regional, national and European levels. The appropriateness of each level’s implementation is categorised: \checkmark – the instrument may be implemented at this level, $\checkmark\checkmark$ – the instrument should be implemented at this level; $\checkmark\checkmark\checkmark$ – there is a high priority should be given to implementing the instrument *at this level*.

In the example below, an assessment is made that policy actions regarding certification programmes for TTO professionals may be implemented on a national level, but that the priority implementation on the European level seems to be superior. On the other hand, we do not see the need for direct policy actions on any level to allow defensive publishing platforms to emerge.

Table 15 Example of assessing priorities regarding policy action implementation on certain levels.

Instrument	Priority regarding policy action implementation		
	Regional level	National level	European level
Certifications for TTO professionals		\checkmark	$\checkmark\checkmark$
Defensive publishing platforms			

Source: Own illustration.

In this chapter, the entire assessment, based on the introduced evaluation scheme and conducted in respect of the instruments on the supply, intermediary and demand sides, should be considered a rough estimate that provides policymakers with a first assessment of the presented instruments’ feasibility and effectiveness.

9.2 Strengthening the supply side

This chapter summarises and analyses instruments that strengthen the IPR supply side with the goal of increasing IPR circulation in Europe. The scheme introduced in section 9.1 is used to evaluate the feasibility and effectiveness of these instruments.

9.2.1 Challenges on the supply side

According to the analyses in the previous chapters of this study, the following are the main challenges in professionalising and enhancing the supply side of the IPR circulation scheme:

- *General awareness of IPR.* Inventors often do not have a deep awareness of patents as a means of transferring and exploiting knowledge for the emergence and growth phase of IPR. Increased awareness about the opportunities of IPR protection, as well as the risks of non-protection, is crucial for a better IPR supply. Inventors need reliable contact partners to get advice for their organisational, legislative and fiscal questions.
- *Patent generation.* Exchangeable IPR is the result of successful, basic and translational⁴⁷ R&D processes aligned with IPR protection processes. Guiding and supporting inventors all the way to patent filing will help increase the IPR supply. Patent scouting at public research organisations (PROs) will help to generate patent portfolios by complementing the basic patent with peripheral patents, which industrial companies often need. Funding translational research for proof-of-principle, proof-of-concept and prototype building is vital.
- *Patent selection.* Successful patent evaluation and valuation processes are the key to winning investors’ patent selections. Knowing and fitting the (e)valuation criteria used here are crucial for IPR’s exploitability.
- *Patent quality.* Ensuring a high patent quality has a positive effect on IPR’s exploitability. Awareness and skills are needed to ensure the patent quality. Clustering patents from different sources, for example, PROs and private entities will raise their overall quality.
- *Patent funding.* The costs of filing patents and enforcing IPR are significant. In most cases, the application phase for a patent exceeds the funding period of the underlying research project by far. Inventors need reliable funding mechanisms to protect IPR. In parallel, inventors have to learn how to use their IPR as a source of liquidity or funding. Patent litigation procedures also need reliable funding.
- *Launching IPR on the market* is a further challenge in addition to creating IPR. Stimulating IPR holders to offer their rights is an essential precondition for increased

⁴⁷ Translational research, which is mainly but not only conducted in medical and health care research, tries to overcome the dichotomy of basic research and applied research. It is an approach to align the fundamental (basic) research with processes to directly transfer insights into products. In contrast to applied research, which is more about incremental improvements by specifically using results from basic research, translational research is more about directly “translating” the paradigm shifts within fundamental research into market-orientated solutions.

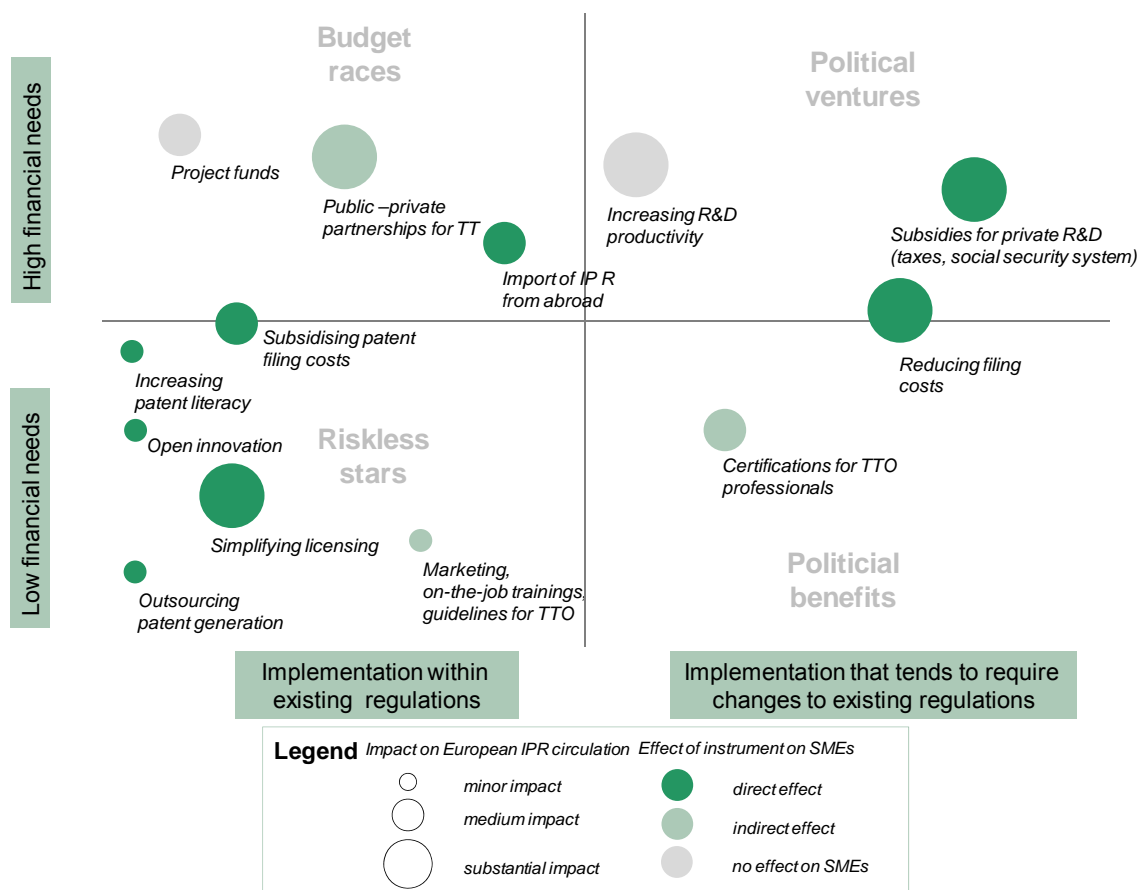
IPR circulation. Knowledge sharing under conditions of equitable remuneration will most certainly promote IPR circulation and exploitation.

- *Patent propensity*, defined as the number of patents generated per innovation, is an increasing challenge. The evolving trend towards cumulative innovations will create patent mosaics with a wide fragmentation of the IP rights. Early pooling (or bundling) of these rights will increase the value and the exploitability of each integrated patent. Creating an economic model relying on broad technology portfolios (“critical mass”) and not on single, improbable blockbusters will foster IPR generation and awareness of the importance of IPR protection.

9.2.2 Overview of instruments to strengthen supply

Figure 77 summarises the evaluation of the instruments that strengthen supply according to the scheme introduced in section 9.1.

Figure 77 Overview of the instruments to strengthen supply.



Source: Own illustration.

The figure reveals that there is a multitude of instruments to stimulate IPR supply in all categories. The following table summarises our assessment of these instrument’s policy action scope.

Table 16 Priorities regarding policy action implementation of instruments that strengthen supply

Instrument ⁴⁸	Priority regarding policy action implementation		
	Regional level	National level	European level
Certifications for TTO professionals		√	√√
Importing of IPR from abroad	√	√√	√
Increasing patent literacy	√	√	√
Increasing R&D productivity		√√	√√√
Marketing, training, guidelines for TTOs	√√	√√	√
Outsourcing patent generation			
Open innovation and co-invention	√√	√√	√√
Project funds	√	√√	√√
Public-private partnerships for TT	√	√√√	√
Reducing filing costs		√	√√√
Simplifying licensing	√	√	√
Subsidies for patent filing costs	√	√	√
Subsidies for private R&D	√	√√	

Source: Own illustration

9.2.3 Patent literacy

Inventors need increased patent literacy to stimulate IPR supply. Hence, knowledge about the functionality of the patent system will become part of the key items in universities' curricula. More specialised Master programmes (full-time and part-time) fostering the education of IPR professionals are also of vital interest for increased IPR circulation in Europe. Hence, European funding schemes with educational targets should add a focus on researchers' as well for future IPR professionals' patent literacy.

Assessment: Only a few approaches have been implemented towards increased patent literacy. In general, stimulating educational efforts to increase patent literacy is a riskless star with a minor impact on IPR circulation, but a direct effect on SMEs. It will mainly contribute to the IPR awareness challenge and indirectly to patent generation, selection, quality and market launching challenges. *Policy actions* can be implemented on a regional, national and European level.

⁴⁸ The instruments are in alphabetical order.

9.2.4 R&D funding

The most important input factor for IPR supply is basic as well as applied and translational R&D in Europe. To reach the 3% EU target, the member states and industry are implementing a multitude of funding schemes. It is obvious that the increase in research budgets will have a positive effect on the IPR created in Europe. In this section, specific aspects with a superior impact on the creation and, consequently, the circulation of IPR will be emphasised.

9.2.4.1 Increasing R&D productivity

The 3% target mainly focuses on input factors, but increasing the productivity of R&D in Europe is a key driver of more IPR. Paul et al. (2010) define R&D productivity as an aggregate of R&D efficiency (the ability to translate inputs like ideas into defined outputs within a fixed time) and R&D effectiveness (the ability to produce outputs with certain intentional and desired qualities).

In this context, the European research area (ERA) needs deep investigations into R&D productivity. The existing funding instruments should be evaluated accordingly, the adjustments should be applied and innovative funding instruments should be investigated. Furthermore, basic research on R&D methods is required, as are significant investments in research infrastructure. Fostering interdisciplinary knowledge sharing will broaden the scope of R&D projects.

"In particular, it is unacceptable that the current state aid rules for R&D are based on the linear model of innovation when there is broad academic, governmental and industry consensus that the model is wrong. The interactive innovation process is necessary to take advantage of the market-driven approach. We are advocating that the obsolete, artificial distinction between 'industrial research' and 'precompetitive development' should be replaced by a single category "industrial R&D' (including prototyping, software, testing and trials), implementing an allowable aid intensity of at least 50%." (Aho 2006)

Assessment: Some efforts have already been realised regarding increasing R&D productivity. In general, increasing R&D productivity tends to be a political venture with a substantial impact on IPR circulation, but in the short term and with little direct effects on SMEs. It will mainly contribute to the patent generation challenge. *Policy actions* should be implemented on a national level, while, on the European level, research programmes that focus on increasing R&D productivity have a high priority.

9.2.4.2 Project funds

These funds share similarities with venture capital (VC), but the investments are made in projects, not in companies (Darcy et al. 2009). Often the IPR (of universities or research organisations) is not mature enough to be licensed directly to companies, but needs further validation and valorisation. Project funds are investments and investors who acquire rights on pre-validated IPR and then fund the further development of the technology. Converting

this IPR to seed-stage companies is these project funds' exit strategy. Hence, the project funds bear significant technological risks and their investments should be supported by public funding. Alternatively, project funds should be established as public endeavours. The CD3 Centre for Drug Design and Discovery in Leuven⁴⁹, the Helmholtz-Validierungsfonds⁵⁰ and the Fonds zur Veredelung und Verwertung von Patenten der staatlichen Hochschulen Hessens (Patentfonds)⁵¹ are examples of private-public validation financing that sometimes act as project funds.

Assessment: The first project fund prototypes have already been implemented. In general, project funds are budget races with a medium impact on IPR circulation, but with no direct effects on SMEs. They will mainly target patent generation, patent quality, market launching and IPR awareness challenges. *Policy actions* can be implemented on a regional level and should be implemented on a national and European level.

9.2.4.3 Subsidies for private R&D

As the outcome of R&D, inventions are the basis for IPR supply in Europe. Direct research funding is not the only way to stimulate R&D in industry. Other incentives could be tax reductions for R&D costs. Another instrument, even better visible to decision-makers in industry, is waiving or reducing social security charges for research employees (Aho, 2006). Obviously, taxation and social security are national or regional issues; consequently, European solutions are currently hardly imaginable. The State Aid Rules also need to be taken into consideration.

Assessment: On a national level, several subsidies for private R&D have already been implemented. In general, changing taxation (and social security) schemes as subsidies for private R&D is considered a political venture with substantial impact on IPR circulation and with direct effect on SMEs. It will mainly contribute to patent generation and IPR awareness challenges. *Policy actions* can be implemented on a regional level and should be implemented on a national level, but direct engagement on a European level is not conceivable.

9.2.5 Total costs of patent ownership

The total costs of patent ownership in the life cycle of a patent determine SMEs' willingness and feasibility to generate and actively use IPR portfolios. Reducing these costs will significantly influence IPR circulation.

9.2.5.1 Reducing patent generation costs through outsourcing

After an invention, the internal costs of creating and prosecuting patents are significant, at least from the perspective of SMEs. The patent registration process is well-standardised, hence nearly all non-core parts of this process can be outsourced (or off-shored) to

⁴⁹ <http://lrd.kuleuven.be/en/tc/cd3-1/cd3-discovery-of-innovative-medicines>

⁵⁰ <http://www.helmholtz.de/forschung/technologietransfer/foerderinstrumente/>

⁵¹ <http://www.wibank.de/de/Foerderprogramme/Wirtschaft/Patentfonds.html>

professionals abroad. These are tasks like prior art searches, patent drafting, patent filing and prosecution, or patent translation and proofreading. Outsourcing could decrease costs, increase quality and accelerate the process.

Assessment: There are fragmented approaches towards increased productivity in the market. In general, outsourcing patent generation is a riskless star (from policymakers' perspective) with a minor impact on IPR circulation and a direct effect on SMEs. It will mainly contribute to patent generation, quality and funding challenges. *Policy actions* for this instrument are not conceivable.

9.2.5.2 Reducing filing costs

Patent protection sought in the EU-27 has reached approximately 32 000 EUR, of which 23 000 EUR arises from translation fees alone. In comparison, a US patent costs 1 850 EUR on average. It is obvious that particularly for SMEs and R&D entities that are not well-funded – especially those from the poorer economies in Europe – these costs are a substantial barrier to generating patents with a European scope for a single IPR Asset Market. Substantial efforts have to be undertaken to reduce these costs in future. As part of the Single Market Act, the European Commission concentrates its work on European unitary patent protection with the target post-grant translation costs of 680 EUR for a European patent (after a transitional period of a maximum of 12 years; and a currently estimated total procedural costs of far less than 10 000 EUR⁵²), as well as unified litigation procedures.⁵³ Our interview partners underlined the importance of the unified patent on condition that the promised cost savings are realised.

Another approach to reduce filing costs is the green technology pilot programme⁵⁴ of the USPTO, which favours patent applications from specific domains through fast-tracked registration. This accelerated application process saves the applicants costs through shorter engagement and will increase the availability of IPR from preferred domains. Know-how needed to solve urgent problems will flow to industry faster.

Assessment: Vital efforts are being made towards a unitary patent. Dependent on the implementation, instruments to reduce filing costs are political benefits or political ventures with a substantial impact on IPR circulation and a direct effect on SMEs. A unity patent will mainly contribute to patent generation and patent funding challenges, and will probably have a negative effect on patent propensity. *Policy actions* on a national level seem feasible, but there is a strong urgency (and on-going activity) for solutions on a European level.

9.2.5.3 Subsidising patent filing costs

There are various public instruments for funding patent-related activities. In many R&D grants, the costs of patenting are eligible. However, although researchers do not always

⁵² http://ec.europa.eu/internal_market/indprop/docs/patent/patent_fees_report_en.pdf

⁵³ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/470>

⁵⁴ http://www.uspto.gov/patents/init_events/green_tech.jsp

know this, they must apply for this at the beginning of their research. Funding programmes directly focused on patent-related expenditure could increase inventors' awareness. For example, the Chinese Ministry of Finance established a 10 million EUR patent-filing funding vehicle in 2009 to support SMEs' patent applications abroad.⁵⁵ A European example is the Polish government's 5 million Zloty (around 1.25 million EUR) Patent Plus programme to support local PROs' patent filing and commercialisation activities.⁵⁶ (There is a similar program for Polish SMEs.⁵⁷)

Assessment: There are already various subsidising instruments worldwide. Depending on the implementation, instruments for subsidising patent filing costs are riskless stars or budget races with a medium impact on IPR circulation and a direct effect on SMEs. These instruments will mainly contribute to patent generation, selection, quality, funding and IPR awareness challenges. *Policy actions* can be implemented on a regional, national and European level.

9.2.6 TTOs for HEIs and PROs

Owing to active policy changes on a European, national and regional level, transfer and validation have increasingly become the third stream of funding for higher education institutions (HEIs) as well as for public research organisations (PROs). TTOs are the main actors in this field and have the following profile: "TTOs are (i) process catalysts that lower the threshold of university-industry technology transfer (UITT) stakeholders to engage in technology transfer and maintains sustainability, (ii) knowledge converters that enable congruence between university technology and market needs, and (iii) impact amplifiers that alleviate problems related to the opportunistic incentive structures of UITT stakeholders and maximise societal impact" (Tahvanainen, Hermans 2011). TTOs also have a fourth mission, namely to act as patent scouts and promote additional patenting by informing and advising university researchers about the leading edge in current research in the area closely related to the fields which generated the patents already filed. TTOs can therefore act as true catalysts to allow better exploitation of recent fields of technology by undertaking the integrated IPR management required between the researchers and the TTO. One of the greatest TTO inputs is profound market knowledge of all the adjacent fields of those technologies that have already been commercially exploited.

Owing to TTOs current central position in university structures and strategies on the one hand, and in the political agenda on the other hand, the productivity of these actors seems to be critical for increasing IPR supply from universities (and research organisations). Increasing productivity is especially important, as most of our interview partners (from industry) explicitly questioned TTOs current capabilities in Europe.

⁵⁵ <http://english.people.com.cn/90001/90778/90862/6782417.html>

⁵⁶ http://www.pi.gov.pl/Finanse/chapter_94645.asp

⁵⁷ http://www.pi.gov.pl/eng/chapter_86534.asp

On the one hand, TTOs act on the supply side by helping universities to generate IPR based on their research and launching it on the market. On the other hand, TTOs act on the intermediary side because they are actively engaged in matching supply and demand. In the following section, we will focus on the supply-orientated functions of TTOs, while the intermediary-orientated functions will be discussed in section 9.3.

As can be observed by the rise and maturation of software solutions for customer relationships, supply chain management and human resources, the increasing demand for productivity in TTOs will stimulate the emergence of industry-proven TTO management systems like CaSTT⁵⁸. These systems will support all business processes in offices, will also support the means (like marketing and certification) discussed below and will provide a deep and automatic integration into the emerging electronic platforms described in section 9.3.7.

9.2.6.1 Marketing

TTOs need to learn how to establish themselves as a reliable brand. Besides their essential but not yet constantly implemented operational excellence, active marketing is crucial for their success. This implies advanced public relationship management, a vital Web strategy with SEO (search engine optimisation) as well as lead generation with e-mail campaigns or other tools with which to contact customers.

These marketing activities are in no way the only feasible ones for outbound relations. Especially from the perspective of strengthening the supply side, TTOs have to position themselves as reliable service providers at their own universities. University members have to know about and rely on their TTOs, their service portfolio and service quality.

9.2.6.2 On-the-job training for TTO professionals

Seminars, webinars, newsletters and workshop participation are means of important on-the-job training for TTO professionals. Another option is participation in developing modules for MBA programmes to train IPR managing professionals. In the rapidly changing and demanding field of technology transfer, lifelong learning is a prerequisite for successful TTO professionals, and will possibly increase IPR circulation in Europe. Our interview partners mainly concurred that these educational efforts have value.

9.2.6.3 Guidelines for TTO professionals

Defining and disseminating guidelines for business processes in TT and TTOs pave the way towards efficiency and effectiveness in the field of technology transfer. For example, in Annex I of "Commission recommendation on the management of intellectual property in knowledge transfer activities and code of practice for universities and other PROs"⁵⁹, the European Commission defines a code of practice for universities and other PROs concerning the management of intellectual property in knowledge transfer activities. Similarly, the "Guidelines for collaborative research and knowledge transfer between science and industry"

⁵⁸ <http://castt.com>

⁵⁹ http://ec.europa.eu/invest-in-research/pdf/download_en/ip_recommendation.pdf

resulted from the Responsible Partnering Programme, a joint endeavour of EIRMA, EARTO, EUA and ProTon.

Assessment: In general, increasing the productivity of TTOs by active marketing, on-the-job training and guidelines are riskless stars with a minor impact on IPR circulation and indirect effects on SMEs. It will mainly contribute to patent generation, patent quality, market launching and IPR awareness challenges. Policy actions should mainly be implemented on a regional or national level. European approaches can be considered for certain instruments (i.e. European guidelines).

9.2.6.4 Certification of TTO professionals

Certificates are appropriate tools to standardise and improve services and to disseminate a minimum level of requirements in the market as well as crowd out actors unable to fulfil these minimum standards. The quality of processes and personnel are two of the main barriers to industry partners working with university TTOs (Bowering 2011; our interview partners consent broadly), hence certificates are important indicators of ability, quality and reliability.

The need for certification is recognised globally. In November 2008, the Association of University Technology Managers (AUTM), the Association of European Science & Technology Transfer Professionals (ASTP), the Association of Technology Managers in Taiwan, Knowledge Commercialisation Australasia, and UNICO announced a memorandum of understanding (MoU) to launch a global project on the professional development of knowledge and technology transfer. The MoU claims: "Given the rising interest in accreditations and certifications, we feel it is appropriate to explore the demand, scope and the desirability of these approaches within the career arcs, skills and training required by our members."⁶⁰

Currently, the Certified Licensing Professional (CLP) programme⁶¹ in the USA has successfully awarded the demanding CLP certification to more than 800 IPR professionals. The Cert-TTT-M⁶² (funded within FP-6), was a European certification approach which focused on transnational technology transfer. The follow-up project within FP-7 is EuKTS⁶³, which aims to provide the institutional framework for certification, accreditation and harmonisation of data collection in the knowledge transfer field.

It is important to emphasise that the impact of these certification programmes increases with aligned legal changes. For example, if organisations' eligibility for participation in specific programmes is tied to the certification of professionals or processes, their willingness to gain certification will increase automatically.

Assessment: In general, increasing TTOs' productivity by implementing reliable and recognised certifications for TTO professionals provides a political benefit with a medium

⁶⁰ <http://www.praxisunico.org.uk/uploads/mou.pdf>

⁶¹ <http://www.licensingcertification.org/>

⁶² <http://www.ttt-manager.eu/>

⁶³ <http://www.eukts.eu/>

impact on IPR circulation and an indirect effect on SMEs. It will mainly contribute to patent generation, patent quality, market launching and IPR awareness challenges. While national certification programmes might stimulate progress in this field, there should at least be an action for European-level certification programmes.

9.2.6.5 Public-private partnerships for TT

While the interview partners questioned the performance of publicly funded TTOs, they were much more optimistic about public-private partnerships, especially if they are combined with translational research. Institutions like VTT (FIN), Fraunhofer (DE) or the Carnot Institutes (F), but also ETRI⁶⁴ (KR) or ITRI⁶⁵ (TW) undertake applied, translational and validation research based on the know-how created through basic research (Arnold 2010). A stronger emphasis on the later valorisation of IPR is achieved through the required financial engagement of their industrial partners. On average, the IPR that is then created is significantly more mature than the IPR of universities and similar research facilities.

Assessment: PPPs like VTT or Fraunhofer are long-lasting, established and successful instruments which help to increase IPR circulation in Europe. In general, it is a budget race with significant impact on IPR circulation and an indirect effect on SMEs. It will mainly contribute to patent generation and patent quality challenges. *Policy actions* are currently successfully applied on a national level, but similar approaches on a regional and European level seem to be feasible.

9.2.7 Further sources for IPR circulation

Besides the already discussed instruments, IPR circulation in Europe can be stimulated by activating unused sources of IPR. By applying innovative, highly-standardised licensing mechanisms it is possible to add IPR with lower commercial value into the IPR value cycle. Also the active acquisition of non-European IPR is a feasible option to feed this cycle. A third option is the simulation of open innovation and co-invention. This instrument only has a minor impact on IPR circulation, but directly supports the knowledge circulation in the European research industry context.

9.2.7.1 Simplifying Licensing

Besides selling IPR assets like patents, providing access to IPR through licensing is a valuable and favourable instrument to increase IPR circulation (or at least usage and exploitation) in Europe. The simplification and standardisation of the licensing process, trying to set up fair, reasonable and non-discriminatory terms (FRAND), as well as innovative licensing models, are measures to be implemented for increased European competitiveness. Launching patent pools based on the open source principle (i.e. driven by an industrial consortium behind a specific standardisation) is a special, but considerable, example of the simplification of licensing.

⁶⁴ <http://www.etri.re.kr/eng/> (Electronics and Telecommunication Research Institute)

⁶⁵ <http://www.itri.org.tw/eng/> (Industrial Technology Research Institute)

Three existing mechanisms for simplifying licensing are described next.

Easy Access IP (by the University of Glasgow)

The premise of the Easy Access IP (see Bowering 2011 for details) programme at the University of Glasgow is that all IPR has inherent value, but only a small proportion of it has real significant commercial value. The TTO seeks to exploit the small proportion of IPR (around 5% to 10% of the disclosed inventions) with significant commercial value and with industrial and commercial partners; the other IPR will usually be transferred free of charge to partners willing to demonstrate the societal or economic benefits.

Funded with 80 000 GBP⁶⁶, the Easy Access IP programme has been established and is implemented by the University of Glasgow (UK), King's College London (UK), the University of Bristol (UK) and the University of Copenhagen (Denmark).

Exclusive⁶⁷ and non-exclusive⁶⁸ licence agreements⁶⁷ are concluded in the Easy Access IP programme. Both provide the licensee as well as the licensor with a well-balanced position.

The Easy Access IP programme seems to be an appropriate model to increase the circulation of pre-validated technologies and fits well within the open innovation environment. The main impact of the Easy Access IP model is the increased effectiveness of the TTOs that apply it. They can concentrate their resources on high-value transactions as well as on low-value transactions that are both mainly executed efficiently by the removal of all existing barriers through standardised contracts, concise negotiations and negligible legal challenges.

Carolina Express Licence

The University of Chapel Hill⁶⁹ (USA) applies a similar model called Express Licensing. The basic idea is the implementation of standard licence agreements with predefined, non-negotiable terms. The licence fees are paid as an equity grant, instead of upfront licence payments. Like the Easy Access IP programme, this model reduces set-up complexity by extensive standardisation. In contrast to Easy Access IP, when applying the Carolina Express License, the TTO/university profits financially if there is commercial success. Our interview partners emphasised that TTOs often insist on up-front licence payments in negotiations, but that the potential licensees often rely on flexible, success-orientated licence terms to set up funding. The Carolina Express Licensing seems to provide a feasible solution to this challenge.

Public Patent License

Under specific circumstances, patent owners might be interested in-licensing their IPR in a non-discriminatory and fair way. Creative Commons is developing the CC Public Patent

⁶⁶ <http://www.kcl.ac.uk/newsevents/news/newsrecords/2011/03March/FundingtoexpandIntellectualProperty.aspx>

⁶⁷ Exclusive Licence Agreement contract: http://www.gla.ac.uk/media/media_193371_en.pdf

⁶⁸ Non-Exclusive Licence Agreement contract: http://www.gla.ac.uk/media/media_193370_en.pdf

⁶⁹ <http://otd.unc.edu/CarolinaExpressLic.php>

License⁷⁰, which is intended to be a transparent offer to conclude a licence agreement in respect of a patent. The success of CC licences for other IPR types, such as copyright protected photos or other content, has proven that it is easy to use. Understandable licence agreements help to increase IPR circulation. The existence of the CC Public Patent License and knowledge of it might stimulate patent holders to license their rights as well as supporting them.

Assessment: Prototypes for innovative licensing mechanisms have been successfully implemented. In general, simplifying licensing by innovative licensing models or more standardisation is a riskless star (from policymakers' perspective) with a substantial impact on IPR circulation and a direct effect on SMEs. It will mainly contribute to market launching and IPR awareness challenges. Besides funding pioneering projects (like Easy Access IP), there seems to be little scope to set up other *policy actions*. If implemented, policy actions could originate on a regional, national or European level.

9.2.7.2 Importing IPR from abroad (non-EU actors)

Besides producing IPR through EU-based R&D activities, importing from abroad is another important option for increasing IPR supply in Europe. Direct purchase of patents (and other tradable IPR assets) is the most obvious procedure for importing IPR from abroad. This is part of a global IPR Asset Market and it will not be discussed in detail here.

Other activities for importing IPR from abroad are direct investments in R&D actors, but distinguishing between innovative and adaptive overseas R&D (Todo, Schimizutani 2009). The former is about purchasing R&D facilities to obtain know-how currently not available for the investor (in its home country). The latter is about purchasing R&D facilities to adapt existing IPR to local circumstances. Consequently, European companies should be stimulated (through national and European incentives) to invest in R&D activities abroad with the aim of increasing the European share in global IPR control.

National taxation schemes that allow companies from non-EU states to save tax on royalties and other IPR-related income, might lead to substantial migration of IPR from abroad into the EU (Mutti, Grubert 2009). Because the same effect occurs in the opposite direction, European companies will obtain cost savings when transferring IPR abroad. Our interview partners, especially those from industry, partly agreed on the importance of competitive taxation schemes for IPR-related income.

Assessment: Stimulating IPR import from abroad through investment subsidies or tax optimisation is a budget race with significant political risks, but will have a medium impact on IPR circulation and a direct effect on SMEs. It will mainly contribute to patent generation challenges. If the main stimulus is provided through tax, the *policy actions* will be implemented (mainly) on a national and (occasionally) on a regional level. On a European level, the finance providers (like EBRD or EIB) will be the main actors.

⁷⁰ http://wiki.creativecommons.org/CC_Public_Patent_License

9.2.7.3 Open innovation and co-invention

“The open innovation paradigm treats R&D as an open system. [...] ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as those reserved for internal ideas and paths to market in the earlier era.” (Chesbrough 2006). In short, open innovation is the new imperative for creating and profiting from technology. Ebersberger and Herstadt (2011) underline the importance of open innovation for Europe and recommend the implementation of instruments “which promote the dynamics of regional and national innovation systems” on the European level (Ebersberger et al. 2011). They empirically show that more industry-industry and fewer industry-science relationships in European networks will help to strengthen open innovation.

The basic principle underpinning open innovation is the requirement of a fair balance of interest between the partners. The partners must also be willing to take steps to provide equitable compensation and eliminate all problems relating to IP management and ownership of results.

Assessment: Open innovation is a broadly discussed and partially adopted method. In general, stimulating open innovation and co-invention is a riskless star (from policymakers’ perspective) with a minor impact on IPR circulation but a direct effect on SMEs. Besides the direct IPR circulation between the participating partners, open innovation will mainly contribute to the IPR awareness challenge. *Policy actions* should be implemented on every level – regional, national and European.

9.3 Strengthening the intermediaries

As defined by the indicative market structure introduced in the course of this study, there is often a third group of actors between buyers and sellers, namely intermediaries. Their primary role is to coordinate transactions to merge supply and demand. Many intermediaries are involved in IPR circulation, for example, licensing agents, electronic platforms, patent enforcement companies, and incubating funds.

This section summarises and analyses instruments that strengthen the intermediary side with the aim of increasing IPR circulation in Europe. The scheme introduced in section 9.1 is used to evaluate the feasibility and effectiveness of these instruments.

9.3.1 Challenges on the intermediary side

According to this study’s previous analyses, the following are the main challenges in professionalising and enhancing the intermediary side of the IPR circulation scheme:

- *Internationality* is one of the key success drivers of IPR exchange. Regulations, marketplaces and the capacities of the involved parties have to fit the sophisticated requirements of international exchange. Besides legal and regulatory issues, language is also decisive for efficient IPR circulation in Europe and beyond.

- *Standardisation of the services* offered by the intermediaries increases the comparability and reliability for customers. It forms the basis for industrialisation and the broad commercialisation of the technology transfer business; this seems to be one of the main drivers of more IPR circulation in Europe.
- *Transparency* about prices, transactions, supply and demand is crucial for efficient markets and other exchange facilities.
- *Patent quality* is essential for the vital exchange of IPR assets. It is one of the driving preconditions for the intermediaries’ successful business models.
- *Patent (e)valuation* methods are needed for efficient asset pricing. This is also a precondition for more asset liquidity on the market.
- *Transaction time* is essential for the turnover rate and the pace of IPR circulation. Consequently, all organisational and regulatory conditions resulting in reduced transaction time significantly strengthen IPR circulation.
- *Awareness* of the importance of IPR circulation has already been established among the intermediaries, but their business models depend heavily on increased awareness on the supply and demand side. Intermediaries fulfil an important role on these two ends of the market and need instruments to set the corresponding agenda.

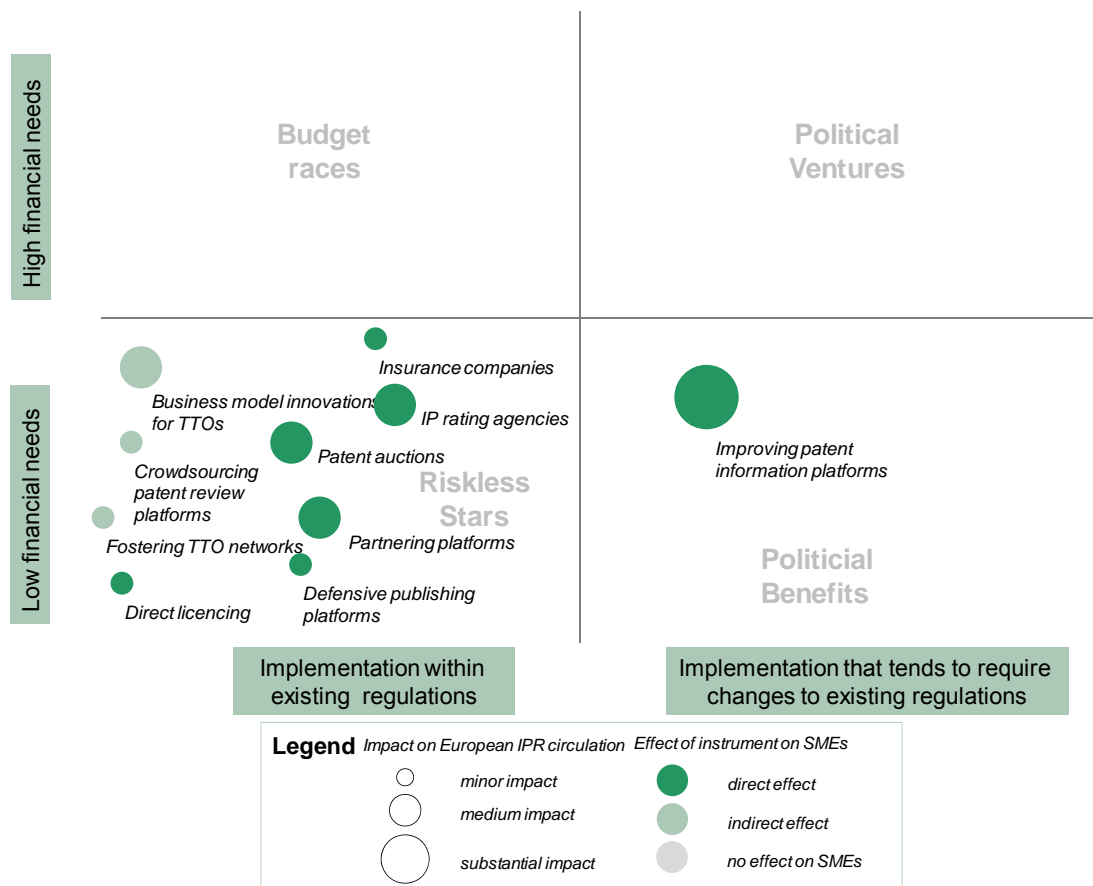
Some of the above-mentioned challenges have already been identified as drivers of the supply side. The implementation of instruments for intermediaries and targeting one of these challenges will strengthen the supply side, and vice versa.

We want to underline that an efficient and valuable IPR asset exchange relies on an ecosystem of providers of innovative services. It is these companies’ creativity that produces new business models that stimulate more IPR-related exchange on a national, European and international level. When these new players and their ideas enter the intermediary market, they will create new business opportunities and will stimulate the supply and the demand side of the market to conduct more transactions.

9.3.2 Overview of instruments to strengthen intermediaries

Figure 78 summarises the evaluation of instruments that strengthen intermediaries according to the scheme introduced in section 9.1.

Figure 78 Overview of instruments that strengthen intermediaries.



Source: Own illustration.

Contrary to the supply side, almost all the instruments can be implemented within existing regulations. Additionally, the realisation of the instruments needs only moderate (public) financial budget. Consequently, there are many opportunities to establish innovative and professional intermediaries. The following table summarises our assessment of the scope in which policy actions can be implemented for these instruments.

Table 17 Priorities regarding policy action implementation of Instruments that strengthen intermediaries.

Instrument ⁷¹	Priority regarding policy action implementation		
	Regional level	National level	European level
Business model innovations for TTOs	√	√	√
Crowdsourcing patent review			
Defensive publishing platforms			
Direct licensing			
Fostering TTO networks	√	√	√
Improving patent information platforms		√	√√√
Insurance companies			
IPR rating agencies			
Partnering platforms		√	√√
Patent auctions			

Source: Own illustration

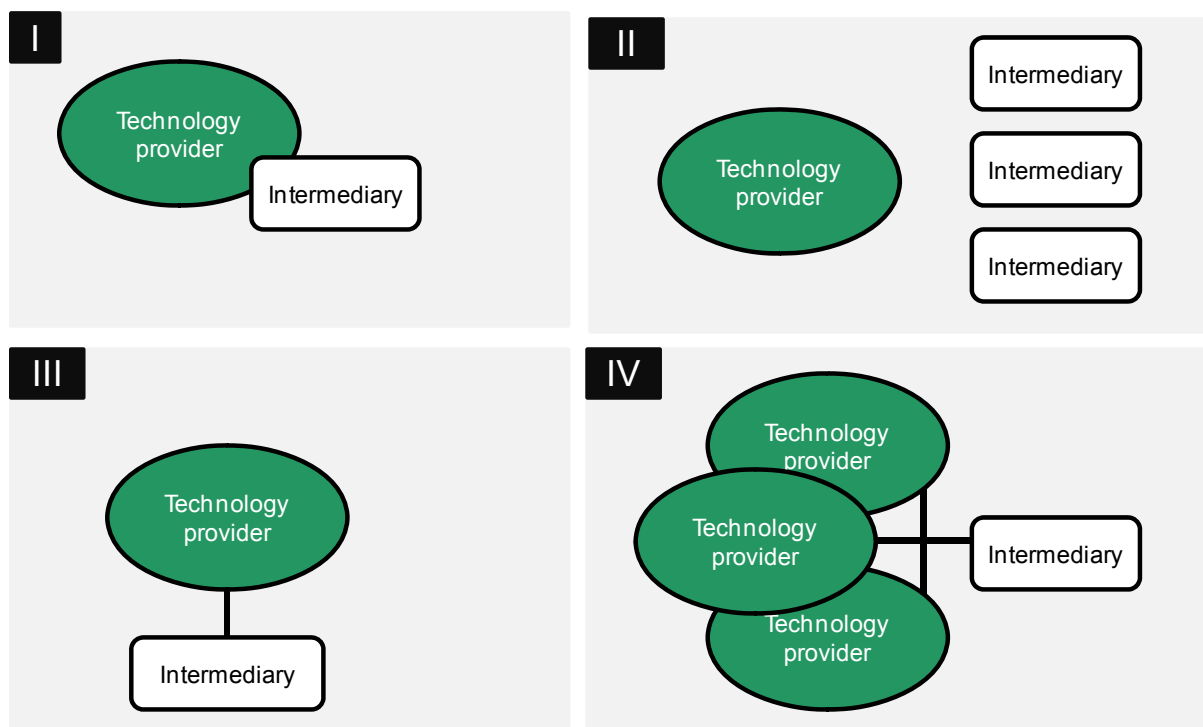
9.3.3 TTO business models

The supply-orientated functions of TTOs in HEIs and PROs were discussed in section 9.2.6. In this section, TTOs are analysed from the perspective that they function as intermediaries.

In the field of TTOs for universities, public research institutions and larger companies, business models' predominating scheme is depicted in square I of Figure 79. These TTOs are an institutional and organisational part of the technology provider. Strong ties between the technology provider and the intermediary have significant consequences for their professionalism, necessities and funding. Within these strict structural dependencies, differently shaded business models occur, such as those concentrating on IPR-related coaching, strict IPR management, or on providing fully fledged IPR services. In practice, these TTOs perform differently in terms of the number and value of their deals, which are due to environmental as well as institutional factors (Siegel, Waldman, Link 2007).

⁷¹ Instruments in alphabetical order

Figure 79: Schemes for business models between technology providers and intermediaries.



Source: Own illustration.

These strong organisational dependencies imply the exclusivity of the relationship between the technology provider and the intermediary. As depicted in square III of Figure 79, this exclusivity is equally achievable in cases where intermediaries act as independent legal entities, and where the technology provider might have a significant share of the intermediary's equity. Examples of this construct are Ascenion GmbH (an intermediary for various public research institutions in the life sciences field in Germany) and the Max Planck Innovation GmbH (the exclusive intermediary for Max Planck Institutes worldwide). In combination with exclusivity, independence could increase responsibility and controllability, and have a positive influence on the intermediary's performance.

Taking this market orientation a step further, the organisational separation of technology providers and intermediaries could also imply the abandonment of exclusivity. As depicted in square II of Figure 79, it is feasible that the strong ties between IPR providers and intermediaries will relax in future. Consequently, an ecosystem of intermediaries will establish itself around each capable provider, offering their services on a case-by-case basis. This will drive competition between the service providers, which could have a positive impact on the number of deals, the transaction time and the expected earnings per deal. The downside of this approach might be less controllability due to the technology providers' increased communicative and administrative workload and their simultaneous collaboration with various IPR exploiters.

A balanced solution could be *fixed-term exclusivity* with technology providers regularly inviting tenders for IPR exploitation services. Consequently, successful and operational

intermediaries will win tenders from different providers and expand, while others will have to leave the market.

In another business model scheme, as depicted in square IV of Figure 79, technology providers cooperate and act as unified actors to achieve economies of scale. Regional IPR transfer offices like OTTLIV (the TTO for 37 Paris hospitals in France) or TLB (the TTO for the Baden-Württemberg universities in Germany) are the results of this kind of cooperation. Increased professionalism and an impact on the resulting TTOs can be expected.

Regardless of the chosen business model between the technology provider and the intermediary, the latter can operate internally, based on a non-profit or for-profit scheme. We assume, but do not test, that for-profit intermediaries will stimulate IPR circulation more than non-profit ones.

Assessment: In general, enforcing innovative business models for technology transfer is a riskless star (from policymakers' perspective) with a medium impact on IPR circulation in Europe and an indirect effect on SMEs. The more the intermediaries are forced to find and execute innovative solutions in the IPR transfer field, the higher the potential for increased IPR circulation. Hence, the above described innovations in respect of the TTOs' business models target IPR awareness, standardisation of services and transaction time challenges. *Policy actions* like adjusting research funding schemes or refining the direct funding mechanisms of TTOs can be implemented on every level – regional, national and European.

9.3.4 Intermediary networks

Increasing TTO managers' level of professionalism as an enhancement instrument for the supply side was discussed above. On a national and international level, the implementation of networking instruments for these professionals and institutions seems to be important to strengthen their role as intermediaries. Besides other advantages, these intermediary networks will support the TTOs in establishing relationships with industry. The industry links that are subsequently created will help to transfer market insights back into the innovation process, and vice versa.

The world's leading intermediary network is AUTM⁷², founded in 1974 by the Society of University Patent Administrators. Today, AUTM is a global network of members from more than 350 universities, research institutions, teaching hospitals, government agencies, and hundreds of companies involved in managing and licensing innovations derived from academic and non-profit research.

ASTP⁷³ is the network of European Science & Technology Transfer Professionals, which has more than 600 members from 41 countries, mostly from public institutions. A similar European approach is ProTon⁷⁴, which regards itself as a leading European knowledge transfer association reaching almost 600 universities and public research organisations

⁷² <http://www.autm.net/>

⁷³ <http://www.astp.net/>

⁷⁴ <http://www.protoneurope.org/>

across Europe. A third network on a European scale is the Luxembourg-based TTI⁷⁵, which regards itself as a global gateway to innovation (with about 230 members from 40 countries).

Networks with a national focus are AURIEL⁷⁶ (1 600 members in the UK), C.U.R.I.E.⁷⁷ (100 institutional members in France), TechnologieAllianz⁷⁸ (about 200 institutional members in Germany), Netval⁷⁹ (47 universities in Italy), RedOTRI (in Spain), and UTEN⁸⁰ (about 20 institutional members in Portugal).

Examples in Asia are TTN⁸¹, the 2008 founded Technology Transfer Network for Singapore-based knowledge institutions, and ATMT⁸², the Association of Technology Managers in Taiwan.

Since 2010, the Alliance of Technology Transfer Professionals (ATTP)⁸³ has acted as a global umbrella organisation for (national) associations for technology transfer professionals and bundles their efforts globally, especially regarding internationally recognised standardisation in the field of TT. During its launching, ATTP already connected 5 000 technology transfer professionals in 67 countries, showing a huge potential for international exchange, cooperation and capacity building in the field of IPR circulation.

Assessment: In general, fostering national and international intermediary networks is a riskless star with a minor impact on IPR circulation and an indirect effect on SMEs. It will mainly contribute to the internationalisation and awareness of challenges. For increased IPR circulation, it seems to be important that these networks actively invite and support the participation of the private sector. *Policy actions*, like setting up appropriate funding schemes, are implementable on every level – regional, national and European.

9.3.5 Patent auctions

Patent auctions are the means on the intermediary level to increase the IPR circulation without establishing an IPR Financial Market. These auctions may drive up the transaction speed of the IPR Asset Market. After the first live auction was held in San Francisco in 2006, several others followed (Malackowski, 2006). ICAP Ocean Tomo has held over 10 live auctions with a total transaction volume of approximately 170 million USD in the USA (ICAP Patent Brokerage, 2011). Our interview partners emphasised that they actively observe these auctions because they assume they will have a growing impact; nevertheless, none of them has purchased IPR on one of these auctions.

⁷⁵ <http://www.tii.org>

⁷⁶ <http://www.qub.ac.uk/auril/>

⁷⁷ <http://www.curie.asso.fr/>

⁷⁸ <http://www.technologieallianz.de/>

⁷⁹ <http://www.netval.it>

⁸⁰ <http://utenportugal.org/>

⁸¹ <http://www.ipi-singapore.org/ipi/slot/u2605/ttn>

⁸² <http://www.atmt.org.tw/>

⁸³ <http://www.attp.info>

This observation from the interviews is in accordance with Tietze’s (2011) conclusion that “technologies are more likely to be auctioned if they are characterised by low complexity, high technology quality and technological impact.” In addition, technologies whose sellers have medium to moderate value expectations have a higher probability of being auctioned. As far as sales prices go, “[t]he results show also that technologies reach higher sales prices if they have a higher technological complexity, higher technological impact and higher technology quality. The sales price appears also positively related to the value perception of the seller” (Tietze, 2011).

The auctions’ potential success may originate from three sources: cost, speed and anonymity. Firstly, by acting as a broker bringing together supply and demand, a platform like ICAP Ocean Tomo Live Auctions reduces both parties’ transaction costs. Secondly, auctions speed up the transactions, for example, by requiring the bidders to show that they have the financial means to close the auction, or by facilitating (compared to a bilateral negotiation) the negotiation process. Thirdly, a patent auction platform like ICAP Ocean Tomo Live Auctions offers various mechanisms to keep the participants anonymous. This can be important for companies, since selling or buying patents might provide hints about their strategic direction, which might give their competitors an advantage.

A disadvantage of patent auction models is the low trade frequency. Compared to a continuous trading exchange model, where trades may occur continuously, patent auctions only occur rarely. Consequently, patent auctions may enhance liquidity in the IPR Asset Market, but should not be considered its key driver. Given the current developments in the patent auction market, these auctions experienced a good start, but have failed to achieve the expected revenue and activity growth over the past years, and seem to have lost popularity (Jarosz, et al., 2010).

Assessment: Patent auction platforms are already on the market, but have only achieved modest success. In general, patent auction platforms are riskless stars (from policymakers’ perspective) with a (potential) medium impact on IPR circulation and a direct effect on SMEs. They will mainly contribute to the internationalisation, transparency, patent (e)valuation, service standardisation, transaction time and IPR awareness challenges. *Policy actions* need not be implemented on any level – regional, national or European. Patent auction platforms may emerge without political intervention.

9.3.6 Value-added services

Increased competition between intermediaries will lead to increased diversification and specialisation of these actors. In the following section, several types of services which might increase IPR circulation in Europe, and thus become the business model of specialised intermediaries, are discussed.

9.3.6.1 IPR rating agencies

As already discussed, one of the main challenges for efficient IPR exchange is patent (e)valuation. While there is a wide spectrum of qualitative and quantitative methods, SMEs

specifically do not have sufficient skills and capacities to evaluate all IPR that enters the market. IPR rating agencies that are comparable to credit rating agencies (Standard & Poor’s, Fitch or Moody’s) can also be established. These agencies could rate quality, (litigation) risks and other rather objective criteria. The task of these actors is not to evaluate the value of an IPR asset itself, but to evaluate and disclose objective criteria as the basis for fair prices in negotiations on the IPR Asset Market. Hence, these agencies will support the (e)valuation processes of third parties.

Assessment: As far as we know, IPR rating agencies do not yet exist. In general, IPR rating agencies are riskless stars (from policymakers’ perspective) with a medium impact on European IPR circulation and a direct effect on SMEs. Once established, they would target patent e(valuation), patent quality, service standardisation, transparency, IPR awareness and transaction time challenges. *Policy actions* need not be implemented on any level – regional, national or European. IPR rating agencies may emerge without political intervention.

9.3.6.2 IPR insurance

Purchasing and using IPR assets implies that a company runs risks. On the one hand, there is always a systematic quality risk with purchased IPR, which could have consequences like revoked patents. On the other hand, there is always the risk of infringements by third parties.

Absorbing these risks in the process of IPR exchange seems to be a well-definable business model for new types of intermediaries. Insurance against litigation costs, but also bundling IPR assets with insurance against the costs of patent revocation are imaginable. A few IPR insurances (brokers) on the market (like Charles Milnes⁸⁴ from the UK and IPISC⁸⁵ from the USA) provide these kinds of products. Bundling this insurance directly with IPR transfer processes is a promising, but underdeveloped and immature, market niche.

Assessment: IPR insurance has been on the market for a long time. In general, new business models which focus on the absorption of the risks in IPR transfer are riskless stars (from policymakers’ perspective, hence the public sector has not covered or stimulated potential insurers’ significant financial needs) with a minor impact on IPR circulation, but a direct effect on SMEs. It will mainly contribute to service standardisation, transparency, patent quality and patent (e)valuation challenges. *Policy actions* need not be implemented on any level – regional, national or European. This kind of insurance may emerge without political intervention.

9.3.7 Electronic platforms

There are electronic platforms, existing and imaginable, which provide options for increasing IPR circulation. (This section does not discuss platforms for patent transactions.)

Generally, our interview partners concurred that these platforms have value, but were sceptical of the current implementations’ success. According to them, the main goal of these

⁸⁴ <http://www.reactinsurance.com/>

⁸⁵ <http://www.patentinsurance.com/>

platforms should be to bundle information from different sources and provide unified access on the largest possible scale.

9.3.7.1 Improving patent information platforms

All national and international patent agencies provide electronic patent information facilities. The comprehensiveness and availability of the data vary and depend on the policies and regulations that apply to these agencies. Easy access to this information has a positive impact on market transparency, awareness and patent quality. Besides official content providers, private actors, like Google’s patent search⁸⁶ (USA) and freepatentsonline⁸⁷ (USA), provide patent searches. Their business models are based on available material and could provide value-added services besides the raw data. These services will have an additional positive effect on market transparency.

The raw data (also searchable) provided by the EPO are comprehensive, but not overall sufficient for database searches with a focus on commercialisation. Hence, patent holders may be stimulated, for example, by reduced fees or accelerated processes – as already implemented in the UK⁸⁸ and Singapore⁸⁹ – to disclose some information about purchasing options with regard to the registered IPR (licence of rights). Gowers (2006) finds that this instrument only has a limited effect: “The take up of these licences of right is low, at around 0.5 per cent of patent renewals, and has not increased in recent years.” However, it is assumed that making this and other market-orientated information broadly available through searches in patent agencies’ databases would significantly increase market transparency. A mandatory IPR ownership register, similar to land registers for real estate, would significantly facilitate their exchange (and investigations into the freedom to operate). If available, all the data should be made available (freely) to third parties, who will then be able to create further value-added services.

A reference databases for IPR asset trades could be another instrument for improved market transparency. Structured and detailed information about performed deals provides insight into the market mechanisms (even for academia). Emerging service providers will be able to collect, use and analyse this data, providing the market participants with added value. This reference database could be the result of regulations regarding the IPR Asset or Financial Market. If no regulations are established, only the market platform providers will be able to deliver this value to the customers. Hence, they will earn an additional premium from their data monopoly.

It is important to emphasise that in terms of increased IPR circulation, the full power of these information platforms is only achievable with legal changes. Only when an ownership registry or similar obligations is mandatory for all participants in the market, will value-adding transparency be achieved.

⁸⁶ <http://www.google.com/patents>

⁸⁷ <http://www.freepatentsonline.com/>

⁸⁸ <http://www.ipos.gov.uk/types/patent/p-manage/p-useenforce/p-licence/p-licence-right.htm>

⁸⁹ <http://www.ipos.gov.sg/leftNav/pat/Licence+of+Right+%28LOR%29.htm>

Assessment: In general, improving patent information platforms is a political benefit with a substantial impact on IPR circulation in Europe. If third parties can exploit data for more market transparency, a group of new service providers could emerge and could add further value. This new transparency dimension will have a direct impact on SMEs. Improved platforms will especially target patent (e)valuation, service standardisation, internationality, transparency and IPR awareness challenges. *Policy actions* in respect of highly integrated and value-adding platforms are strongly recommended, especially on a European level.

9.3.7.2 Partnering platforms

One of the most obvious business models in the intermediary field is partnering platforms. The goal of these platforms is to amplify the scale technology providers could use to meet the demand. These platforms should foster the connection between technology needs and capacities. For-profit examples are Yet2Come⁹⁰ (USA), Techtransferonline⁹¹ (USA; with more than 140 000 technologies available for sale or licensing according to their website; July 2011), Flintbox (USA; 3 500 innovations; July 2011). From the non-government side, non-profit examples are ibridge⁹² (USA; 16 000 innovations; July 2011). From the government side, there are IP Mart⁹³ of the Korean KIPA (KR; 32 innovations on the English version of the website; July 2011) and the partnering service of the European Commission's Enterprise Europe Network⁹⁴ (EC; 13 000 technology profiles; September 2011). In general, partnering platforms can be understood as predecessors of IPR asset trading marketplaces, paving the way to more standardised and international IPR exchange.

Our interview partners underlined that the success of these partnering platforms depends, on the one hand, on their facilities to bundle offers from a wide variety of sources. On the other hand, these platforms need advanced (i.e. semantic) search facilities and matchmaking solutions to simplify user research significantly.

Assessment: There are already various partnering platforms on the market, but fragmentation is one of the main drawbacks. In general, partnering platforms are riskless stars (from policymakers' perspective) with a medium impact on IPR circulation in Europe and a direct effect on SMEs. Improved partnering platforms will target IPR awareness, transparency, transaction time and service standardisation challenges. It is important to emphasise that an overwhelming number of platforms operate from the USA, also those aimed at the European market. Competitive European for-profit and non-profit solutions that bundle a significant number of technology providers seem to be required. *Policy actions* with regard to internationally highly integrated partnering platforms are recommended, especially on a European level.

⁹⁰ <http://www.yet2.com/>

⁹¹ <http://www.techtransferonline.com/>

⁹² <http://www.ibridgenetwork.org>

⁹³ <http://www.patentmart.or.kr/english/>

⁹⁴ <http://www.enterprise-europe-network.ec.europa.eu/services/technology-transfer>

9.3.7.3 Direct licensing platforms

Direct licensing platforms are a niche market, such as FolioDirect (USA; 72 IPR-related products for sale; July 2011)⁹⁵, between pure partnering platforms and IPR (licensing) marketplaces like the IPXI. On these platforms, customers can directly add licences for applicable technologies to their shopping cart. At FolioDirect, most of the offers are from universities and in the field of software or content management; other patents are product-orientated, for example, a building plan for a specialised couette cell.

Assessment: Direct licensing platforms are already on the market and have achieved modest success. In general, stimulating direct licensing business models is a riskless star (from policymakers' perspective) with a minor impact on IPR circulation but a direct effect on SMEs. They will mainly contribute to service standardisation, transaction time and IPR awareness challenges. But it is questionable whether this generic approach to IPR transfer is also applicable on a larger scale. *Policy actions* need not be implemented on any level – regional, national or European.

9.3.7.4 Crowdsourcing patent review

The emerging crowdsourcing patent review platforms are targeting the challenge of patent quality. The mechanism of these platforms is similar to Innocentive⁹⁶, where a purchaser issues a request to tender in respect of technological problems, which are solved by one of an anonymous crowd of inventors. In this setting, the inventors are engaged in tough competition, but none of the registered inventors is legally forced to provide a solution.

Similarly, crowdsourcing patent review platforms call for participation in patent review processes. The advantages of crowdsourcing models are their scalability through parallelisation and fast delivery as a result of the competition; the main challenges are quality enforcement and reliable scheduling (Howe 2008).

With PeerToPatent⁹⁷, the USPTO and the New York Law School established a non-profit crowdsourcing patent review platform with the goal of helping the USPTO find relevant information for assessing the claims of pending patent applications. Lately, a UK subsidiary⁹⁸ was established in collaboration with the UK Intellectual Property Office. Even Australian⁹⁹ and Japanese¹⁰⁰ subsidiaries have recently been established. Besides this public, non-profit approach, Article One¹⁰¹ partners launched a private, for-profit crowdsourcing patent review platform. On this website, prizes are awarded for patent studies that provide paths to certain patents' invalidity due to their lack of prior art.

⁹⁵ <https://foliodirect.net/>

⁹⁶ <https://www.innocentive.com/>

⁹⁷ <http://peertopatent.org/>

⁹⁸ <http://www.ipso.gov.uk/peertopatent.htm>

⁹⁹ <http://www.peertopatent.org.au/>

¹⁰⁰ http://www.iip.or.jp/e/e_p2pj/

¹⁰¹ <http://www.articleonepartners.com/>

A similar, but not a platform-orientated, approach for deeper patent review is the Call for Prior Art. Organisations like the W3C¹⁰² (the standardisation body behind web standards like HTML and XML) requests stakeholders to submit prior art related to patents (or pending applications), which could constrain the users of current standards' freedom to operate. These calls are distributed through appropriate communication channels which, in this case, could have a bigger impact than using existing crowdsourcing platforms.

Assessment: Crowdsourcing patent review platforms are already successful in the market. In general, promoting crowdsourcing patent review platforms is a riskless star (from policymakers' perspective) with a minor impact on IPR circulation and an indirect effect on SMEs. By focussing on patent quality, this approach directly addresses one of the main challenges for stimulating IPR circulation; hence, we foresee an attractive niche market for patent review platforms. *Policy actions* need not be implemented on any level – regional, national or European. Crowdsourcing patent review platforms may emerge without political intervention.

9.3.7.5 Defensive publishing

Enforcing freedom to operate is one of the main drivers of patent system use. Another practice to secure this freedom is defensive publishing (DP). The costs of DP are far lower and it has lower barriers than the filing of patents, but it does not provide the (financial) opportunities that exclusivity offers. DP is an appropriate strategy when guaranteed freedom to operate has the highest priority, but the risks of patentability are too high or the expected financial revenues from the patent are too low compared to the costs and efforts. According to a non-representative empirical study by Henkel and Pangerl (2008), 70% of the interviewed companies use defensive publishing, thus securing between 1% and approximately 30% of their inventions. These companies most frequently use specialised DP internet platforms like IP.com¹⁰³ (USA) or Research Disclosure¹⁰⁴ (UK), as well as peer-reviewed journals for their defensive publishing strategy. Henkel and Pangerl argue that the relevance of defensive publishing will increase in future, which they justify with their projection that this will decrease the economic and signal value of minor patents.

Assessment: Defensive publishing platforms have been established in the market. Especially in the context of increasing national defensive strategies, like the above-mentioned Korea Inventions Capital Fund or the Taiwanese Intellectual Property Bank, defensive publishing seems to be an efficient counteracting option. In general, efficient and visible electronic platforms for defensive publishing are riskless stars (from policymakers' perspective) which will have a minor impact on IPR circulation and a direct effect on SMEs. The platforms directly target transparency, IPR awareness and patent quality challenges. Defensive publishing can be implemented by services that can be properly standardised and which

¹⁰² <http://www.w3.org/2010/12/cfpa> In example with this call the W3C seeks prior art for the US patent 7°743°336 and the US patent application 20070101146.

¹⁰³ <http://priorartdatabase.com/>

¹⁰⁴ <http://www.researchdisclosure.com/>

IPR-related consultancy agencies and other intermediaries will place on the market. *Policy actions* need not be implemented on any level – regional, national or European. Defensive publishing platforms may emerge without political intervention.

9.4 Strengthening the demand side

We regard the demand side as the part of IPR circulation where the IPR is “consumed” – in the sense that it is used for certain kinds of value creation based on the underlying technology.

“The European technological landscape is still mainly supply-orientated, partially due to the lack of adequate matching interfaces between the supply and demand for scientific knowledge” (KfW 2006). This insight is congruent with the shared opinion of our interview partners that creating a substantial supply side for an IPR Asset Market is easier than building a substantial demand side. They argued that the most implemented instruments are built from a supply perspective.

Our research affirms that only a few instruments are directly dedicated to stimulating the demand side. In an emerging market, the demand is mostly supply-driven. It must therefore be emphasised that any instrument introduced in the previous sections that helps to strengthen supply and the intermediaries will support a broader supply with a higher quality, more transparency, lower costs and less transaction time. Consequently, it is important to note that all the discussed instruments strengthen the demand side indirectly.

This section summarises and analyses instruments that directly strengthen the demand side and are aimed at increasing IPR circulation in Europe. The scheme introduced in section 9.1 is used to evaluate the feasibility and effectiveness of these instruments.

9.4.1 Challenges on the demand side

According to the analyses in this study, the main challenges in professionalising and enhancing the demand side of the IPR circulation scheme are the following:

- *Awareness* of the importance of IPR in the current and future business models is a crucial point in stimulating additional demand. Especially SMEs do not actively purchase IPR which has “not been invented here”. Any means to help stimulate awareness and understanding of IPR as part of companies’ supply chains and investment strategies will strengthen the demand side significantly.
- *Financing* the acquisition of IPR is another central challenge as far as demand is concerned. There is no standardised and widely accepted way to use IPR as collateral for bank credit. Any approach which eases companies’ access to funding for IPR acquisition will stimulate IPR demand.

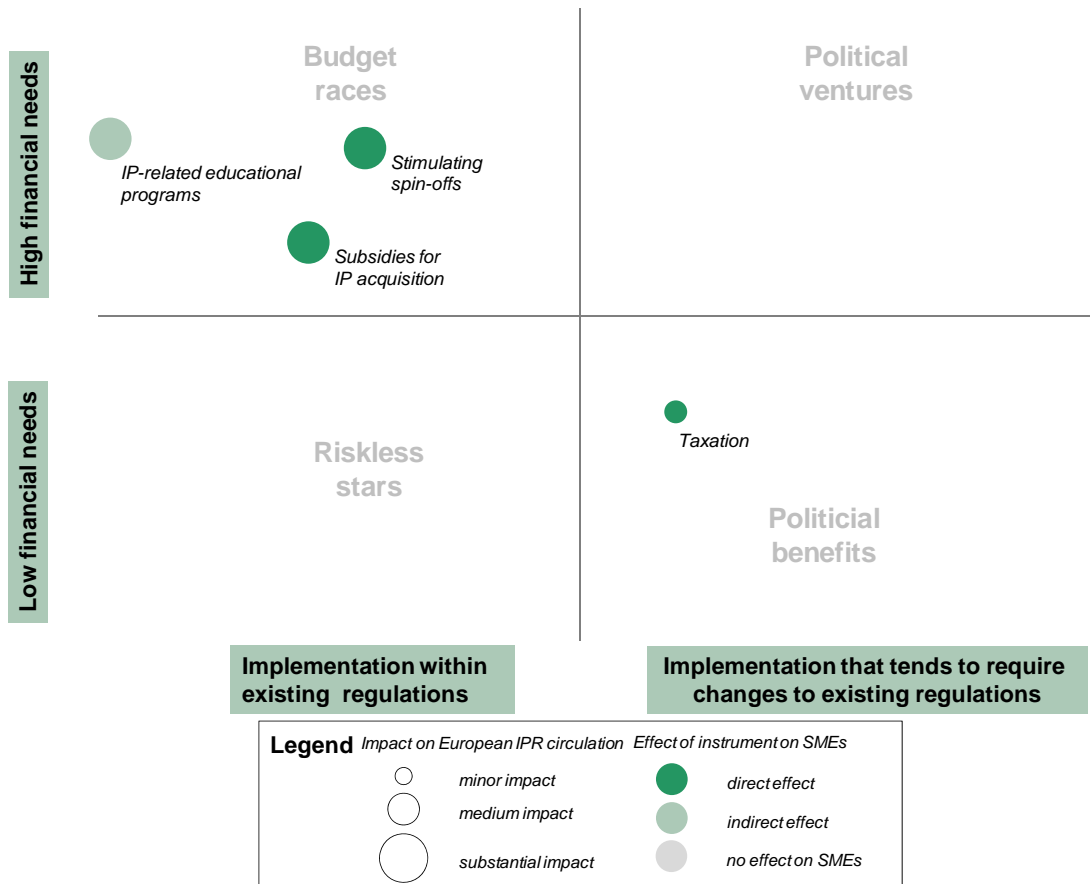
- *Internationalisation* is one of the key success drivers of IPR exchange. The demand side purchases IPR to outperform competitors on a global scale; hence, it requires easy set-up access to global (or at least European) IPR.
- *Accuracy in the local dissemination* of European innovation is an important issue, at least according to our interview partners. They argued that circulation instruments should actively control whether IPR developed with the support of European public funding flows to non-European entities.
- *Standardisation of the service* suppliers' or intermediaries' offers increases the demand side's comparability and reliability. Any effort with regard to service standardisation to decrease screening, information and contracting costs strengthens the demand side.
- *Transparency* about prices, transactions and supply and demand is crucial for efficient markets. Any effort undertaken by suppliers or intermediaries to increase transparency indirectly strengthens the demand side. But even the demand side is responsible for more transparency in the market by exposing current and future interests in specific technology.
- *Patent quality* is essential for a vital demand for IPR assets; hence, it is one of the driving preconditions for IPR circulation. The demand side urges suppliers and intermediaries to provide sufficient, reliable and comparable patent quality.
- *Patent (e)valuation* methods are crucial for the demand side to develop trust in asset pricing. Any effort undertaken by suppliers or intermediaries to develop comprehensible means to (e)valuate patents indirectly strengthens the demand side. In parallel, the demand side is responsible for urging other actors to disclose and explain the underlying (e)valuation methods.
- *Transaction time* is essential for satisfying the demand side on the market. All organisational and regulatory conditions that suppliers as well intermediaries realise and which result in reduced transaction time will improve customers' confidence in IPR as a reliable part of their supply chains.

Some of the above-mentioned challenges have already been identified as drivers of the supply or intermediary side. Consequently, the implementation of instruments to stimulate demand by targeting one of these challenges, will also strengthen the supply and intermediary side, and vice versa.

9.4.2 Overview of instruments that strengthen demand

Figure 80 summarises the evaluation of instruments that strengthen demand according to the scheme introduced in section 9.1.

Figure 80: Overview of instruments that strengthen demand.



Source: Own illustration.

In contrast to the supply and the intermediary side, the instruments directly targeting the stimulation of IPR demand have to be mainly initiated and implemented by politics. They require substantial public funding, changes in existing regulations, or adjustments in current policies, especially in the educational field. The moderate evaluation scheme shows that there is wide range of opportunities for innovative, to-be-invented instruments. The following table summarises our assessment of the scope of the policy actions required for these instruments.

Table 18 Priorities regarding policy action implementation of instruments that strengthen demand.

Instrument ¹⁰⁵	Priority regarding policy action implementation		
	Regional level	National level	European level
IPR-related educational programme	√√	√√	√
Subsidies for IPR acquisition	√√	√√	√
Stimulating spin-offs	√√	√√	√√
Tax	√	√√	

Source: Own illustration.

9.4.3 IP-related educational programmes

According to our interview partners, companies in industry have sufficient IPR awareness. They understand the impact of IPR on their business and execute operations accordingly. However, SMEs have significant weaknesses regarding IPR literacy and IPR awareness.

Consequently, the educational issue is not only important on the supply side, but at least as important as demand stimulus. Improving patent literacy (understood as skills in exploiting the information disclosed by the patent system) is needed “[...] in order to equip all new graduates with the knowledge management skills Europe needs in the 21st century.” (Aho 2006). It will have a wide and long-term effect on IPR awareness in Europe. Not only future IPR professionals should be trained in specific university programmes, but every student (at least in engineering, science and economics) should find IPR-related education in the curricula. These modules should broadly disseminate basic skills in technology transfer, but also upcoming paradigms and methodologies like open innovation. To approach this challenge, EPO has not only released the Patent Teaching Kit¹⁰⁶ but also many modules to help university trainers to create lectures around IPR literacy.¹⁰⁷ These modules are an outcome of the IP4INNO¹⁰⁸ projects. Putting IPR literacy in the curricula of HEIs will help to disseminate this topic to all the companies where these graduates will later work.

IPR-related topics are an important educational issue, not only at universities, but also in the context of life-long learning. For example, the IP Bank of Speakers¹⁰⁹ is a collaboration between the Canadian Intellectual Property Office (CIPO) and the Intellectual Property Institute of Canada (IPIC) and delivers free IPR-related presentations to public and private organisations across Canada. This professional training instrument aims to familiarise business people with IPR as a strategic instrument, hence increasing IPR awareness (mostly on the demand side).

¹⁰⁵ The instruments are in alphabetical order.

¹⁰⁶ <http://www.epo.org/learning-events/materials/kit.html>

¹⁰⁷ <http://www.epo.org/learning-events/materials/ip4inno.html>

¹⁰⁸ <http://www.epo.org/about-us/office/international-relations/projects/ip4inno.html>

¹⁰⁹ <http://www.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/wr00896.html>

The objective of the IPEuropeAware¹¹⁰ project and the aligned IPorta¹¹¹ project is to raise awareness and knowledge of IPR especially for SMEs. They bring together two important existing Europe-wide initiatives: InnovAccess¹¹², a Web portal created by the National Patent Offices to provide information on their services for the end user, and IPR-Helpdesk¹¹³, a helpline and training mechanism for current and potential contractors in EC-funded Framework Programme projects.

Assessment: A few IPR-related educational programmes have been implemented. If implemented on a large, European scale, such programmes are generally budget races with a medium effect on IPR circulation and an indirect effect on SMEs. If included in basic HEI curricula, graduates would study IPR-related issues as part of their courses and later in the workplace. Consequently, the possible impact of IPR-related education (at universities and in professional training) cannot be underestimated as a demand stimulus. It directly targets the central challenge of IPR awareness. *Policy actions* should be implemented on any level – regional, national and European. The European impact is less than the national or regional impact.

9.4.4 Stimulating innovative start-ups

Innovative start-ups (where the start-up is created on the basis of an invention) create significantly more jobs than non-innovative start-ups (KfW 2006).

There is a huge variety of implemented instruments to stimulate innovative start-ups. In cases where these instruments are successful in creating innovative firms (with arguable costs), they have a positive impact on IPR circulation in Europe. The main challenge is the survival of the “valley of death”, which is the phase between the end of technology creation on the one hand and commercialisation and seed funding on the other hand.

It has been recognised that this point between the end of the (basic) technology development and the first seed funding is crucial for the technology transfer process. Funding schemes for validation (or translational) research are currently being implemented to address this challenge. This is accompanied by focusing HEIs on validation (or translational) research. We assume that, in combination with simplified access to seed funding (i.e. through cooperation with seed funds), this increased technology validation importance will have a significant positive impact on European IPR circulation.

Grimpe and Hussinger (2008) investigated the importance of informal university technology transfer channels for patents or collaborative research activities in addition to legal contracts. According to their findings, there is a complementary relationship: “[U]sing both transfer channels contributes to higher innovation performance. The management of the firms should therefore strive to maintain close informal relationships with universities to realize the full

¹¹⁰ <http://www.ipeuropaware.eu/>

¹¹¹ http://ec.europa.eu/eaci/docs/calls/lporta/IPorta%20_Ad_Hoc_Grant_specifications.pdf

¹¹² <http://www.innovaccess.eu>

¹¹³ <http://www.iprhelpdesk.eu/>

potential of formal technology transfer." (Grimpe, Hussinger, 2008). Incubator strategies, like business innovation centres, university research parks and other cluster facilities with high technological and management support (Aerts et al. 2007), are well-suited to foster such convergence of informal and formal technology transfer.

Assessment: In general, stimulating an innovative start-ups culture is a budget race with a medium effect on IPR circulation in Europe and a direct effect on SMEs. It targets the central challenge of financing IPR as well as the later stages in the IPR valorisation processes. In the short term, it also targets the accuracy of the local dissemination challenge; European programmes will therefore stimulate European spin-offs. (On the other hand, non-European investors can easily acquire the underlying technology packed into innovative spin-offs at later stages.) *Policy actions* like specific funding programmes should be implemented on any level – regional, national and European.

9.4.5 Tax

As already discussed, tax incentives can be considered and have already been implemented in some member states to stimulate R&D and build the foundation of future IPR circulation in Europe.

On the demand side, the main barrier might be the absence of a harmonised tax policy for IPR in Europe. Our interview partners argued that these fiscal differences do not influence multinational corporations' IPR supply decisions. These companies have the means to design and implement an adequate fiscal framework for their IPR-related acquisitions. The interview partners confirmed that, due to different tax schemes, SMEs (especially those with a national focus) will be confronted with significant disadvantages in the European competition. Smoothing these differences will bring back the actors that currently do not participate due to tax issues into the IPR supply chain. In general, the interview partners saw that this instrument only has a minor impact on IPR circulation.

Furthermore, a single fund structure can be considered "to avoid double taxation for an investor located in one EU member state investing through a fund in another" (Aho 2006).

Assessment: On a national level, some instruments have been implemented. In general, the European harmonisation of tax schemes related to the purchase of IPR is a political benefit with a minor impact on IPR circulation but a direct effect on SMEs. It directly targets the financing challenge. Furthermore, this harmonisation will target the accuracy of the local dissemination challenges if tax schemes that favour European IPR and/or European purchasers are implemented. *Policy actions* should be implemented and tax schemes should be adjusted. Owing to current treaties, only efforts on a regional or national level are imaginable, but not on a European level.

9.4.6 Subsidies for IPR acquisition

It is not common for SMEs to specifically understand the acquisition of IPR as a financial and strategic investment in companies' assets. Besides the general financial challenges that such

investment present, SMEs are often not really willing or able to pay market values for IPR. However, European competitiveness still relies on innovative SMEs that actively acquire know-how when they are unable to invent it in-house, or are not interested in doing so.

IPR acquisition (or licensing) subsidies are a political instrument that can be implemented to address this challenge directly. These subsidies can be granted indirectly through the tax system, but also directly through specific funding programmes. In Europe, various funding programmes for IPR acquisition have already been implemented on a regional as well as a national level.

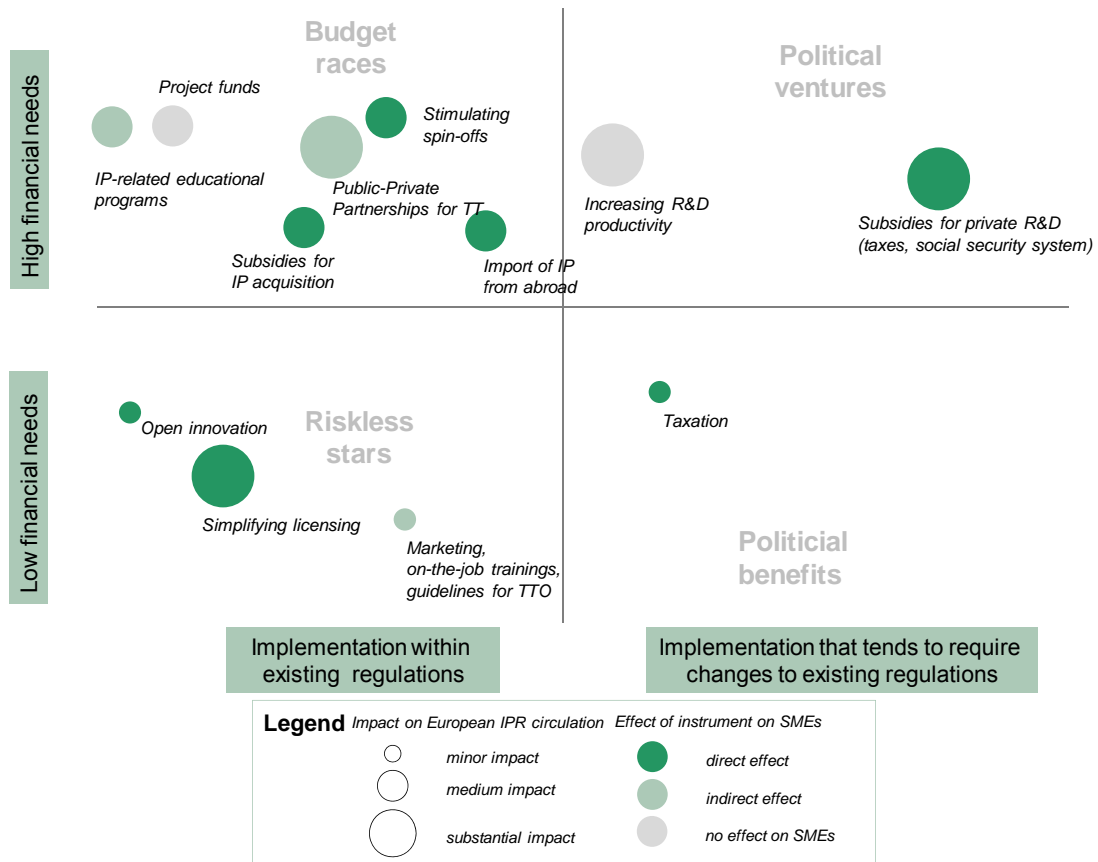
Companies will benefit if these programmes were not only to consider the “raw price” to be paid for the IPR, but also the total costs of the acquisition process, including the screening and/or negotiation costs. Furthermore, aligned funding programmes are needed to integrate acquired IPR into companies’ technological context, for example, by means of innovation assistants, and have already been partially implemented in Europe.

Assessment: Various instruments have been implemented on a regional and national level. In general, IPR acquisition subsidies are budget races which might have a medium impact on IPR circulation and a direct effect on SMEs. They target the financing and the awareness challenge. Furthermore, they can target the accuracy of the local dissemination challenge if the subsidies schemes are implemented to favour European IPR. *Policy actions*, like specific funding programmes, should be implemented on any level – regional, national and European. The European impact seems to be less than the national or regional impact.

9.5 Implementation at regional, national or European levels

In the following, the outcome of the previous analysis is summarised. The first matrix shows all instruments for increasing IPR circulation in Europe and for which policy actions to implement them are appropriate at a national or regional level. The second matrix depicts all instruments for which policy actions to implement them are appropriate at European level.

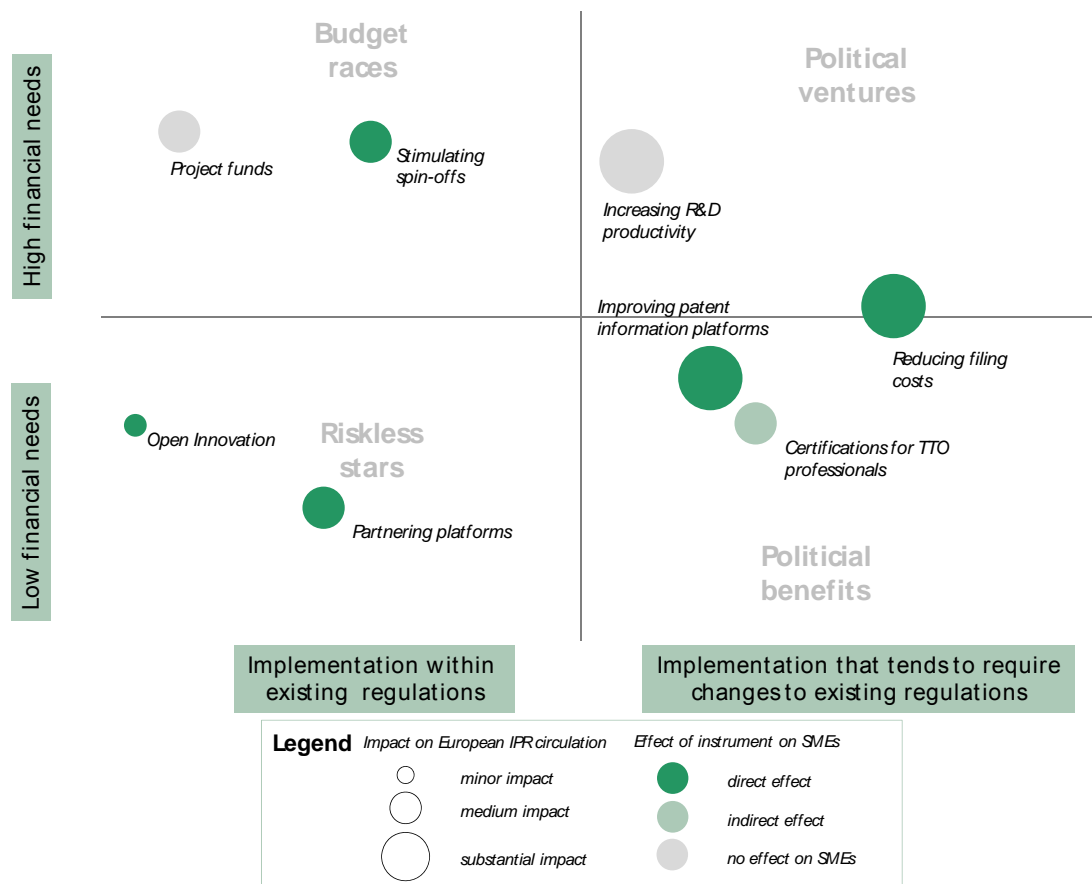
Figure 81 Instruments which should be implemented through policy actions at national or regional levels



Source: Own illustration.

Both matrixes are summaries of the matrixes elaborated for the supply, intermediary and demand sides (Figure 77, Figure 78, and Figure 80). The matrix of the national and regional levels (Figure 81) only depicts instruments assessed to have a significant priority regarding policy action implementation at these levels. Actually, this matrix only depicts instruments which have at least two ticks in the relevant tables (Table 16, Table 17, and Table 18). The matrix of the European level (Figure 82) only depicts instruments where policy actions with a European scope are feasible for their implementation.

Figure 82 Instruments which should be implemented through policy actions at European level



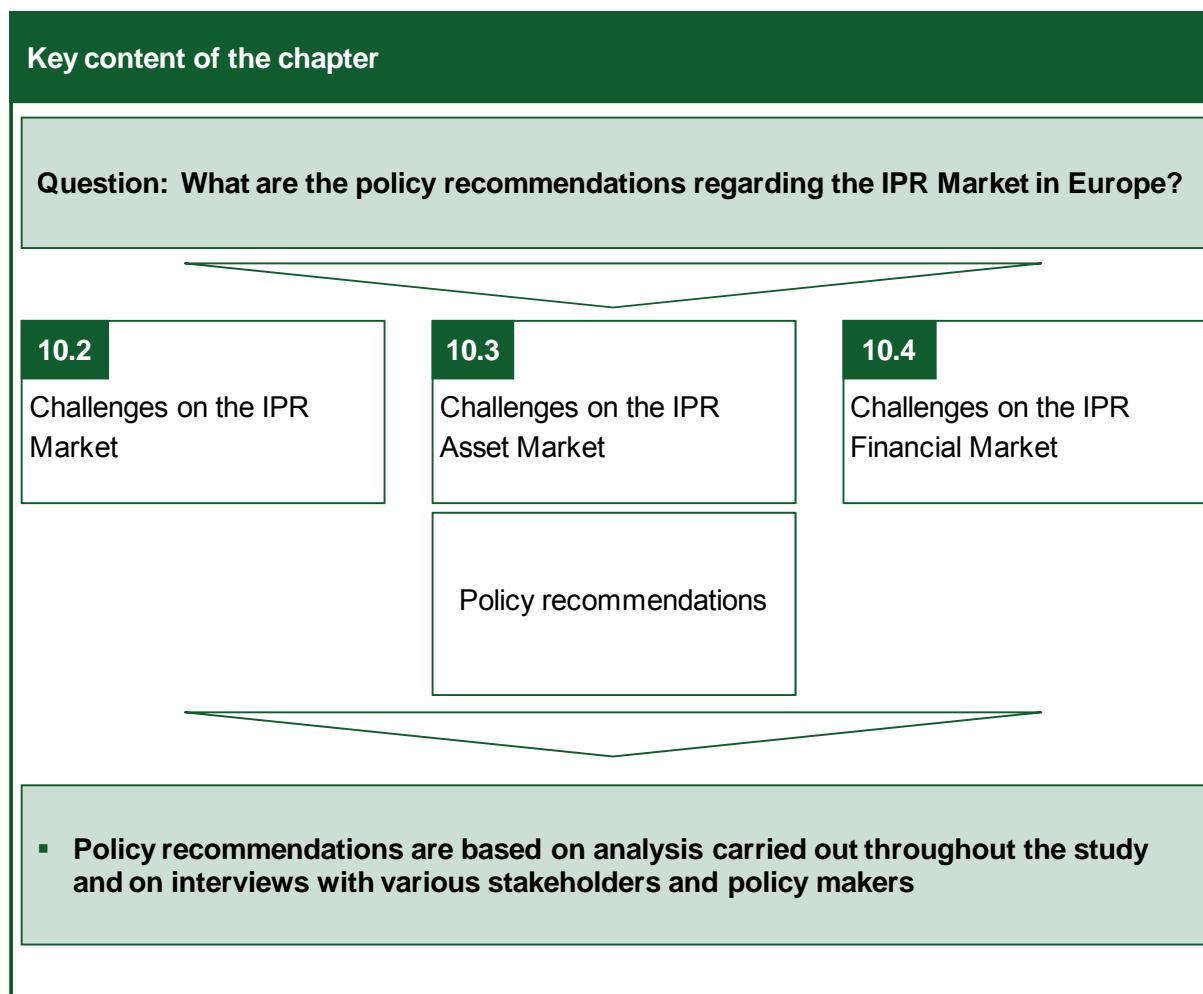
Source: Own illustration.

9.6 Main findings

Main findings of the chapter

- The instruments discussed in this work package are appropriate means to pave the way towards a more structured IP asset circulation in Europe. Their implementation is a precondition for a liquid and vital IPR Market in Europe
- The discussed instruments **complement** and **support** efforts with regard to creating an organised IPR Market
- The instruments have been categorised according to whether they strengthen the **supply, the intermediary, or demand sides of the IPR Market**
- As a decision support for policymakers, all instruments have been assessed according to an **evaluation framework** with the following dimensions:
 - the instrument is implementable within the existing regulation or tends to require changes to existing regulation,
 - the instrument requires little or substantial financial means (directly sourced from the public sector or indirectly stimulated through the public sector),
 - the instrument has a minor, medium or substantial impact on IPR circulation,
 - the instrument has direct, indirect or no effect on SMEs
- Consequently, the instruments have been categorised as **riskless stars, budget races, political benefits, or political ventures** that structure the engagement and risks that policymakers can anticipate by setting up the instrument
- For certain instruments, the implementation of policy actions at the **European level**, but not at a regional or national level, seems to have the highest priority
- The assessment shows that there are various instruments on the supply and intermediary sides. Most of these instruments also indirectly stimulate IPR demand
- Only a limited number of instruments have been identified that will help to stimulate the demand side directly. The invention and **implementation of innovative and advanced instruments to stimulate the IPR demand** directly, are required

10 Outlook – Conclusions and recommendations



10.1 Introduction and overview

This chapter lists the challenges for the European Commission (the EC) to develop an IPR Market in Europe and thereafter presents the respective policy recommendations. One of the key findings of the study is that it is important to differentiate between the IPR Asset Market and the IPR Financial Market. Consequently, the challenges and the policy recommendations are presented in respect of the IPR Asset Market and the IPR Financial Market.

10.2 IPR Market

10.2.1 EU's position towards foreign IPR Markets

The U.S. has a large IPR-orientated private sector that invests in new innovations and distributes new technologies across the world. Asian countries do not yet have a strong R&D capacity, or a large IPR-orientated private sector, but these countries are taking active steps to change the situation. Both the U.S. and Asia are aggregating patents through private enterprises or state-driven companies respectively. By providing companies and research

institutions with better opportunities to transfer technology and trade, IPR will generate revenues for both actors and allow higher investments in R&D. European companies and research institutions are less successful in exploiting their innovations due to the lack of a common functioning patent system and IPR trading mechanisms and are therefore an easy target for foreign patent aggregators. EU may lose its most valuable innovations to other regions of the world, which then collect revenues from these innovations. To hinder the flow of innovations abroad, actors within EU should have clear and simple mechanisms and frameworks to transfer technologies and trade with IPR. From our study we have seen that these challenges cannot be resolved on the level of EU member states. Hence, a single IPR Asset Market should be created in Europe.

10.2.2 Alignment of interests

There is a wide range of electronic platforms and governmental innovation agencies in Europe that try to foster the transfer of IPR. EU member states, however, protect their national interests, which may slow down the development of the IPR Market in Europe. Countries are likely to continue to prefer and protect their companies and research institutions' interests. It may take long time before some member states' national pilot projects broaden to include the whole of Europe. The creation of a central marketplace for Europe may be challenging due to the external effects in individual EU member state (jobs, tax income, and growth), which lead to the member states competing for the marketplace's location. Differences in tax regimes and policies may also influence EU member states' motivation to develop an IPR Market in Europe. These challenges have to be overcome, because multiple national initiatives have a negative impact on industry development in Europe and a fragmented IPR Market causes market actors to have difficulties with IP transactions.

The diversity of countries and legal systems complicates harmonising licence or transfer agreements, establishing similar tax regimes to benefit IP transactions, and ensuring a similar enforcement of contracts and patents across Europe. In addition, IPR traditions differ greatly across the various EU countries. The flow of information about comparable IPR transactions is mostly impeded. This increases the information asymmetry between sellers and buyers. These IPR Market conditions make it difficult for actors in Europe to obtain information about inventions, to predict their value and obtain knowledge about possible transaction partners. IP transactions are therefore only carried out after expensive due diligence activities. IP transactions in Europe are characterised by low efficiency, low transparency and high costs.

Europe needs a single IPR Asset Market to reduce fragmentation and increase transparency and liquidity on the market. It will improve the acquirer's identification, shorten the duration of negotiations, ensure efficient due diligence processes, and improve the matching of price expectations. This would also mitigate the danger that valuable innovations created in Europe will be sold to actors from foreign IPR Markets. To overcome the challenges posed by foreign IPR Markets and a fragmented IPR Market in Europe, the EC should create a

single IPR Asset Market in Europe. Furthermore, the EC should launch a tender for private institutions to propose IPR Asset Market business models. This may provide the EC with an overview of potential attempts and even lead to a (small) experimental market.

Policy recommendation (1): To reduce the flow of innovations out from the EU, to reduce fragmentation of the IPR Market, and to increase liquidity and transparency on the IPR Market, the EC should create a single IPR Asset Market in Europe.

Policy recommendation (2): To gain an overview of potential attempts to create such a market, the EC should launch a tender for private institutions to propose IPR Asset Market business models.

In the following, we present policy recommendations regarding creating a single IPR Asset Market in Europe.

10.3 IPR Asset Market

10.3.1 Optimisation variables directed at innovation

The relationship between competition policy and innovation policy is very important, though complicated, and the existing interdependencies make it difficult to decide on policy measures that could lead to a close to optimal and efficient innovation output. The establishment of the IPR Market should be considered in the context of its impact on competition and innovation activity in Europe.

The EU's long-term research policies have to be also taken into account. The research sector in Europe is an important hub for innovations. Nevertheless, only a small number of universities obtain value from patent sale and licensing. Even if research institutions are interested in exploiting their research results, they find the process complicated. Large corporations have a specific favourable position in the IPR Market due to their extensive networks, their large financial resources, experience and possibility to hire professionals who can market their technologies successfully and, consequently, find buyers. A single IPR Asset Market would benefit from research institutions' common high IPR awareness and from the shared active commercialisation of research output. This is especially important if we take into account that foreign IPR Markets actively strengthen national research institutions' research capacity by providing them with the possibility to transfer their patents to state-financed patent aggregation funds, or to companies that then sell or license patents to domestic companies. The research sector in Europe has to exploit its IPR more actively if Europe wants to maintain its competitive research landscape and generate revenues that could be invested in further R&D.

Owing to their lack of IPR awareness, research institutions often greatly underrate the value of their IPR and disclose valuable technical information without considering the royalties the information could generate if patented. In Europe, universities' orientation towards technology transfer depends largely on their locations. Our interview partners pointed out that universities in Southern Europe and Eastern Europe are more orientated to doing

research according to their scientists' interests, whereas their Northern and Western European counterparts tend to be more aware of IPR and have active policies regarding the commercialisation of research results. A great deal of work is still to be done to secure tradable assets throughout Europe. The EC should therefore foster European research organisations' IPR awareness, both the basic knowledge (e.g., of the types of IPR, their protection, enforcement and counterfeiting) and more sophisticated knowledge (e.g., of IPR management). Since an IPR Financial Market can be set up if the market participants accept IPR as an asset in which to invest, sophisticated IPR knowledge should be specifically fostered. Besides raising IPR awareness, the EC should therefore foster the creation of IPR valorisation services designed to match the needs of certain research fields. These services could, for example, include advice on modes of IPR exploitation and on the required market and industry know-how.

Policy recommendation (3): To increase European research institutions' engagement in the IPR Asset Market, the EC should

- ***foster the IPR awareness of European research institutions, and***
- ***foster the creation of research-field-specific IPR valorisation services for research institutions.***

10.3.2 Legal challenges

The increase in the number of patent filings harms patents' legal quality (i.e. whether a patent meets statutory criteria, including patentability requirements, within a jurisdiction) and lengthens backlogs. Access of industrial property offices' to information to secure timely and thorough examinations of patent applications, the proficiency of patent examiners, and their ability to cope with the increased workload are central for securing legal patent quality. Larger patent portfolios and a high number of claims may also increase patent litigations. An increasing number of patent litigations require appropriate court procedures and a proficient judiciary.

A single IPR Asset Market requires high quality tradable assets – patents. However, market actors in Europe have to cope with variations in patents' legal quality. Variations are subject to the patent examination standards of the office granting the patent (national patent offices, EPO).

Market actors in Europe also have to cope with the variations in patent litigation outcomes. These variations depend on the laws and court practices in the European country solving a patent dispute. Europe lacks a homogenous patent litigation system.

The complexity of patenting and patent enforcement in Europe causes uncertainty among the IPR Market actors. Investors will invest in a high-quality patent which is not (easily) revocable. Patent litigation should therefore be cost effective and efficient. The diversity of patent systems in Europe makes the predictability of patent quality and its enforceability very difficult. Our interview partners expressed the view that a properly functioning single IPR Market in Europe would not be feasible until a solution is found for the fragmentation of the

patent system in Europe. Our quantitative survey also showed that finding a high-quality patent is currently one of the greatest obstacles to IPR transactions. The EC should continue its efforts toward a unitary EU patent, which is likely to increase the use of European patents issued by the EPO, which is known for its high examination standards. The EC should also continue its efforts towards a unified patent litigation system to reduce the duplication of patent court cases and reduce patent litigation costs in Europe.

Policy recommendation (4): To increase the confidence of actors regarding the IPR Asset Market, the EC should ensure a common, high patent quality and its enforceability across Europe.

10.3.3 Supporting SMEs

SMEs are the drivers of economic growth in Europe by contributing most to job creation. The current conditions of the IPR Market in Europe favour large companies that can use their financial capabilities and large networks to obtain information about previous IPR transactions in order to have pricing signals, to search for suitable technologies and find buyers for their technology, to sue companies that infringe their IPR, and undergo a lengthy and costly due diligence as well as negotiations. Large companies use their big patent portfolios to pressurise smaller technology developers to enter into costly licensing agreements, or, if a profitable deal is not likely, acquire smaller companies.

Similarly to research institutions in Europe, European SMEs also lack both basic and more sophisticated IPR awareness. SMEs have difficulties with understanding the complex IPR system in Europe. This hampers firms' entry into innovative markets. We consider it crucial for the EC to foster SMEs' IPR awareness.

Considering that understating patents as an investment opportunity is also a prerequisite for a functioning IPR Financial Market, it is especially important that SMEs' knowledge of IPR as a valuable business asset is increased. SMEs generally also have no strategy regarding their intangible assets. Patents are not yet a fully understood and accepted asset class. Moreover, patents' characteristics are rarely understood. The IPR Financial Market can be set up if the market participants accept IPR as an asset in which to invest. Knowledge about how to sell, buy and invest in IPR ensures competitiveness. SMEs lack this knowledge. This is disadvantageous for Europe and even more so given that foreign IPR Markets are challenging Europe by improving their domestic companies' competitiveness. Asian companies are offered opportunities (e.g., technology exchanges, patent aggregation funds) to buy and sell their intangible assets and, thus, alleviate their financial shortcomings. These countries also help their companies to cover the costs of patent litigations at home and abroad. Firms in Asian countries already have sufficient capacity to be technological leaders, or are rapidly catching up with European technology developers (e.g., with regard to green technologies). European companies have to start capitalising on their IP more actively if they want to have sufficient resources to develop their technologies and, hence, secure their competitiveness.

Therefore, the EC should foster the creation of IPR valorisation services for SMEs. The services could include, for example, advice on how to integrate IPR into corporate strategies, advice on modes of IPR exploitation (sale vs. licensing), and advice on market and industry know-how. Valorisation services would foster a smoother functioning of the IPR Asset Market by reducing the information asymmetries. More transparency would reduce the buyers or investors' uncertainty and would facilitate the transfer of IPR. It would also reduce the associated costs and allow more participants to enter the market. Given SMEs' different sizes and industry sectors, the IPR valorisation services for SMEs should be industry specific and take the characteristics of the IPR trade in the different industry sectors into account. Some industries, for example, pharmaceuticals, have a low number of IPR buyers and buyers require a broad set of IPR. In comparison, for example, in mechanical engineering, patents are acquired for narrow technologies and to cover the whole production process, a buyer needs to possess multiple IPR and/or substantial non-patented know-how.

Policy recommendation (5): To increase SMEs' participation in the IPR Asset Market, the EC should

- ***foster European SMEs' IPR awareness, and***
- ***foster the creation of industry-specific IPR valorisation services for SMEs.***

The EU should also assist its enterprises to overcome the difficulties in other IPR Markets resulting from differences in IPR systems across the world. European businesses endeavour to offer their IPR for sale in the new, developing IPR Markets. These markets are bigger and offer better returns on R&D investments than the smaller, fragmented European market does. Although European businesses are willing to trade their IPR in foreign IPR Markets, they are discouraged by differences in patent laws and law enforcement, especially in Asia. IPR are formally protected, but the actual enforcement is weak. European companies have difficulties in China, which, due to its large market, is current "hotspot" for European businesses. When licensing IPR to Chinese businesses, their European counterparts often lack certainty about the further use of their rights. U.S. markets, on the other hand, are a challenge for European businesses, especially SMEs, due to the threat of being sued by NPEs. The lack of transparency in foreign operations may force many European businesses to abandon their plans to expand to foreign markets.

To support European businesses, the EC should continue to support the harmonisation of IPR systems (e.g., regarding patentable subject matter), and foster the development of state systems and procedures allowing efficient law enforcement.

Policy recommendation (6): To support the expansion of European companies to non-EU IPR Markets, the EC should foster the global harmonisation of IPR systems and foster efficient IPR enforcement outside the EU.

10.3.4 Patents as an asset class

The EC should promote licensing as a preferred mode of IP transaction on the single IPR Asset Market. Industries' and innovators' shared understanding of patents as an underlying

asset class is challenged by diverse patents properties, including type of patent exploitation. Patents may be exploited in different ways, and the difference between carrot licensing and stick licensing is a major topic. Generally, the strong trend towards active technology licensing observed in recent years follows the general trend of open innovation. Licensing, exchanging and sharing technologies are becoming increasingly important. Licensing is difficult to conduct in closed innovation processes if companies have not opened their innovation process to include other companies and allow a certain information flow or information spill-over. Hence, as the ruling paradigm, open innovation can increase licensing.

Trade requiring the transfer of patent ownership requires more extensive due diligence activities than licensing deals and may, thus, prevent many actors from entering the IPR Asset Market. The transfer of patent ownership could create monopolies if the monopolistic rights inherent to patent are accumulated. The freedom to choose between different licensing possibilities (exclusive vs. non-exclusive) allows companies to decide the extent to which competitors are given the right to produce a certain technology. Licensing could increase trading with IPR and minimise monopolies on the IPR Asset Market. Promoting the transfer of research achievements through licensing to SMEs and large companies could activate R&D in research institutions, create new technologies and bring new goods and services on the market.

Policy recommendation (7): To facilitate IP transactions on the IPR Asset Market, the EC should promote licensing as a preferred mode of IP transactions on the IPR Asset Market.

Information asymmetry associated with patent transactions could be addressed by increasing the professionalism of technology transfer structures in Europe. Currently, as our quantitative survey showed, the majority of IP transaction partners are found via personal networks. Difficulties with finding buyers and sellers increase transaction costs. Technology transfer structures' knowledge of how to approach market actors should be higher and the collaboration between them should be more intense. Technology transfer structures' higher professionalism would facilitate the IPR market's liquidity as they would mitigate the information asymmetry by allowing the transaction parties to obtain clear pricing signals. Owing to active policy changes on the European, national and regional levels, transfer and validation increasingly become the third stream of funding for higher education institutions (HEIs) as well as for public research organisations (PROs). As technology transfer structure, technology transfer offices (TTOs) are considered the main actors in this field. Owing to their central position that TTOs currently have in university structures and strategies, but also in political agendas, TTOs' productivity seems to be critical for increasing the IPR supply from universities and research organisations. Increasing productivity is especially important, as most of our interview partners (from industry) explicitly questioned TTOs' current capabilities in Europe. A higher professional level can be achieved by introducing industry-proven TTO management software systems, on-the-job training, guidelines and the certification of TTO

professionals, as well innovative and more profit-orientated business models for the technology transfer business.

Summarised, the number of technology transfer structures in Europe need not be increased, but the professional level and the profit-orientation of the existing structures need to be improved continuously. Therefore, the EC should continue to foster the professionalism of technology transfer structures in Europe.

Policy recommendation (8): To facilitate IP circulation in the IPR Asset Market, the EC should continue to foster the professionalism of technology transfer structures (e.g., TTOs) in the EU.

10.3.5 Patent (e)valuation

Patent pre-selection needs to filter patents with a higher potential without consuming too many resources. Our quantitative survey showed that, currently, the market actors consider the problem of evaluating patent as the greatest barrier to IP transactions. The lack of commonly accepted valuation methods has adverse effects on buyers' and investors' confidence, because the value of the asset is highly uncertain. A liquid market is driven by the actors' confidence. Furthermore, experts find the applicability of patent valuation methods highly debatable. For example, the income-based approach is currently regarded as the most suitable for the selection of potential patent market vehicles. Conversely, the market-based approach is currently not perceived as usable due to the lack of comparable transactions and the lack of transparency regarding patent pricing. The market-based valuation method could gain importance once a transparent and liquid IPR Market has been developed. Experts do not also share a common viewpoint concerning the standardisation of patent valuation. Some argue that common standards should be set, while others do not believe that the standardisation of valuation methods is feasible. To facilitate IP transactions and actors' certainty towards patent valuation methods, the information on existing patent valuation methods should be disseminated among IPR Market actors.

Policy recommendation (9): To facilitate IP transactions and increase actors' certainty regarding patent valuation methods, the EC should foster the dissemination of information on existing patent valuation methods among the actors.

10.4 IPR Financial Market

10.4.1 Economics of creating a new market

An IPR Financial Market can only work if there is a properly functioning underlying IPR Asset Market. A functioning IPR Asset Market would lower IP transaction costs in Europe, which are currently high due to a lack of transparency and insufficient market breath. The development of an IPR Financial Market is challenged by the need to form new entities and, possibly, new authorities on the IPR Financial Market. Currently, Europe lacks appropriate regulatory regimes and individuals to put a developing IPR Financial Market on a track that insures stability and efficiency and has positive impact on European SMEs and European

research landscape. A functioning IPR Financial Market in Europe would also need large numbers of participants and a high trading frequency to be liquid. Furthermore, financial intermediaries are needed to overcome the information asymmetry between the capital providers and capital seekers. In Europe, there is a lack of intermediaries on both the IPR Asset Market and the Financial Market. Before an IPR Financial Market can be set up, the market participants in Europe should have a shared perception of IPR as an investment opportunity. Furthermore, generally, the market participants' idea of an IPR Financial Market in Europe is immature and accompanied by high scepticism. The IPR Financial Market should not be established or supported by the EC before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of the underlying market are clear to the actors.

Besides improving the IPR Asset Market, a network of excellence, to globally observe and analyse new attempts to trade IPR, should be launched by the EC. It is not yet clear which of the multiple IPR trading models available in the world would function and would be successful. As a policy instrument, the network of excellence enhances the integration of resources and expertise at the European level. The Sixth Framework Programme for Research and Technological Development, introduced the network of excellence as a new instrument aimed at integrating the participants' activities/capacities, at collaborating and coordinating, and at generating, demonstrating and validating new knowledge through R&D. Already established network of excellences in Europe have aimed, for example, at establishing platforms for information exchange, at a competition of ideas and the development of new concepts for particular topics. Hence, network of excellence could be an appropriate instrument to globally observe and analyse new attempts to trade IPR and to integrate expertise on the IPR Market. This network could be a learning process for the EC. From the network of excellence could even emerge initiatives, e.g. of launched by financial community, aimed at establishing the IPR Financial Market in Europe. The network of excellence should include the European financial community experienced in IPR trading and financing innovation, patent offices, European SMEs and large companies with different R&D capacities and industry sectors, research institutions representing different research-fields and researchers focusing on innovation and financial markets.

Policy recommendation (10): The EC should not establish or support the IPR Financial Market before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of this underlying market are clear to the actors.

Policy recommendation (11): To globally observe and analyse new attempts to trade IPR, the EC should launch a network of excellence comprising European:

- ***financial community experienced in IPR trading and financing innovation,***
- ***patent offices,***
- ***SMEs and large companies with different R&D capacities and industry sectors,***
- ***research institutions representing different research fields, and***

- **researchers focussing on innovation and financial markets.**

10.4.2 Risks known from financial markets

Establishing the IPR Financial Market could be associated with a variety of risks known from financial markets. Most fundamentally, liquidity has to be achieved for the underlying (patent) on the IPR Asset Market before the IPR Financial Market, where financial products based on patents are traded, is established. The IPR Financial Market may be affected by systemic risk which manifests itself as an excessive volatility or even a breakdown in the functioning of financial markets for traded assets. A collapse or malfunction of an institution in a financial market for patents, or the whole market for patents, would endanger technology transfer and reduce the speed of innovation. Credit risk can also be relevant to the IPR Financial Market, especially with regard to licensing agreements or royalty purchase agreements; the patent holder is exposed to the risk that the counterparty may default, thus potentially incurring a loss of income streams. Risks from prices (e.g., exchange rates, interest rates, and stock price indices) are also part of a potential IPR Financial Market and unexpected changes may lead to losses in the asset portfolio value. Operational risk, which is related to operational reliability and a marketplace's functional efficiency, is inherent to any market or institution participating in a market. A potential IPR Financial Market will therefore be subject to operational risk. Reputational risk is closely linked to (investor) confidence. Investors and other market participants need to trust the asset class and its institutions if a functioning IPR Financial Market is to be established. Strategic and management risks also have to be taken into account in respect of the IPR Financial Market.

The risks to society and European research (e.g., social benefits vs. financial returns and the risk of high variance in the financial inflows into the European research landscape) should also be considered in the process of developing an IPR Financial Market in Europe. A short-term-driven IPR Financial Market may contradict the EU's long-term research policies, which are driven by the wish to maximise social benefits. IPR function as an incentive for R&D investments. If certain industry patents were to attract investments, this could direct research institutions to conduct research into this direction. This would jeopardise Europe's position as a provider of research in multiple fields of science. If we were to presume that the IPR Financial Market would prove successful in facilitating transactions e.g. with automotive patents, it would signal the scientific community, as well as industries, to direct their R&D efforts towards automotives. This could mean that research capacity for invention, e.g. in the research field of clean tech, would be hampered. The concentration of research may tend to benefit those EU countries that, due to their economic structures, are ready to provide the supply and satisfy the demand in the final product market.

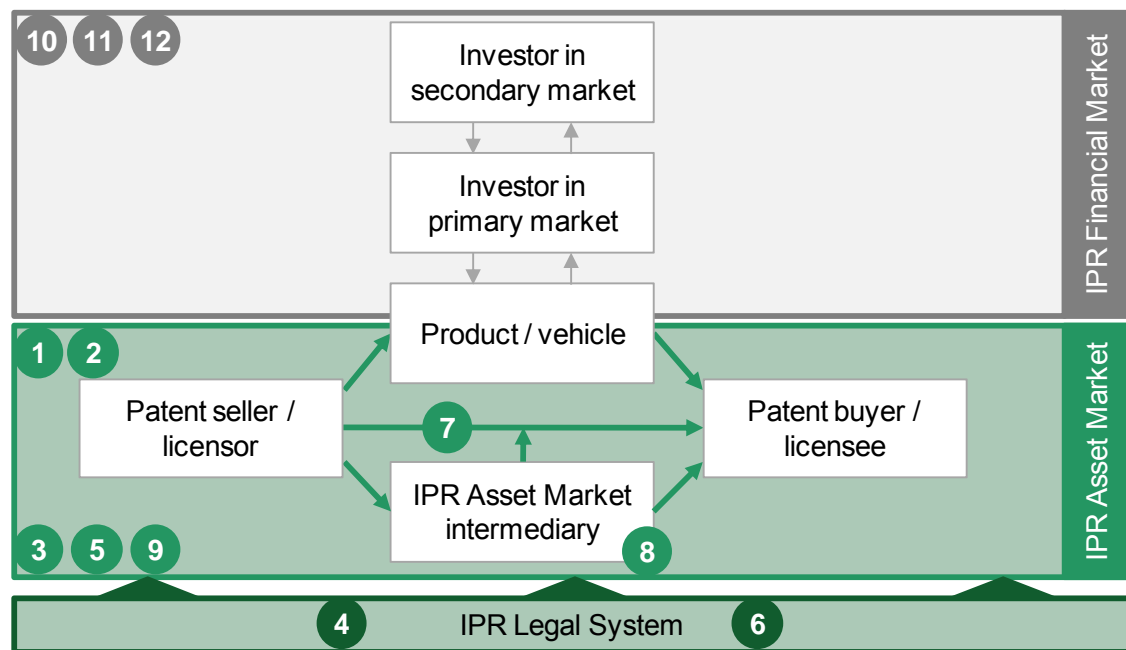
The proposed network of excellence should focus on evaluating and striving to minimise all these risks. Within three years after its launch, the network of excellence should propose policy actions to the EC e.g., with regard to the IPR Financial Market types, actors and financial products. If the IPR Financial Market has already evolved, the network of excellence

should then propose policy actions to improve the functioning of the market (e.g., in respect of the regulatory framework, strengthening benefits to SMEs and research landscape).

Policy recommendation (12): Three years after its launch, the EC should require the network of excellence to propose:

- ***policy actions regarding the establishment of an IPR Financial Market (e.g., concerning the market types and products), and***
- ***policy actions to improve the functioning of the IPR Financial Market (e.g., by adjusting its regulatory framework, strengthening the benefits to SMEs and the research landscape) if it has already evolved.***

Overview of policy recommendations



- 1 Create a single IPR Asset Market in Europe
- 2 Launch a tender for private institutions to propose IPR Asset Market business models
- 3 Increase the engagement of European research institutions in the IPR Asset Market
- 4 Ensure a high patent quality and enforcement in Europe
- 5 Increase SMEs' participation in the IPR Asset Market
- 6 Support global harmonisation of IPR systems and efficient IPR enforcement outside EU
- 7 Promote licensing on the IPR Asset Market
- 8 Increase professionalism of technology transfer structures
- 9 Disseminate information on patent valuation methods
- 10 Establish or support the IPR Financial Market only after the IPR Asset Market has been substantially improved
- 11 Launch a network of excellence to globally observe and analyse IPR trade
- 12 Policy actions regarding IPR Financial Market types, products or functioning

11 Literature

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12 Appendix

12.1 Appendix A - List of interviewed experts

Name	Company	Position
Ahlers, Benedikt	Florenus AG	Member of Management Board
Ann, Christoph	TUM Institute of Advanced Study	Chair of Munich Intellectual Property Law Center (MIPLC)
Anson, Weston	CONSOR Intellectual Asset Management	Chairman
Basedow, Arno	Technologie-Lizenz-Büro Baden Württemberg	CEO
Beissenhirtz, Moritz	Mologen AG	Head of IP Dept.
Beyer, Michael	Patev Associates GmbH	COO
Biskup, Peer	Bavarian Patent Alliance	CEO
Bont, Patrick	Financial Market Authority Liechtenstein	Legal Counsel, Head of Legal & International Affairs
Bream, David	ISBE	Member / Director for Setsquared's business incubation at the University of Southampton
Clayton, Tony	UK Intellectual Property Office	Chief Economist
Coster, Paul	JPMorgan	Executive Director
Cullen, Kevin	NewSouth Innovations Pty Limited	CEO
Darcy, Jacques	European Investment Fund	Head, Equity Fund Investments
Defieuw, Geert	Umicore	Manager Patents & Intellectual Property
De Lencastre Engenheiro, Marcel	Pentium Capital	Managing Director

De Tullio, Elio	INSME	IP Lawyer / Member
Ehrlich, Amit	Intellectual Property Trade (IPTrade) Ltd.	CEO
Erselius, Jörg	Max Planck Innovation GmbH	Managing Director
Flamenbaum, Walter	Paul Capital	Partner Emeritus
Frain, Pat	ProTon	Chair of the board
Gillick, Mary	Enterprise Ireland	Manager, Technology Exploitation Networks
Goddar, Heinz	Boehmert & Boehmert	Partner; Former President LES
Goetz, Mathias	LBBW Ventures	Investment Manager
Granieri, Massimiliano	MI.TO.	Vice president of the Board of directors
Grünewald, Theo	Wurzer & Kollegen	Head of Valuation
Guellec, Dominique	OECD	Senior Economist
Hansen, Rune Heiberg	Danish Patent Exchange	Network Manager
Harrison, Suzanne	Gathering2.com	Founder & CEO
Haskel, Jonathan	Imperial College London	Professor, Chair in Economics
Hertz, Ulrich	Evonik Degussa GmbH	Head of Technology Transfer - Licensing
Hinrichs-Rahlwes, Rainer	The European Renewable Energies Federation (EREF)	President
Holland, Peter	UK Intellectual Property Office	Director of International Policy
Huemer, Gerhard	European Association of Craft, Small and Medium-Sized Enterprises	Director , Economic and Fiscal Policy
Hull, John Christopher	European Association of Research and Technology Organisations	Secretary-General
Ilgner, Dominik	PricewaterhouseCoopers	Valuation Expert
Jarboe, Kenan	Athena Alliance	President

Kaiser, Lorenz	Fraunhofer Society	Division Director Legal Affairs and Contracts
Kirschbaum, Robert	DSM	Vice President Open Innovation
Köllner, Malte	Köllner & Partner Patentanwälte	Patent attorney
Korb, Magdalena Pieker, Mr.	KfW Bankengruppe	Senior Advisor Corporate Strategy
Kosunen, Antti	Anadeus Oyi	Chairman
Lameijer, Annegreth	TU Delft	IP Manager
Lindekens, Bart	SIRRIIS	Coordinator Intellectual Property Programme
Longauer, Leo	UBS AG	Global Lead Intellectual Property
Lundgaard, Sabine	Danish Patent and Trademark Office	Adviser, Policy and Legal Affairs
Malackowski, James	Ocean Tomo, LLC	Chairman & CEO
Mann, Miriam	European Energy Exchange	Strategy & Market Development
Manthey, Christian	Florenus AG	Partner
McCurdy, Daniel	Allied Security Trust	CEO
Ménière, Yann	Paris Tech	Assistant Professor, Economics of IP
Menninger, Jutta	Pricewaterhouse Coopers	Leader Valuation & Strategy Team
Meyer, Udo	BASF	Senior Vice President, Global Intellectual Property
Millien, Raymond	PCT Capital, LLC	CEO
Mitra-Kahn, Benjamin	UK Intellectual Property Office	Economic Advisor, Economics, Research & Evidence
Mozziconacci, Jean-Baptiste	The National Industrial Property Institute in France	Head of international affairs

Mönig, Walter	Federal Ministry of Education and Research in Germany (BMBF)	European and international collaboration in education and research. Head of unit „Europa“.
Neu, Michel	CEA/DRT	Manager for Agreements / Intellectual Property
Pannekoek, Gerard	IPXI Holdings, LLC	President & CEO
Papst, Daniel	PAPST LICENSING GmbH & Co. KG	CPO
Peters, Ruud	Philips Intellectual Property & Standards	CEO
Pot, Emil	Actogenix	Director, Business development, Legal & Intellectual Property
Potter, Stephen	The R&D Society	Former Chairman
Ramer, Andrew	Marqera, LLC	CEO
Riis, Malin	Vinnova	Head Legal Affairs
Robinson, Guy	UK Intellectual Property Office	Head of Business Support Policy
Rohwedder, Frank	Deutsche Bank AG	Director, Global Banking - Asset Finance and Leasing
Romer, Ulrich	BWMI	Leader of Department for Standardization, Patent and Invention Policy
Rupprecht, Howard	VTT	Vice President – New Business Development
Schouten, Marc	European Semiconductor Industry Association (EECA-ESIA)	Chair of IP-Task Force of ESIA
Sheehan, Conor	Enterprise Ireland	Commercialisation Manager
Singer, Bernd	Steinbeis TIB	Head, IP Consulting
Smith, Gordon	University of New Hampshire	Distinguished Professor of IP Management
Soderstrom, Jon	Yale University	AUTM past president

Strömbäck, Peter	Innovationsbrön	CEO
Sullivan, Patrick	ICMG LLC	Founding Partner
Teppo, Tarja	Cleantechinvest	Partner
Terroir, Patrick	Caisse des Dépôts	Directeur général délégué, CDC Propriété Intellectuelle
Tilman, Marcel	IPAL GmbH	Senior Licensing Manager
Thumm, Nikolaus	European Patent Office	Chief Economist
Vanrie, Philippe	EBN	CEO
Von Scheffer, Guido	IP Strategy	CEO
Walz, Stefan	Federal Ministry of Justice	Leader of Department for Patent and Invention Law
Weibel, Beat	ABB AG	Chief IP Counsel, Senior Vice President
Westerlund, Thomas	RPX Corp.	Vice President, Structured Acquisitions
Wild, Joff	Intellectual Asset Magazine	Author
Woods, Donnach	DG Competition	Directorate A: Policy and Strategy. Unit 2: Antitrust and Mergers Policy and Scrutiny
Wurzer, Alexander	Wurzer & Kollegen	Managing Director

12.2 Appendix B - Questionnaire on challenges and risks

1. General information about your company

2. Your business model

3. A market for IPR

3.1 General topics

How would you describe a market for IPR and a financial market for IPR? Do you see any differences? If yes, please explain.

Open innovation: would you participate in a market that is also / exclusively engaged in technology or know-how transfer?

3.2 Alternative A: an asset market

How could an asset market look like?

Who are potential market participants?

Where do you see the key differences between the U.S. and Europe?

For which purposes and transactions would you use this market?

Which type of patents and technology would you expect to be traded in such a market?

Which products would you be interested to be created in this market?

Who should be responsible for the enforcement of the IPR?

Which challenges do you see in the market set-up process with respect to the following parameters?

- Product / vehicle / company / fund
- Underlying (i.e. the patent)
- Innovation paradigm
- Actors
- Industries

Which risks could arise for such a market and why?

Are there institutional parameters which you would like to be established to reduce any of the risks?

3.3 Alternative B: a financial market

How could a financial market look like?

Who are potential market participants?

Where do you see the key differences between the U.S. and Europe?

For which purposes and transactions would you use this market?

Which type of patents and technology would you expect to be traded in such a market?

Which products would you be interested to be created in this market?

Who should be responsible for the enforcement of the IPR?

Which challenges do you see in the market set-up process with respect to the following parameters?

- Transaction costs
- Market creation
- Actors
- Institutions
- Awareness

Which risks could arise for such a market and why?

Are there institutional parameters which you would like to be established to reduce any of the risks?

3.3 A market for IPR - challenges appearing in the spheres of both markets

Which challenges do you see in the context of political interests?

4. Patent System

Where do you see the key differences between the U.S. and Europe?

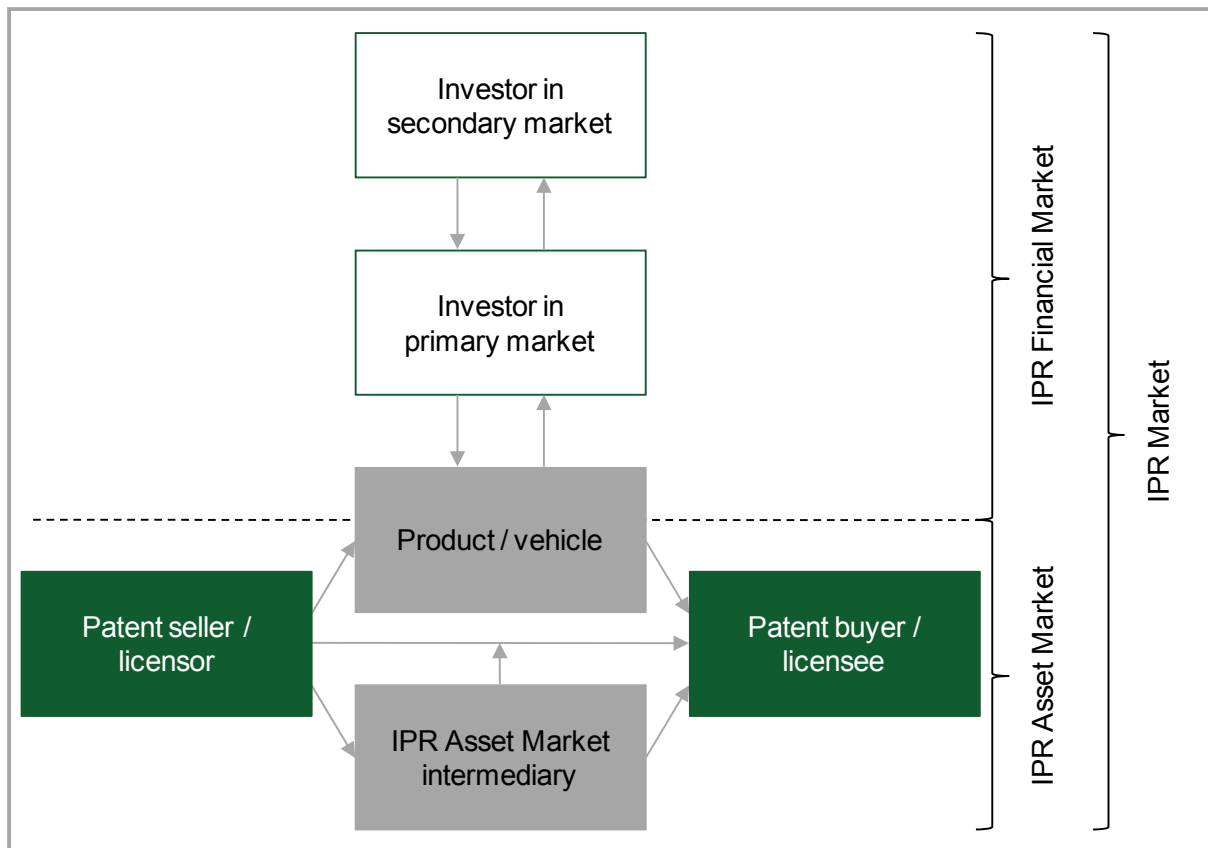
Why should an European market be established?

Where are the shortfalls in the current European system?

How do you define patent quality? Which impact does patent quality have on the market?

5. Outlook / future trends in IP, patenting, technology transfer

Appendix I - indicative market structure



Appendix II

Risks associated with patents

- Infringement risk
- Valuation risk (quality, context, encumbrance)
- Economic life risk
- Credit risk
- Legal risk

Appendix III

Risks in financial markets

- Systemic risk
- Liquidity risk
- Credit risk
- Market risk
- Operational risks
- Other risks (reputational risk, strategic and management risks)

12.3 Appendix C - Questionnaire on barriers

National policy goals and European dimension

1. What are your country's technology policy objectives and what are the main differences and/or similarities to the other EU member states policy objectives?
 - a. What are the main objectives of your country's technology policy e.g. innovation, competitiveness, creation of jobs, technology transfer?
 - b. Where are the main weights in patent policy?
 - c. Why do you think that technology policy has different characteristics between the EU member states?
 - d. Would you see national technology policy interest as an issue / problem towards an European technology policy?
 - e. Would you think that in a Union with countries of different economic capabilities, there exist different technology policy interests?

Policy objectives and the effects on trading with IPR

2. Could you describe the relation of your country's technology policy objectives and the trading with IPR?
 - a. What could be the effect that your country's technology policy may have on the trade with IPR?
 - b. What could be a negative effect that different technology policies may have on the trade with IPR?

Alignment of policy interest

3. How important do you consider the alignment of technology policy objectives on an European level?
 - a. Why or why not do you think an alignment of interest in technology policy on a European level and between the EU member states is feasible and desirable?
 - b. Can you specify the timely horizon and the efforts necessary to do so?

Regulation of the market

4. What kind of regulation makes sense for such a financial market?
 - a. What in your mind are the main reasons for having the regulation of financial markets on a national and not an EU level?
 - b. What needs to be done and where are the main complexities in establishing a central European financial market regulation?

IP Legislation

5. What are your country's IP legislation objectives and what are the differences and/or similarities to the other EU member states IP legislation objectives?

- a. Where do you see the key differences between your countries IP legislation objectives and of the other EU member states?
- b. What are the major reasons for having these differences e.g. historical, political?
- c. What in your mind are the main factors in IP legislation that enable market actors trading with IPR?
- d. What could be the impact that a single European Patent would have on the ability of trading with IPR?
- e. Can you describe the impact a single European patent court would have on the ability of trading with IPR and the number and frequency of infringement cases?
- f. What would be the effort associated and the timely horizon you expect in unifying the European patent system?

Taxation of IPR trades

6. What are your country's legislative objectives regarding the taxation system on innovation / IPR efforts and what are the differences and/or similarities to the other EU member states objectives?
 - a. What legislative objectives is your country following regarding the taxation of innovation efforts e.g. tax deductibility of R&D cost etc.?
 - b. What are the differences in taxation of earnings from selling patents and granting licenses in your country compared to the other EU member states? Alternatively, what are the similarities?
 - c. What impact do you derive from the countries taxation system on the ability and acceptance of trading with IPR?
 - d. What would be good measures / incentives from a fiscal perspective to increase trade with IPR?
 - e. Is it realistic and reasonable in terms of efforts and expenses to unify the member states fiscal policy regarding taxation of IPR trading? If yes, why, If not, why not?

Transaction costs

7. How significant would you see the impact of transaction costs on trading with IPR?
 - a. What are mainly costs associated with trading IPR that lead to rejection of trading with patents?
 - b. Do you see differences in the member states in handling the issue of transaction cost e.g. state funding?

European competitiveness

8. How would you evaluate the economic impact of an organized trade with IPR?
 - a. What are the negative impacts of an organized trade with IPR on the macroeconomic environment e.g. increased competition, antitrust issues, job creation, and economic growth?
 - b. In an EU of different economic capabilities and development, what could be the economic consequences for the top and the last quartile of member states?

Accounting standards

9. What is the impact of accounting standards in your country on trading with IPR?
 - a. What is in your mind the impact of different accounting standards on intangible asset in trading with IPR in Europe?
 - b. What needs to be done and what effort will be necessary in order to align the system of accounting standards on intangible assets in Europe?

12.4 Appendix D - Questionnaire on the value of an IPR Market

Added Value of a Pan-European financial market for Intellectual Property Rights

Performance relevant characteristics of a financial market

1. What in your mind are the most important characteristics in terms of success and performance of a financial market and what can we learn for the design of a patent market?
 - a. How would you measure the performance of a financial market compared to another?
 - b. What would you consider the main benefits of an organized financial market compared to an unorganized?
 - c. Can you point out an example for a well-functioning financial market?
 - d. Do you have an example for a financial market that does not work that well?
 - e. What drives the acceptance of organized markets?

Economic effects of a financial market for IPR

2. What will be the effects of a financial market on the competitiveness and innovativeness of Europe and the member states?
 - a. Which industrial sectors benefit the most from the establishment of the market and why?
 - b. In which way is an European market affecting competition among and in European industries?
 - c. Can you describe the impact of an IPR market on the competitive position of SMEs relative to corporations?
 - d. How would an European financial market influence the speed of innovations in Europe?
 - e. What will be the effect of such a market on commercialization of inventions?
 - f. How and why can a financial market lower the risk of "free-riding" e.g. benefiting from an invention that is not invented by the person/institution commercializing it?
 - g. What would be the impact of such a market on the pricing of patents and licenses?
 - h. What will be the effect on the market entry cost to technology markets?

Effects on the European patent system

3. Can you describe possible impacts on the existing European patent system?
 - a. What effect are you expecting on the total number of patents field?
 - b. Will the number of patents field at EPO rather than at national patent office be affected because of the IPR market?

- c. What effect will an IPR market have on patents field that increase the technological "state of the art"?
- d. What may be the influence on the introduction of a European patent?
- e. How will an IPR market affect the number of litigation processes in Europe?

Regulation of the market

- 4. What kind of regulation makes sense in view of strong international technology and innovation competition?
 - a. Can you think of Non-European actors using the market? Who can you think of?
 - b. How will European actors be affected by excluding Non-European actors?
 - c. What benefits/dangers can you think of by extending an European to a global marketplace?

Impact of the financial market on research and research policy

- 5. What effects will a financial IPR market have on European research policy?
 - a. What effects do you expect on the cooperation between research institutions in the Union?
 - b. What effect will the IPR market have on the effective use of research capacities?
 - c. What will be the contribution of the financial market on the settlement of technological standards?
 - d. How do you think an European IPR market affects technology transfer between developers and applicants?
 - e. Do you think an IPR market leads to a more efficient allocation of financial resources to the varying technology exploration?
 - f. Do you think concerns regarding international exhaustion of European intellectual property are justified?

12.5 Appendix E - Quantitative survey

EVALUATION OF THE DEMAND AND MOTIVATION FOR PARTICIPATING IN A FINANCIAL MARKET FOR IPR

PROLOGUE:

In the past decades, the use of technology has shifted from only internal exploitation e.g., developing new products, to an active commercialization of technology outside of companies. External technology exploitation can come as licensing agreements, technology sales, technological collaborations, or divestments of company units. Moreover, the enforcement of patents has increased. An organized patent marketplace can enhance the ability to exploit and enforce patents successfully. This marketplace has evolved over the last decade. In 2006, IP-related damage awards and settlements in the US totaled USD 3.4 billion, and global licensing revenues approached USD 90 billion. Further attempts to make patents a more liquid asset class e.g., the creation of the Intellectual Property Exchange International („IPXI“), have been announced. Within this exchange, yet-to-be-created IP-based financial instruments would be listed and traded much like stocks are today.

The European Union is considering the establishment of a financial market for intellectual property rights (IPR) in Europe. In cooperation with the University of St. Gallen, Fraunhofer MOEZ was assigned by the European Commission to evaluate the chances and risks of creating such a market in Europe.

OVERVIEW OF THE FOLLOWING QUESTIONS:

This questionnaire aims to increase our understanding of the demand and the motivation of the actors to participate in a financial market for intellectual property rights (IPR). We strive to compare the current and the envisioned situations for market actors and to identify possible patent-based financial products and additional services

Thank you very much for your cooperation!

DISCLAIMER:

The results of this survey will be used exclusively for scientific reasons and the records kept of the questionnaire do not contain any identifying information on the respondents. The analysis of the survey will be anonymous. Your data will not be forwarded or disclosed to any third party.

There are 32 questions in this survey

GENERAL QUESTIONS

1 [45]1. Please specify the character of your organization: *

Please choose only one of the following:

- University
- Research institution
- Public institution
- Company

2 [37]2. Please name the country in which your organization has its headquarter? *

Please write your answer here:

3 [38]3. Which type of industry is your institution most active in? *

Only answer this question if the following conditions are met:

° Answer was 'Company' at question '1 [45]' (1. Please specify the character of your organization:)

Please choose only one of the following:

- Aerospace & Defense
- Automotive
- Banking
- Beverage, Food & Tobacco
- Capital Equipment
- Chemicals, Plastic & Rubber
- Construction & Building
- Consumer Goods: durable
- Consumer Goods: non-durable
- Containers, Packaging & Glass
- Energy: Electricity
- Energy: Oil & Gas
- Environmental Industries
- FIRE: Finance
- FIRE: Insurance
- FIRE: Real Estate
- Forest Products & Paper
- Healthcare & Pharmaceuticals
- High Tech Industries
- Hotel, Gaming & Leisure
- Media: Advertising, Printing & Publishing
- Media: Broadcasting & Subscription
- Media: Diversified & Production

- Metals & Mining
- Retail
- Services: Business
- Services: Consumer
- Sovereign & Public Finance
- Telecommunications
- Transportation: Cargo
- Transportation: Consumer
- Utilities: Electric
- Utilities: Oil & Gas
- Utilities: Water
- Wholesale

4 [41]4. Is your company manufacturing or non-manufacturing?

Only answer this question if the following conditions are met:

° Answer was 'Company' at question '1 [45]' (1. Please specify the character of your organization:)

Please choose only one of the following:

- Manufacturing
- Non-Manufacturing

5 [39]5. Number of employees in 2010?

Only answer this question if the following conditions are met:

° Answer was 'Company' at question '1 [45]' (1. Please specify the character of your organization:)

Please write your answer here:

6 [40]6. Annual turnover in 2010 (in Mio. Euros)?

Only answer this question if the following conditions are met:

° Answer was 'Company' at question '1 [45]' (1. Please specify the character of your organization:)

Please write your answer here:

7 [41]7. Total assets on balance sheet in 2010 (in Mio. Euros)?

Only answer this question if the following conditions are met:

° Answer was 'Company' at question '1 [45]' (1. Please specify the character of your organization:)

Please write your answer here:

RECORDING THE CURRENT STATE: SCOPE OF THE PATENT PORTFOLIO

8 [5]1. What type of protection are you using in order to protect technical inventions from duplication?

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Secrecy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utility model	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Copyright	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9 [22]2. Please characterize your objectives of using patent protection:

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Internal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Licensing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cross-licensing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Licensing and internal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Block competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sleeping patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10 [42]3. To what degree would you consider the patents in your portfolio as commercially usable (in %)?

Total of all entries must not exceed 100

Please write your answer(s) here:

Unusable

Decently usable (e.g. for licensing)	<input type="text"/>
Excellently usable (e.g. high market value)	<input type="text"/>

11 [1]4. Please specify your patent portfolio by location of registration (in %):

Total of all entries must not exceed 100

Please write your answer(s) here:

Europe (registered at national patent office)	<input type="text"/>
North America (registered at national patent office)	<input type="text"/>
China, India and Korea (registered at national patent office)	<input type="text"/>
Japan (registered at national patent office)	<input type="text"/>
Asia - excluding China, India, Japan and Korea (registered at national patent office)	<input type="text"/>
South America (registered at national patent office)	<input type="text"/>
Rest of world (registered at national patent office)	<input type="text"/>
EPO patent (registered in more than one country)	<input type="text"/>
Triadic patent (registered at national patent office in Germany, Japan and USA)	<input type="text"/>

12 [6]5. Please specify the main industrial areas covered by the technologies in your patent portfolio (choose as much as needed, but at least one):

Please number each box in order of preference from 1 to 35

- Electrical engineering: Electrical machinery, apparatus, energy
- Electrical engineering: Audio-visual technology
- Electrical engineering: Telecommunications
- Electrical engineering: Digital communication
- Electrical engineering: Basic communication processes
- Electrical engineering: Computer technology
- Electrical engineering: IT methods for management

- Electrical engineering: Semiconductors
- Instruments: Optics
- Instruments: Measurement
- Instruments: Analysis of biological materials
- Instruments: Control
- Instruments: Medical technology
- Chemistry: Organic fine chemistry
- Chemistry: Biotechnology
- Chemistry: Pharmaceuticals
- Chemistry: Macromolecular chemistry, polymers
- Chemistry: Food chemistry
- Chemistry: Basic materials chemistry
- Chemistry: Materials, metallurgy
- Chemistry: Surface technology, coating
- Chemistry: Micro-structural and nano technology
- Chemistry: Chemical engineering
- Chemistry: Environmental technology
- Mechanical engineering: Handling
- Mechanical engineering: Machine tools
- Mechanical engineering: Engines, pumps, turbines
- Mechanical engineering: Textile and paper machines
- Mechanical engineering: Other special machines
- Mechanical engineering: Thermal processes and apparatus
- Mechanical engineering: Mechanical elements
- Mechanical engineering: Transport
- Other fields: Furniture, games
- Other fields: Other consumer goods
- Other fields: Civil engineering

13 [24]6. Please estimate the value composition of your patent portfolio (e.g. <30,000€: 10%)?

Total of all entries must not exceed 100

Please write your answer(s) here:

<€30,000	<input style="width: 100px; height: 20px;" type="text"/>
€30,000 - €100,000	<input style="width: 100px; height: 20px;" type="text"/>
€100,000 - €300,000	<input style="width: 100px; height: 20px;" type="text"/>
€300,000 - €1,000,000	<input style="width: 100px; height: 20px;" type="text"/>
€1,000,000 - €3,000,000	<input style="width: 100px; height: 20px;" type="text"/>
€3,000,000 - €10,000,000	<input style="width: 100px; height: 20px;" type="text"/>
€10,000,000 - €30,000,000	<input style="width: 100px; height: 20px;" type="text"/>
€30,000,000 - €100,000,000	<input style="width: 100px; height: 20px;" type="text"/>

€100,000,000 - €300,000,000

>€300,000,000

RECORDING THE CURRENT STATE: ORIGIN OF THE PATENT PORTFOLIO AND RESPECTIVE R&D ACTIVITY

14 [2]1. Please specify the region where the technologies in your patent portfolio were developed (in %):

Total of all entries must not exceed 100

Please write your answer(s) here:

Europe - excluding Russia	<input type="text"/>
North America	<input type="text"/>
China, India and Korea	<input type="text"/>
Japan	<input type="text"/>
Asia - excluding China, India, Japan and Korea	<input type="text"/>
South America	<input type="text"/>
Rest of world	<input type="text"/>

15 [23]2. Please characterize if the technologies in your patent portfolio were developed internally or externally (in %):

Total of all entries must not exceed 100

Please write your answer(s) here:

Internally	<input type="text"/>
Co-invention	<input type="text"/>
Externally	<input type="text"/>

16 [12]3. Please specify which institutions developed the technologies in your patent portfolio if they were not developed internally:

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corporations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SMEs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17 [25]4. Please specify how the development of the patents you own was financed:

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Completely internally financed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Externally financed via private bank	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Externally financed via public bank	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Externally financed via public development funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooperatively internally financed via cash-pooling with competitors and partners	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RECORDING THE CURRENT STATE: PURPOSE OF TRANSFERRING PATENTS

We define transferring patents, either against payment or free of charge, as the transfer of patented technologies. We also consider licensing in our definition.

18 [21]1. What are your main goals in selling, purchasing and licensing patents?

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Increase revenue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost cutting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology transfer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Efficient R&D (e.g. share risk and cost of R&D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Increase market share	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhance social welfare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Build industry network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19 [22]2. Please evaluate, if the following issues have a negative impact on selling, purchasing or licensing patents:

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Evaluate economic value of patent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluate the novelty / originality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Find transaction partner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Find best-fit patent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Find high-quality patent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negotiate price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negotiate detail of patent transaction other than price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunistic market behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Market size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-financial risk (e.g. legal framework / enforcement)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RECORDING THE CURRENT STATE: CHARACTERIZING PATENT TRANSACTIONS

20 [11]1. Which of the following types of intermediaries are you using for patent transactions?

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Very often	Always
Personal networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trade fairs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental platforms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic trading platforms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent brokers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent auctions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-practicing-entities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent pools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent attorneys	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial services firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lawyers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consulting firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21 [15]2. How often does your organization purchase, sell or license patented technologies?

Please choose only one of the following:

- Never
- Rarely
- Sometimes
- Very often
- Always

22 [18]3. What are the main types of cost for patent transactions from your perspective?

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Screening cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(e.g. finding suppliers or customers)					
Advisory cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information cost (e.g. identification and access to information about transaction partners, or characteristics of the patent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contracting cost (e.g. negotiation of the price and other contract details)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring cost (e.g. cost of controlling the transaction after closing of the contract)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23 [08]

4. Please specify the geographical regions where you are selling, purchasing and licensing patents (in %):

Total of all entries must not exceed 100

Please write your answer(s) here:

Europe - excluding Russia	<input type="text"/>
North America	<input type="text"/>
China, India and Korea	<input type="text"/>
Japan	<input type="text"/>
Asia - excluding China, India, Japan and Korea	<input type="text"/>

South America

Rest of world

CHARACTERIZING THE ENVISIONED STATE

Imagine the financial market for patents as a market platform, that increases transparency over prices and market actors, reduces uncertainties regarding the quality of the offered assets and offers an additional source of liquidity to participating parties and extends the spectrum of financial investments.

24 [09]1. Please specify your preferences regarding the nature of patent transactions:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Transferring the ownership in patent rights	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Licensing of patent rights – exclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Licensing of patent rights – non-exclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hedging risk of R&D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25 [40]2. Please specify your preferences regarding the mode of patent transaction:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Selling patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing university-owned patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Out-licensing patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In-licensing patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Licensing university-owned patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Cross-licensing patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participation in patent pools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating patent pools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Support enforcement of patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26 [10]3. Please specify your preferences regarding the type of patent to be exchanged on the patent marketplace:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Single patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent bundles covering a certain technological area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent bundles covering a range of patents from different technological area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27 [14]

4. Please specify your preferences regarding the region you like to sell, purchase and license patents in the future:

Please number each box in order of preference from 1 to 7

Europe - excluding Russia	<input type="text"/>
North America	<input type="text"/>
China, India and Korea	<input type="text"/>
Japan	<input type="text"/>
Asia - excluding China, India, Japan and Korea	<input type="text"/>
South America	<input type="text"/>
Rest of world	<input type="text"/>

28 [13]5. Please specify your preferences regarding institutions you are planning to increase selling, purchasing and licensing of patents in the future:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Universities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corporations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SMEs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent brokers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patent funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology transfer agencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are not planning to sell, purchase or licence patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29 [18]6. Please specify your preferences towards the development phase of patents you would like to sell, purchase and license on the new patent market:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Emergence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maturity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obsolescence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30 [28]7. Please comment if the following features of the financial market for patents are relevant for a smooth functioning:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Transparency over prices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency over supply and demand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensure a stable quality of the offered assets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internationality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk sharing mechanisms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Serve as source of liquidity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce the timely effort for transactions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Offer information about products and market participants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guarantee the anonymity of transaction partners	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31 [29]8. Please evaluate the usefulness of the following financial products for your organization on a financial market for patents:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Patents serving as collateral for loans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patents serving as additional upside for collateralizing loans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Securitization products based	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

on patents					
Issuing patent-based bonds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insurance for patent infringement cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instruments to hedge financial risk of R&D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CHARACTERIZING THE ENVISIONED STATE: POLICY MEASURES

32 [32]

1. Please comment whether the following policy measures are likely to enhance transferring, purchasing, selling and licensing of patents from your perspective:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Rising IP awareness among innovators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rising IP awareness among investors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strengthening of the existing IP Regime	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weakening of the existing IP regime	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unified EU-Patent System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase patent quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop binding valuation guidelines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish a regulation system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(e.g. ensure that transfer
channels work frictionless)

Enhance possibilities to
finance the development
of patents

Enhance possibilities to use
patents as finance
instrument (e.g. as collateral)

Submit your survey.

Thank you for completing this survey.

12.6 Appendix F - Questionnaire on products, trade possibilities and actors

A: Introduction

B: General Questions

- Please share your intuitive thoughts concerning the idea of creating a financial market for IP.
- What financial market designs for IP do already exist? What financial market designs could you imagine?
- Which financial market designs could work well and which financial market designs would you consider as weak?
- For the financial market designs you just mentioned, which financial products involving IP could be traded?
- What do you think is the more important challenge regarding the creation of a financial market for IP: The lack of an optimal market design or the lack of an optimal product design?

C: Criteria for a financial market design

- What criteria does a financial market have to fulfil to work properly?

Criteria Propositions:

- Liquidity (broad customer basis)
 - Technology (System architecture & solutions, capacity)
 - Efficiency (transaction costs, quality of products, transparency)
 - Access (broad access possibilities)
-
- Please share your intuitive thoughts regarding those criteria.
 - Do you want to add a criterion?
 - How can a financial market gain liquidity?
 - Which are the most important criteria?
 - What criteria would you focus on during the creation of a financial market for IP?
 - How important would be the investor's confidence in the asset class and the market's institutional setting?

D: Criteria for a financial product design

- What criteria does a financial product have to fulfil to be marketable?

Criteria Propositions:

- Homogeneity
 - Simplicity / Traceability
 - Cash Flows
 - Conservation of Value
 - Transferability
 - Valuation
-
- Please share your intuitive thoughts regarding those criteria.
 - Do you want to add a criterion?
 - Which are the most important criteria?
 - Are products tradable even if they are not homogeneous? Could you give an example?
 - What is your opinion the simplicity of a product? Does simplicity enhance the investor's confidence?

E: Chances / Potential / Threats of market designs for IP

Design Propositions:

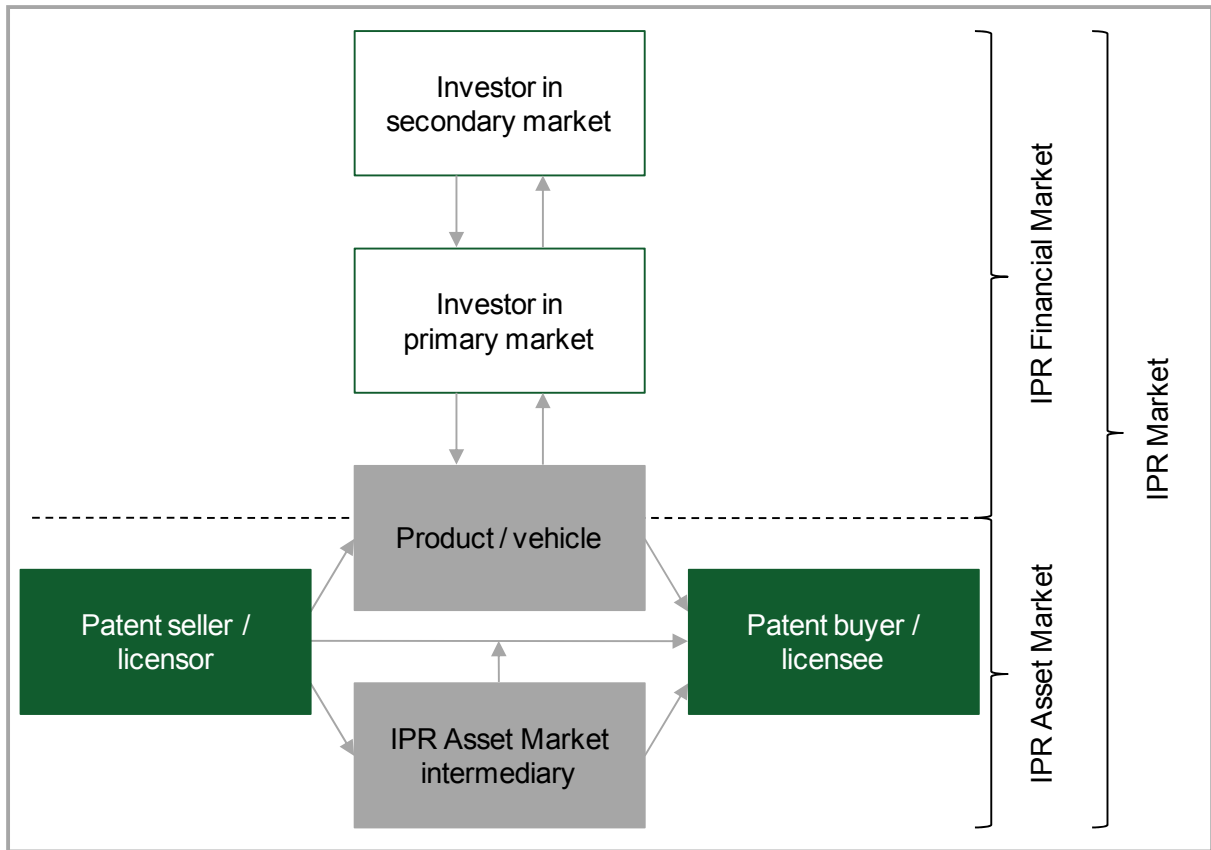
- Publicly traded Patent funds on exchanges
 - Regulated OTC market with intense information network between patent intermediaries
 - Quote-driven market vs. Order-driven market
 - IPXI
 - EEX (Power, Oil, CO2 Emission rights, Coal)
-
- Please share your intuitive thoughts concerning these market designs as a possibility to trade financial products for IP.
 - Would you suggest another market design to trade financial products for IP?
 - Do you have a personal favourite?
 - Please give a "quick evaluation" of your favourite market design regarding the criteria above (Liquidity/Technology/Efficiency/Access).
 - Do you see any specific advantages coming along with your favourite market design?
 - Do you see any specific problems coming along with your favourite market design?
 - Which actors would take part on these market designs?
 - What are their roles?
 - What are their tasks?
 - What is their motivation to participate?

F: Chances / Potential / Threats of product designs for IP

Product Propositions:

- Patent funds
 - IP-backed instruments
 - Licensing rights (ULRs)
 - Derivatives on the products above
-
- Please share your intuitive thoughts concerning these product designs.
 - Would you suggest another product design?
 - Do you have a personal favourite?
 - Please give a "quick evaluation" of your favourite product design regarding the criteria above (Homogeneity/Simplicity/Cash Flow/Conservation of Value/Valuation)
 - Do you see any special advantages coming along with your favourite product design?
 - Do you see any special problems coming along with your favourite product design?
 - Is a successful implementation realistic?
-
- What actors of the market designs above would be interested in which kinds of financial products?
 - What would be their motivation to invest?

Indicative market structure



12.7 Appendix G - Questionnaire on evaluation

1. Patent funds

- What do you think about the model of the patent (exploitation) funds?
- Are / were you personally involved in such a project?

2. (Pre-) selection

- Assuming you were to select patents for a fund. In a first step, a pre-selection would be conducted before defining the patents to be evaluated in more detail:
 - How could a (pre-) selection process be structured?
 - Which (pre-) selection criteria would you use and why?
 - Is the frequency of citations important?
 - Does a patent have to be granted or is the application sufficient?

3. Valuation

- Should the application of valuation methods vary according to the remaining life of the patent?
- Which are the major challenges with regard to patent valuation?

4. Miscellaneous

- Are there any open topics you would like to mention?

12.8 Appendix H - Questionnaire on impact analysis

Financial products and potential market structure:

1. Please comment on the potential market structure:
 - a. Feasibility of the model for facilitating IP trade
 - b. Who will be the main beneficiaries
 - c. Risks / dangers of the model for SMEs & Industry
2. Please comment on the advantages/disadvantages and their impact on potential market actors of:
 - i. existing IP exchange models e.g. Live auctions & Unit license rights
 - ii. Risks / dangers of the model for SMEs & Industry
 - iii. Who will be the main beneficiaries
 - b. Equity Models - Fund structures
 - i. Who will be the main beneficiaries
 - ii. Risks / dangers of the model for SMEs & Industry
 - c. IP Securitization and IP Bonds
 - i. Who will be the main beneficiaries
 - ii. Risks / dangers of the model for SMEs & Industry
3. Please comment on the impact of the discussed models on:
 - a. Better utilization of research efforts, increased research dynamics
 - b. Increased competitiveness of European firms and contribution to growth
 - c. Impact on the number of infringement cases and litigation in Europe
 - d. Effects on the quality of the patent
 - e. Impact on valuation standards and evaluation of technology potential
 - f. Increased awareness of how to commercialise IP

12.9 Appendix I - Questionnaire on other options

a. Open questions

- Which proposed or implemented models for a better IP circulation you want to emphasize? Why?
- About which (proposed) models for a better IP circulation you are especially skeptical? Why?
- What are the main challenges for increased IP circulation at supply, intermediary, and supply site?
- At which site of the market you see promising leverages for increased IP circulation: Supply, Intermediaries, Demand? Why?
- Instruments the EU should / could apply to increase the circulation of IP assets? What could be a realistic roadmap for the implementation at EU level?

b. Discussion about alternatives proposed by the interviewer

- What is your opinion about the following instruments at the supply side?
 - Increase professionalism of TTO-Managers
 - Guidelines for transfer professionals
 - Strengthen existing models like Fraunhofer or VTT
 - Changing funding instruments
 - Other innovative approaches
 - Optimizing patent system
- What is your opinion about the following instruments at the intermediary side?
 - Fostering new business models in technology transfer
 - Supporting intermediary networks
 - Non-profit patent funds
 - For-profit patent funds
 - (electronic) exchange platforms
 - Other innovative approaches
- What is your opinion about the following instruments at the demand side?
 - Raising awareness
 - Supporting spin-off culture (technology transfer instead of patent transfer)

- Taxation and Bureaucracy
 - Supporting collaborative projects (call design; SBIR)
 - What is your opinion about the general regulations?
- c. Discussion about public, defensive-oriented patent funds:
- Do you know the endeavor of the Korean government and the Korean Intellectual Property Office to establish a patent fund to yield as a protective shield for the home industry against non-Korean NPE and other offensive actors?
 - What is your opinion about this kind of public engagement? Is this an (desired) option even for Europe in terms of stimulating the IP circulation?

12.10 Appendix J - Questionnaire on policy recommendations

1. What are the drivers for the EUC to improve IPR circulation?

1.1. Is it because

- Europe has low investment into R&D (private/public sector)?
- Research institutions have low IPR commercialisation possibilities?
- SMEs due to financial shortages have low access to IPR?
- Foreign countries (China, US) are developing and using business models (patent funds) to buy IPR developed in Europe?
- Foreign companies are carrying out “corporate acquisitions” in Europe (buyout of European technology companies)?

2. How should the EUC improve IP circulation?

2.1. Should it and what is the impact on Europe, if the EUC

Conduct		Impact
Establishes IPR Financial Market		
Establishes trading platform/exchange for IPR (e.g. IPXI in US, similar in China)?	Does itself	
	Assigns	
Launches a patent fund (e.g. Taiwan, Korea, France)?	Does itself	
	Assigns	
Establishes supportive regulatory framework (regarding IPR Asset Market, patents etc.)		

3. What will happen if the EUC does not improve IPR circulation in Europe?

3.1. What is the impact on Europe, if the EUC

Action		Impact
EU establishes IPR Financial Market		
EU member state takes initiative, and offers:	National solution (patent fund, IPR exchange)	
	European solution (patent fund, IPR exchange)	
Non-EU country or private entity (e.g., IPXI) takes initiative and offers an European solution		
No-one takes initiative in respect of Europe (in comparison, other IPR Markets continue to develop: Taiwan, Korea, US, Japan)		

4. What should the EUC do first?

4.1. Should it:

- Improve IPR awareness (IPR as an asset and investment opportunity)?
- Increase the presence of intermediaries (licensing agents, patent brokers, university transfer institutes, patent pools, patent enforcement companies, IPR auctions, online IPR exchanges)?
- Improve common patent valuation?
- Improve patent quality and enforcement?
- Lower transaction costs (associated with contract negotiations etc.)?

Area of policy action	Urgent
IP awareness	
Quantity and quality of intermediaries	
Patent (e)valuation	
Patent quality and enforcement	
High transaction costs	

12.11 Appendix K – Recommendations and Challenges

Challenges	Policy recommendations
IPR Market	
<p>EU's position towards foreign IPR Markets</p> <ul style="list-style-type: none"> • The IPR Markets in the U.S. and the Asian countries are rapidly developing • In some parts of the world countries' authorities are involved in aggregating patents across the world, including from Europe • Europe may lose its most valuable innovations if a single IPR Asset Market is not created in Europe 	<p><u>Policy recommendation:</u> To reduce the flow of innovations out from the EU, to reduce fragmentation of the IPR Market, and to increase liquidity and transparency on the IPR Market, the EC should create a single IPR Asset Market in Europe.</p> <p><u>Policy recommendation:</u> To gain an overview of potential attempts to create such a market, the EC should launch a tender for private institutions to propose IPR Asset Market business models.</p>
<p style="text-align: center;">Alignment of interests</p> <ul style="list-style-type: none"> • If EU member states continue to protect their national interests, it may delay the development of the IPR Market in Europe • Differences in tax regimes and policies may influence EU member states' motivation to develop an IPR Market in Europe • A central marketplace is likely to create positive external effects (jobs, tax income, and growth), which would cause the EU member states to compete for the marketplace's location • If the EU member states were to oppose a central marketplace, this may give way to the increased fragmentation of the IPR Market in Europe 	<p><u>Policy recommendation:</u> To reduce the flow of innovations out from the EU, to reduce fragmentation of the IPR Market, and to increase liquidity and transparency on the IPR Market, the EC should create a single IPR Asset Market in Europe.</p> <p><u>Policy recommendation:</u> To gain an overview of potential attempts to create such a market, the EC should launch a tender for private institutions to propose IPR Asset Market business models.</p>

IPR Asset Market	
<p style="text-align: center;">Optimisation variables directed at innovation</p> <ul style="list-style-type: none"> • A tension between competition and innovation policy makes it difficult to decide on policy measures that could lead to a close to optimal and efficient innovation output • The EU's long-term research policies have to be taken into account when developing the IPR Market • The diffusion of innovations is crucial for economic growth in Europe • The trade-off between societal welfare and private (investor) return has to be considered when developing the IPR Market 	<p><u>Policy recommendation:</u> To increase European research institutions' engagement in the IPR Asset Market, the EC should</p> <ul style="list-style-type: none"> • <i>foster the IPR awareness of European research institutions, and</i> • <i>foster the creation of research-field-specific IPR valorisation services for research institutions.</i>
<p style="text-align: center;">Legal challenges</p> <ul style="list-style-type: none"> • Increased patenting affects the functioning of patent systems (lengthens backlogs, increases litigation) • IPR Market actors are uncertain about patenting and patent enforcement in Europe • Europe lacks a shared, high legal patent quality and homogenous patent litigation system • Non-practicing entities (NPEs) are less actively involved in patent transactions and patent litigations in Europe due to the fragmented legal system 	<p><u>Policy recommendation:</u> To increase the confidence of actors regarding the IPR Asset Market, the EC should ensure a common, high patent quality and its enforceability across Europe.</p>

<p style="text-align: center;">Supporting SMEs</p> <ul style="list-style-type: none"> • SMEs are the drivers of economic growth in Europe and should therefore be more active on the IPR Market • SMEs need better access to the IPR Market in Europe and to the IPR Markets abroad 	<p><u>Policy recommendation:</u> To increase SMEs' participation in the IPR Asset Market, the EC should</p> <ul style="list-style-type: none"> • foster European SMEs' IPR awareness, and • foster the creation of industry-specific IPR valorisation services for SMEs. <p><u>Policy recommendation:</u> To support the expansion of European companies to non-EU IPR Markets, the EC should foster the global harmonisation of IPR systems and foster efficient IPR enforcement outside the EU.</p>
<p style="text-align: center;">Patents as an asset class</p> <ul style="list-style-type: none"> • A common understanding of patents as an underlying asset class is challenged by diverse patents properties (the liquidity of patents, asymmetric information, and type of exploitation) • IPR Asset Market vehicles face several challenges (time horizon – investment vs. patent's value creation, business models, and delimitation of existing products) that must be overcome before a functioning marketplace for patents can be ensured • A strong trend towards active technology licensing is in line with the open innovation trend. • The value of patents, the patenting behaviour of companies and the 	<p><u>Policy recommendation:</u> To facilitate IP transactions on the IPR Asset Market, the EC should promote licensing as a preferred mode of IP transactions on the IPR Asset Market.</p> <p><u>Policy recommendation:</u> To facilitate IP circulation in the IPR Asset Market, the EC should continue to foster the professionalism of technology transfer structures (e.g., TTOs) in the EU.</p>

<p>strategic use of patents differ across industries and technology classes.</p> <ul style="list-style-type: none"> • A patent's economic life may differ from its legal life (usually 20 years) if the underlying invention is substituted by superior new technologies 	
<p style="text-align: center;">Patent evaluation</p> <ul style="list-style-type: none"> • Experts find the applicability of patent valuation methods highly debatable • The income-based approach is the most popular, while the market-based approach may evolve over time as the IPR Market becomes more transparent and liquid • Patent pre-selection needs to filter patents with a higher potential without consuming too many resources 	<p><u>Policy recommendation:</u> To facilitate IP transactions and increase actors' certainty regarding patent valuation methods, the EC should foster the dissemination of information on existing patent valuation methods among the actors.</p>
<p>IPR Financial Market</p>	
<p>Economics of creating a new market</p> <ul style="list-style-type: none"> • An IPR Financial Market requires a functioning IPR Asset Market • The creation of the IPR Financial Market implies the formation of new entities and, possibly, authorities; Europe may lack the required pool of suitable individuals • IPR transaction costs in Europe are high due to their lack of transparency and insufficient market breath • A functioning IPR Financial Market in Europe needs large numbers of participants and a high trading frequency to be liquid • Financial intermediaries are needed 	<p><u>Policy recommendation:</u> The EC should not establish or support the IPR Financial Market before the underlying IPR Asset Market in Europe has not been substantially improved and the rules of this underlying market are clear to the actors.</p> <p><u>Policy recommendation:</u> To globally observe and analyse new attempts to trade IPR, the EC should launch a network of excellence comprising European:</p> <ul style="list-style-type: none"> • financial community experienced in IPR trading and financing innovation, • patent offices, • SMEs and large companies with different R&D capacities

<p>to overcome the information asymmetry between capital providers and capital seekers; in Europe, there is a lack of intermediaries on both the IPR Asset Market and the Financial Market</p> <ul style="list-style-type: none"> • Before an IPR Financial Market can be set up, the market participants in Europe should commonly perceive IPR as an investment opportunity 	<p>and industry sectors,</p> <ul style="list-style-type: none"> • research institutions representing different research fields, and • researchers focussing on innovation and financial markets.
<p>Risks from financial markets</p> <ul style="list-style-type: none"> • Systemic risk manifests itself as an excessive volatility or even a breakdown in the functioning of financial markets for traded assets. A collapse or malfunction of an institution in a financial market for patents, or the whole market for patents, would endanger technology transfer and reduce the speed of innovation. • The liquidity of the underlying (patent) on the IPR Asset Market is a precondition for an IPR Financial Market • Credit risk can be relevant for IPR Markets, especially regarding licensing agreements or royalty purchase agreements • Market risk factors (e.g., exchange rates, interest rates, and stock price indices) are a part of a potential IPR Market and unexpected changes in the factors may lead to losses in the asset portfolio value 	<p><u>Policy recommendation:</u> Three years after its launch, the EC should require the network of excellence to propose:</p> <ul style="list-style-type: none"> • policy actions regarding the establishment of an IPR Financial Market (e.g., concerning the market types and products), and • policy actions to improve the functioning of the IPR Financial Market (e.g., by adjusting its regulatory framework, strengthening the benefits to SMEs and the research landscape) if it has already evolved.

- | | |
|---|--|
| <ul style="list-style-type: none">• Operational risks related to a marketplace's operational reliability and functional efficiency are inherent to any market or institution participating in a market; a potential IPR Market will also be subject to operational risks• Reputational risk is closely linked to (investor) confidence; investors and other market participants need to trust the asset class and its institutions to ensure a functioning IPR Market• Financial products based on patents could be exposed to strategic and management risks | |
|---|--|

13 Glossary

Asset-backed securities

Asset-backed securitisation allows a company to monetise the cash flow assets generate. Bär (2000) provides an overview of the concept. An originating company transfers assets or the right to the associated cash flow to a special purpose vehicle (SPV). In return, it is compensated through a cash payment. The SPV issues securities to investors, which promise a share of the cash flow the assets generate. The proceeds from the emission are used to finance the purchase from the originating company. Several additional elements help to enable the transaction, for example credit-enhancing institutions. In essence, the originating company receives a lump sum in return for granting investors a share of future returns realised by an asset.

Asset-backed securities possess an important characteristic: The risk associated with the quality of the underlying asset is separated from the business risk of the originating firm (Clancy, 2006). The ownership of a security is independent from the company which initially provided the underlying asset. Investors are thus only exposed to the risk derived from the ability of assets held by the SPV to generate cash flow (Fleiner, 2007). This characteristic distinguishes asset-backed securities from asset-secured bonds. In the latter case, the return primarily depends on the operations of the issuing company as opposed to the quality of the underlying asset.

Bonds

Bonds are financial instruments that promise repayment of the initial outlay as well as interest (Fabozzi, Wilson & Ritchie, 1997). In addition to the capital that is provided initially, interest payments capital reward investors. On the downside, bond owners bear the risk that the issuer may default on repayments. This risk generally depends on the ability of the issuing company to generate sufficient returns to meet debt liabilities. It is taken into account by adapting the required rate of return: Bonds with high default risk are associated with higher interest payments. A company's cost of capital thus increases with the difficulty to generate cash flow and the likelihood of default.

One measure to reduce the interest rate investors expect, is through securing bonds. An asset is used as collateral, meaning that it will be transferred to the ownership of the bondholder if the issuer is unable to meet its liabilities. It is important to note that such a measure does not influence the likelihood of default, which is still determined by a company's strength of earnings (Spremann & Gantenbein, 2007). However, an investor's position is greatly improved in the case of default. The provided capital is only lost to the extent that it cannot be recouped through the liquidation of collateral assets. While it does not reduce the risk of default, the measure greatly mitigates the severity of such an event in terms of its

influence on an investor's funds. As a result, a company is required to pay less interest on the bonds in question (Spremann & Gantenbein, 2007).

Funds

Funds invest capital collected from interested parties in certain assets. In return, investors receive shares in the fund, which entitle them to a part of the realised returns. The question of which additional rights are associated with the ownership of fund shares has led to the development of different models (Glaus, 1997; Haslem, 2003). In the case of open-end funds, new shares are continuously emitted and can be bought by new investors. Inversely, the fund is obliged to take back existing shares and pay out the initial investment. Price changes of assets aside, the total investment from shareholders at any point in time determines the size of the portfolio. The price of a share in an open-end fund is therefore equal to the net asset value per outstanding share. This calculation is usually carried out daily. As a consequence, shares in open-end funds can only be traded once a day.

Closed-end funds, on the other hand, emit shares in public offerings similar to those on the stock market. Once issued, the fund does not take back shares in return for the original investment. The portfolio is created using the initially invested capital and subsequently remains unaffected by share transactions. This means that the price of shares in closed-end funds is determined by market developments, not the net asset value of the portfolio. As a result, it may exceed or fall short of the theoretical share in net asset value, leading to a premium or discount respectively. Since the shares are valued by the market and not through daily calculations, the shares can be traded continuously, i.e. intraday.

A third model is exchange-traded funds (ETFs), which combine elements of open and closed-end funds (Haslem, 2003). ETF shares are traded on markets. The continuous valuation permits intraday trading, similar to closed-end funds. They also allow additional share issues following the initial offering as well as the redemption of outstanding shares for authorised participants. This similarity to open-end funds mitigates an important drawback associated with the closed-end variety: The potential difference between price and net asset value is limited due to the possibility of redemption, which would allow investors to profit from large premiums or discounts through arbitrage gains. Besides intraday trade, the other important point of differentiation from open-end fund is the possibility to use assets for additional investments and redemptions. New shares thus do not have to be bought for cash, but can be obtained by transferring a quorum of target assets to the fund. Similarly, redemptions can be paid out in the form of assets. Through these differences, ETFs attempt to combine the advantages of open-end and closed-end funds.

Futures

"A futures contract is an agreement between two parties, a buyer and a seller, where the parties agree to transact with respect to the underlying at a predetermined price at a specified date. Both parties are obligated to perform over the life of the contract, and neither party charges a fee. Once the two parties have consummated the trade, the exchange

becomes the counterparty to the trade, thereby severing the relationship between the initial parties" (Collins & Fabozzi, 2008). In order to have interchangeable contracts, their terms are standardised. This means that the contracts are known in advance. In addition, this allows a secondary market for future contracts. All futures contracts are accompanied by exact information regarding the terms, the underlying assets and further contract details. In the case of futures contracts, delivery is often not the objective of the parties, but they are mainly used to manage risks or costs. In contrast to options, no money changes hands between the buyer and the seller when the contract is executed. It also differs from options in the sense that "futures are marked-to-the-market on a daily basis. This means that daily gains or losses in the investor's position are counted for immediately and reflected in his or her account" (Collins & Fabozzi, 2008). Hence, the buyer pays when the price of the underlying asset falls, and vice versa. In practice, most equity futures use a stock index as the underlying asset. However, there are also futures on individual stocks or other asset classes (Collins & Fabozzi, 2008).

IPR Asset Market

Although the IPR Asset Market currently has shortcomings, it already exists. In the IPR Asset Market, patent sellers (e.g., original patent holders) transfer their IPR to patent buyers in exchange for monetary compensation. This may take place directly or through brokers, dealers and vehicles (e.g., funds, companies, SPVs, etc.).

IPR Financial Market

In the IPR Financial Market, vehicles (e.g., funds, companies, SPVs, etc.) create financial products (shares, bonds, etc.) which investors can purchase. The primary market is created there when the vehicle issues shares, bonds, etc., whereas the secondary market arises as soon as these financial products can be traded between different investors.

IPR Market

The IPR Market comprises both, the IPR Financial Market and the underlying IPR Asset Market.

Options

"An option is a contract in which the option seller grants the option buyer the right to enter into a transaction with the seller to either buy or sell an underlying asset at a specified price on or before a specified date" (Collins & Fabozzi, 2008). The price is called a strike or exercise price and the specified date is known as the expiration date of the option. The option seller grants this right in exchange for the option premium to the option buyer. The asset over which the option contract is made, is called the underlying and can be virtually any asset, often being a stock or a stock index. There are two types of options: call option and put option, depending on the right granted through the contract. If the option holder has the right to buy the underlying asset, it is a call option. If he/she has the right to sell the asset, it is called a put option. Different exercise styles classify options, the most prominent being the American and the European option. The latter can only be exercised on the specified

date. The former can be exercised before or by the specified date. In practice, the terms of exchange are determined by the contract unit, often 100 shares of type of stock, or multiple times an index value for a stock index. These terms are standard for most contracts (Collins & Fabozzi, 2008).

14 List of abbreviations

AIM	Alternative Investment Market
ASTP	Association of European Science & Technology Transfer Professionals
ATTP	Alliance of Technology Transfer Professionals
AUTM	Association of University Technology Managers
BRICS	Brazil, Russia, India, China and South Africa
CAPM	Capital Asset Pricing Model
CBOT	Chicago Board of Trade
CC	Creative Commons
CER	Certified Emissions Allowance
CIPO	Canadian Intellectual Property Office
CLP	Certified Licensing Professional
CO2	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECJ	European Court of Justice
EEX	European Energy Exchange
EIB	European Investment Bank
EIRMA	European Industrial Research Management Association
EPO	European Patent Office
ERA	European Research Area
ERATO	European Association of Research and Technology Organisations
ETF	Exchange-traded fund
ETRI	Electronics and Telecommunication Research Institute
EU	European Union
EUA	European Union Allowance
EUR	Euro
FRAND	Fair, Reasonable And Non-Discriminatory Terms
GAT/LuK	GAT versus LuK is a landmark decision of the European Court of Justice concerning cross border infringement situations

GDP	Gross Domestic Product
HEI	Higher Education Institutions
IAS	International Accounting Standards
IFRS	International Financial Reporting Standards
IP	Intellectual Property
IPC	International Patent Classification
IPO	Intellectual Property Office
IPR	Intellectual Property Rights
ISO	International Organisation for Standardisation
ICT	Information and Communication Technology
ITRI	Industrial Technology Research Institute
IPXI	Intellectual Property Exchange International
LSE	London Stock Exchange
MoU	Memorandum of Understanding
NPE	Non-Practicing Entities
NYSE	New York Stock Exchange
OECD	Organisation for Economic Co-operation and Development
OTC	Over-The-Counter
PCT	Patent Cooperation Treaty
PPP	Public-private partnership
PreTon	European Knowledge Transfer Association, created in 2003 by the European Commission
PRO	Public Research Organisations
R&D	Research and Development
ROW	Rest of World
RTS	Russian Trading System
SEAQ	Stock Exchange Automated Quotation System
SME	Small and Medium-sized Enterprise
SPV	Special Purpose Vehicle
TTO	Technology Transfer Office
UITT	University Industry Technology Transfer

ULR	Unit License Right Contract
UNICO	Educational non-profit organisation set up to support innovation and commercialisation of public sector and charity research for social and economic impact
US	United States
USD	United States Dollar
USPTO	United States Patent and Trademark Office
VC	Venture Capital
VTT	Valtion Teknillinen Tutkimuskeskus
WIPO	World Intellectual Property Organization