Europe Economics

Economic Analysis of the Unitary Patent and Unified Patent Court

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1 Introduction

This report was commissioned from Europe Economics, in collaboration with surveying specialists Accent, by the European Patent Office (EPO), at the request of the Economic and Scientific Advisory Board (ESAB). It provides an economic analysis of the switch from the current system to the Unitary Patent (UP) and Unified Patent Court (UPC).

1.1 The current system

In order to establish a right for patent protection in Europe, interested parties have two options to choose from. The options are to register a claim at the national level, through National Patent Offices (NPOs) or alternatively, through the regional European Patent Office (EPO). This section examines the process by which a claim with the EPO can be registered and the manner in which it is validated and consequently applied at the national level.

The European Patent Convention enabled applicants to seek patent protection through filing a single application, in an area which now consists of 38 European countries.[1] The EPO accepts applications centrally in three official languages; English, French and German. An applicant to the EPO has the ability to choose which of the 38 Member States of the EPO it requires protection in. Once the patent is granted by the EPO, the patent proprietor then has the possibility to choose which of the countries the patent should be validated in. Once validated the European patent turns into a set of legally equivalent national patents. [2] It should be made clear at this stage that the EPO does not offer a pan-European patent for the geographic area it covers; rather, it provides a bundle of national patents for a number of states for which the patent proprietor validated its patent.

Filing for a European patent involves a number of costs. Initially, the applicant incurs "filing and search fees". Additionally, the applicant may be liable for further charges if there are more than 15 claims. Once a patent has been granted by the EPO, control is transferred to the contracting member states. NPOs are then in a position to request certain fees involved with the validation, publication and renewal of the patent. Moreover, NPOs can require translation of the patent specification, or only the claims, if the official language of the grant is not in a language accepted as official in the country in question.[3]

The renewal fee framework in each of the involved Member States is described in detail in section IV of the EPOs' publication "National law relating to the EPC".[4] A rather important aspect of the renewal framework is that it occurs at the national level. After the grant has been assigned by the EPO, the applicant is then in a position to determine whether it is in their interest to renew their patent in each of

[1] In addition to the 38 Member States there are two extension states (Bosnia-Herzegovina and Montenegro). Source: http://documents.epo.org/projects/babylon/eponet.nsf/0/e6ce616afbb87afac125773b004b93b5/$FILE/EPO_EuroPatente13_en.pdf

[2] EPO: *"Under Article 2(2) EPC, a European patent shall, in each of the contracting states for which it is granted, have the effect of and be subject to the same conditions as a national patent granted by that state, unless otherwise provided in the EPC."*

[3] Extended description of requirements by member state can be found here: http://documents.epo.org/projects/babylon/eponet.nsf/0/EE1929ACFAA82EC3C125725800374350/$File/National_law_relating_to_the_EPC_en.pdf

[4] Article 141 of the EPC states that national renew fees pertinent to European patents may be imposed. Section IV of: http://documents.epo.org/projects/babylon/eponet.nsf/0/EE1929ACFAA82EC3C125725800374350/$File/National_law_relating_to_the_EPC_en.pdf

the concerned Member States. Such a renewal will of course be subject to the costs imposed by the individual country.

Professional representation during the process is required for parties that are not resident or whose business is not active in the states in question. In addition to this, professional representation is advised by the EPO for all concerned applicants. A professional representative is a European patent attorney (EPA) and needs to fulfil the conditions set forth by Article 134(2) of the EPC.[5]

Even though the European patent system provides a centralised granting procedure through the EPO, patents granted by the EPO constitute a bundle of national patent rights that can be enforced only before National Patent Courts. This leads to a lack of harmonization in patent litigation activity in Europe which may lead to a number of incongruities. The litigation system in Europe is characterised by a significant degree of variation across the following key aspects:

- Uncertainty in outcomes: court decisions related to infringement or validity of the same patent may not be homogenous across national jurisdictions.
- The possibility of parallel validity proceedings in national courts and at the EPO, and the effect of EPO opposition on stays: patent courts in some countries (e.g. Germany) will grant a stay, others will not (e.g. in the Netherland), whilst others (e.g. in the UK) may exercise their discretion on the matter.
- The possibility of bifurcation: litigation procedures in Austria, Germany and Hungary allow for an infringement and invalidity case concerning the same patent to be heard separately and by different courts.
- The nature of documents to be presented and disclosed (e.g. full disclosure by all parties in the UK versus production of infringer's only documents in France).
- Use of expert witnesses: whilst this is common practice in UK courts it is not in German courts.
- Speed of the proceedings: whilst proceedings are relatively quick in some countries (e.g. 6-12 months to decision in the UK and the Netherlands), they may last several years in others (more than three years to decisions in Italy).
- The costs of litigation: this varies significantly across jurisdictions and may increase exponentially when patents are being enforced in several countries.

1.2 The UP/UPC system

1.2.1 The Unitary Patent (UP)

A third option for patent applicants in Europe will be made available. On the date the Agreement on a Unified Patent Court has been ratified by 13 Member States including France, Germany and the United Kingdom, regulations concerning a Unitary Patent for Europe will come into effect. This new "European patent with unitary effect" or "Unitary Patent" will cover all participating EU Member States.[6]

A key benefit of the UP is that it provides a one-stop shop, i.e. instead of different national proceedings which apply in the post-grant phase the UP will be centrally administered. It will therefore no longer be necessary to validate the European patent in all of the states separately, or be required to individually pay the renewal fees for the different states. Instead, the EPO will be responsible for the collection of the renewal fees concerning the UP.[7] Furthermore, and in contrast to a classical European patent, it will no longer be necessary to file translations in the local language in those states which still require such translations in order to validate the patent.

[5] Namely, they must have passed the European qualifying examination and they need to be a national and have a place of business in an EPC State.

[6] Spain and Italy for example have chosen not to participate.

[7] At the time of writing the level of the renewal fee has not been set.

1.2.2 The Unified Patent Court (UPC)

The Unified Patent Court will be responsible for rulings in disputes concerning Unitary Patents and classical European patents as well, unless the patent proprietor of the classical European patent has opted out of this. This Court will also be in a position to nullify the patent following a single action. The option to apply for a Unitary Patent will be presented along with the traditional, pre-existing option of a European Patent. Since the choice will only need to be made once the patent has been granted, the new rules will also apply to pending applications.

The UPC is based on the Agreement on a Unified Patent Court (the "UPC Agreement") which will enter into force once ratified by at least 13 Member States, including the three States in which the highest number of European patents had effect in 2012 (DE, FR, UK).

The UPC shall comprise a Court of First Instance, a Court of Appeal (with seat in Luxembourg) and a Registry. A Patent Arbitration and Mediation Center will be created in Lisbon (Portugal) and in Ljubljana (Slovenia).

The decentralised Court of First Instance shall comprise a number of local and regional divisions set up in the UPC Agreement contracting states as well as a central division with its seat in Paris, one section in London and another in Munich. The central division's seat in Paris will deal with cases relating to patents in Classification Sections B (performing operations; transporting), D (textiles; paper), E (fixed constructions), G (physics) and H (electricity). The section in London will deal with patents in Classification Sections A (human necessities) and C (chemistry, including pharmaceuticals), while the section in Munich will deal with patents in Classification Section F (mechanical engineering).

Jurisdiction of the UPC

The UPC shall have exclusive jurisdiction to hear in particular; infringement actions, revocation actions and actions for provisional and protective measures and injunctions. It shall also deal with counterclaims for revocation and other defences (e.g. counterclaims relating to licences).

In general, infringement actions and requests for provisional and protective measures and injunctions against defendants having their residence within the territory of an UPC Agreement contracting state shall be brought before a local or regional division, either at the place of the alleged infringement or the domicile of the defendant. Actions against defendants having their residence outside the territory of a contracting state shall be brought before the local division or regional division where the alleged infringement took place or before the central division. Isolated revocation actions shall be brought before the central division of the Court of First Instance.

Judges of the UPC

All panels of the UPC – whether at first or second instance – will be composed of judges coming from at least two different Member States. Most panels will be composed of three legally qualified judges but a fourth technically qualified judge will often be allocated to the panel (on request by a party to the dispute or when the patent's validity is at stake).

Representation

Parties must be represented either by lawyers (attorneys-at-law) or by European Patent Attorneys with appropriate qualifications in patent litigation. Representatives may be assisted by patent attorneys who may address the UPC.

Powers of the UPC and award of damages

Inspired by Directive 2004/48 on the enforcement of IPR, the UPC Agreement provides the UPC with wide powers to issue orders and impose measures, procedures and remedies. The UPC may, for example, order provisional measures to preserve evidence, order the inspection of premises, order a party to

produce evidence, appoint court experts and grant provisional and protective measures against an alleged infringer.

Where the UPC finds that a patent has been infringed it may, for example, grant provisional and permanent injunctions aiming at prohibiting the continuation of the infringement, order corrective measures such as recalling the infringing products from the channels of commerce or even their destruction and order the infringer to communicate information such as origin and distribution channels of the infringing products.

With regard to requests for injunctions it is worth noting that the UPC has the discretion of whether it grants such injunction, i.e. the Court will have to carefully weigh the interests of both parties involved before granting or rejecting the request.

The UPC may also award an injured party damages appropriate to the harm actually suffered as a result of the infringement, although damages shall not be punitive.

It should also be noted that the UPC is designed not only to bring benefits for patent proprietors but also for third parties because of the possibility of filing a central revocation action.

Transitional period: Litigation before national courts and opt-out scheme

The UPC Agreement provides applicants and patent proprietors with two possibilities to escape from the exclusive jurisdiction of the UPC during an (extendable) seven-year transitional period: litigation before national courts and opt-out.

Litigation before national courts

Plaintiffs may decide during the seven-year transitional period to initiate actions which fall in the jurisdiction of the UPC relating to European patents before the national courts of one or more UPC Agreement contracting states.

Opt-out scheme

It is also possible for patent proprietors to opt-out from the scope of application of the UPC Agreement. This possibility is available for:

- any classical European patent granted before the end of a seven-year transitional period (which will start on the date of entry into force of the UPC Agreement); and
- any European patent application filed before the end of the seven-year transitional period.

Where a patent proprietor has notified an opt-out for a particular European patent, litigation relating to that patent must be brought before a national court. Note that there is no possibility to opt out from the exclusive jurisdiction of the UPC as regards European patents with unitary effect.

1.3 This report

The remainder of this document sets out our analysis of the switch from the current system to the UP/UPC. It is structured as follows:

- Section 2 sets out our review of the relevant previous literature, our conceptual framework for analysing the impact of the change and produces a number of "prior theories" or working hypotheses that are compared in later sections with the results of a survey of patent users.
- Section 3 describes our survey.
- Section 4 sets out the results of the survey by organisation type and location.
- Section 5 sets out the results by industrial classification.
- Section 6 analyses how the results of the survey compare with our prior theories and draws conclusions.

2 Literature Review and Conceptual Framework

2.1 Introduction

The aim of this section is to provide a review of the literature which would help us to gain an understanding of the potential economic impact of the introduction of the Unitary Patent ("UP" hereafter) and the Unified Patent Court ("UPC" hereafter).

We review the literature on patenting activity in order to gain insights into how patent users may react to the introduction of the UP/UPC. Decisions of whether and where to file, validate and renew a patent are dictated by economic considerations of the costs and benefits of doing so. Therefore, the review will cover studies in the areas of cost of patenting and value of patenting. Since the new regime will introduce a new centralised court for patent litigation procedures we will also cover the economic literature on patent litigation. The few studies that have explicitly attempted estimate the impact of the UP/UPC will also be part of the review.

We then set out a conceptual framework by identifying those areas that will be reshaped by the introduction of the new regime and provide a categorisation of the potential impact in each of these areas, distinguishing between benefits and costs.

Finally, based on the lessons learnt from the literature review we provide, for different typologies of patent users, a set of "prior theories" (i.e. hypotheses drawn from the literature and from broader economic reasoning) concerning the expected impact (benefit or cost) of the UP and the UPC.

The remainder of this is section is organised as follows:

- Cost of patenting — reviews studies related to cost of patenting and its impact on patenting behaviour.
- Patent litigation — reviews economic studies on patent litigation.
- Existing studies on the UP/UPC — reviews existing studies that have attempted to assess the impact of the UP/UPC.
- Patenting areas affected by the UP/UPC — identifies the patenting areas that are more likely to affect by the new regime.
- Classification of costs and benefits — identifies costs and benefits for different patenting areas.
- "Prior theories" — provides a set of working hypotheses concerning the expected impact (benefit or cost) of the UP and the UPC.

2.2 The cost of patenting

Under the current European patenting system, the costs of patenting can be categorised in six main groups:

- Procedural costs — these include all procedural fees up to the stage when the patent is granted. Typically they are composed of fees for filing, search, examination, country designation and grant fees. The procedural costs will depend on the application route chosen. A patent can be filed at the EPO either via the European route or via the Patent Cooperation Treaty (PCT) route (also referred to as the "international" route). Alternatively, patents in Europe can be filed via the national route. The procedural costs of this route depend on the fees set by each national patent office. Some procedural

costs are fixed per patent whilst others depend on patent characteristics such as the number of pages or number of claims.

- Translation costs — validation at national patent offices might require a translation of the full patent or its claims. Due to the technical nature of the text of many patents, specialised translators are needed. The translation cost typically depends on the size of the patent, measured by the number of pages. The larger the number of countries where protection is sought, the higher the translation costs.
- Publication/Printing fees — as mentioned above, many states still require the filing of a translation in the local language in order to validate the European patent.[8] The translation requirements depend on whether the state concerned participates in the London Agreement and on whether this state has a language in common with an official language of the EPO (English, French and German). States participating in the London Agreement which have a language in common with the EPO refrain from additional translations. States participating in the London Agreement which do not have an official language in common with the EPO usually request a translation of the claims into the local language if the patent was granted in English. The states which do not participate in the London Agreement request a full translation of the patent in their local language. The national patent offices regularly charge a publication or "printing" fee for this.
- Renewal fees — these fees need to be paid at national patent offices on a yearly basis in order to maintain the patents' validity in that country. Renewal fees are generally increasing over time. The level of these fees is set by national patent offices and can vary significantly across countries in terms of both absolute value and rate of progression.
- External expenses — the procedures required to file, validate and renew patents can be demanding, especially for companies that do not have their own intellectual property department. These firms typically rely on the services provided by specialised companies and patent attorneys. In addition, local patent agents are often needed to interact with national patent offices in countries where the company has no physical presence. The category of external expenses includes the fees paid to intermediaries that ensure that patents are correctly filed and validated.
- Litigation costs — patent holders or alleged infringers face the risk of being subject to multiple litigation in different jurisdictions. At present, patent holders who want to enforce their patents against alleged infringers must typically file their actions before different courts. Similarly, alleged infringers or competitors who want to revoke a European patent taking effect in several states must file their actions country by country. Each of these proceedings entails costs such as legal counsel and court fees (potential damages are excluded from this cost category).

The implementation of the UP and the UPC would affect some but not all of these cost categories. First, procedural costs would remain largely unchanged, as all the existing filing routes (national, European or international) will still be available. Second, validation of the UP will be simplified, since it will not have to be performed at NPOs. Third, for the registration of the UP no translation is required. However, during a transitional period which may last up to 12 years:

- a translation into another EU language must be provided if the patent was granted in English; or
- a translation into English must be provided if the patent was granted in French or German.

Fourth, the renewal fees for the UP will be due at the EPO instead of NPOs, which will simplify patent maintenance. It is currently not known what the renewal fee for the UP will be, but it is expected that they would be significantly lower than the existing fees in all Member States combined. Fifth, it is expected that the simplification of validation and renewal requirements will reduce external expenses. Finally, the implementation of the UPC would reduce the costs of infringement and revocation suits in multiple jurisdictions but would leave the opposition procedures largely unchanged.

[8] Please note that publication and printing fees are jointly referred to as 'validation fees' later in this report.

2.2.1 Cost of patenting at the EPO

Estimates of the costs of patenting at the EPO are based on a study conducted by Roland Berger in 2005. An update of that study is currently being carried out for the EPO.

Litigation costs

There is very limited literature assessing the cost of patent litigation, in part because there is litigation over only a small minority of patents. Moreover, most of these cases are settled confidentially before a ruling is obtained.

Harhoff (2009) adapts earlier findings on the cost of litigation to produce the estimates presented in Table 2.1. These estimates are for the costs per party; including court fees, fees for hearing witnesses and attorney costs. In computing further estimates, Harhoff (2009) assumes that 50 per cent of cases are "large" and 50 per cent are "small to medium". In addition, the paper assumes that appeals occur in between 25 and 30 per cent of cases.

Table 2.1: Estimated litigation costs

		First Instance Proceedings		Second Instance Proceedings	
Country	Litigation Cases (EP)	"Small-Medium Case"	"Large Case"	"Small-Medium Case"	"Large Case"
DE	420	50,000	250,000	150,000	190,000
FR	210	50,000	200,000	40,000	150,000
UK	105	150,000	1,500,000	150,000	1,000,000
NL	56	60,000	200,000	40,000	150,000
Total	**791**	**63,982**	**399,115**	**113,009**	**284,071**

Source: Harhoff (2009), adapted from WPL (2003) and EPO (2006).

Table 2.1 shows that the estimates of the cost of litigation vary by country. It should be noted that the cost in the UK is considerably higher than in other countries. This fact has been recognised in the literature.[9]

2.3 The impact of patenting cost on patenting behaviour

The literature on the impact of the cost on patenting behaviour can be distinguished in the following broad categories:

- the impact of total and specific costs on the propensity to file patents;
- the impact of renewal fees on patent lifetime, typically showing that higher fees induce shorter-lived patents; and
- the impact of post-grant costs (such as validation and translation costs) on the choice of countries where patents are to be validated.

2.3.1 Impact of total patenting costs on filing

An early answer to this question was provided by Eaton et al (2003), who found that the change in the fee structure of the EPO between 1990 and 2000 had a profound effect on the distribution of patent applications across countries. In this period, the cost of filing and designation decreased by approximately 33 and 50 per cent, respectively. Eaton et al (2003) estimated that nearly 40 per cent of the 70 per cent

[9] See for example Helmers and McDonagh (2012).

increase in European patenting between 1990 and 2000 can be attributed to changes in the fee structure employed by the EPO.

Danguy and Van Pottelsberghe (2010) estimate that, if the cost per claim per capita decreases by 45 per cent, it would induce a 14 per cent increase in the demand for patents at the European Patent Office, all else being equal.

De Rassenfosse and van Pottlesberghe (2008) test whether the patent fees charged by the major patenting offices (e.g. the EPO, the USPTO and the JPO), have contributed to the surge in patenting activity over the past two decades. Using data on entry fees and fees up to grant between 1987 and 2007, they find that of the three major patent offices the EPO has reduced its patent fees the most since the mid-1990s (both in absolute and in relative terms, i.e. per capita). This applies to both entry fees (which in their methodology includes all fees paid in the first 18 months after the filing date and which therefore tends to include both filing and search fees) and those up to grant. They find that the price elasticity of demand for patents is approximately -0.4 (ranging between -0.13 and -0.58), which is similar to the elasticities reported in the de Rassenfosse and van Pottlesberghe (2007) study on national patent offices. They conclude that the reduction in the EPO's fees contributed to the increase in patent volumes.

2.3.2 Specific patenting costs

A survey of the elasticity of demand for different costs groups identified in the literature is provided by de Rassenfosse and van Pottelsberghe (2010). The results are summarised in Table 2.2.

Table 2.2: Survey of estimate for impact of specific patenting costs

Type of cost	Literature	Elasticity estimate
Pre-grant and application fees	Archontopoulos et al. (2007)	Elasticity of -0.20
	De Rassenfosse and van Pottelsberghe (2007, 2009)	Elasticity of -0.50
Validation fees	Harhoff et al. (2009a)	Elasticity of -0.30
	Harhoff et al. (2009b)	An increase in validation fees of 1 per cent leads to a decrease in the validation probability of 5.3 per cent, whereas a 1 per cent increase in early renewal fees leads to a decrease in the validation probability of 13.7 per cent.
Translation fees	Harhoff et al. (2009b)	National patent validations may increase by as much as 29 per cent for the countries that put the London Agreement into force.
Renewal Fees	Danguy and van Pottelsberghe (2009), De Rassenfosse and van Pottelsberghe (2010)	The elasticity of the maintenance rate with respect to renewal fees is -0.03 at year 6, -0.08 at year 10, -0.25 at year 15 and -0.80 at year 20.

Source: de Rassenfosse and van Pottelsberghe (2010).

De Rassenfosse and Van Pottlesberghe (2007) assess the impact of application filing fees set by Member States of the EPC on the number of patent filings. Using data on priority filings in NPOs in 2003, they found that the impact of national filing fees (which they summed for each Member State in the sample, all fees to the patent grant) on patent applications was statistically significant for all countries in the sample. More specifically, they found that the price elasticity, on average, was approximately -0.5 (ranging between -0.45 and -0.56): a 10 per cent increase in filing fees will lead to a five per cent reduction in patent applications. They also found that the strength of the patent system (proxied by an index of protection) was also statistically significant and positive: stronger degrees of patent protection lead to more patent filings. According to this study, the size of the country is relevant: protecting a market in a smaller country

is more expensive in terms of fee per capita than protecting a market in larger countries. Taken together, the authors argue that the differences in fees across national patent offices and the negative patent fee elasticity results in the suboptimal treatment of inventors which, as a result, has a significant impact on their filing behaviour.

A report by BASF (Popp, 2013) notes that the expected participation rate in the UP is sensitive to renewal fees. It estimates that a UP renewal fee set at the sum of the existing fees for validation in three, four or seven Member States would result in an expected participation of 50, 25 and 11 per cent, respectively. Similarly, Danguy and van Pottelsberghe (2009) estimate that the lower cost for the business sector from the UP would result in an increase of about 18 per cent in the demand for patent protection.

In contrast, in a study of the determinants of the proportion of inventions patented by French manufacturing firms, Duguet and Kabla (1998) report that there is limited correlation between the actual or perceived cost of patenting and the observed size of a firm's patent portfolio. They find that neither patenting costs nor the costs of legal action have a significant effect on the propensity to patent. Similarly, Peeters and van Pottelsberghe (2006) find that there is no significant correlation between the perception of the cost of patenting and the observed size of a firm's patent portfolio.

2.3.3 Renewal fees and patent lifetime

There is a large amount of theoretical literature that investigates how the structure of renewal fees can address the problem of asymmetric information regarding the value of the patent. Examples of this literature include Pakes (1986), Scotchmer (1999), Cornelli and Schankerman (1999), Gans et al. (2004) and Baudry and Dumont (2006).

However, there are relatively few empirical studies on the impact of renewal fees on patent lifetime. This question has been addressed by a report published by the EPO in 2010 which suggests that renewal fees play an important role in shaping patent life. Specifically, an econometric analysis on renewal data at the selected NPOs finds that:

- the overall effect of an increase in the absolute level of renewal fee is that of decreasing patent life;
- short-lived patents appear to be more sensitive to renewal fee levels than long-lived patents; and
- more progressive renewal fee structures have a negative effect on patent life.

2.3.4 Impact of costs on validation behaviour

In addition to an increase in patents filings, the literature estimates how lower costs may increase the number of countries in which patent holders will seek protection. Harhoff et al (2009a) explicitly model and quantify the impact of office fees and translation costs on firms' decisions to validate a patent in a particular country once it has been granted by the EPO. Their result suggests that both translation costs and fees for validation and renewals have a strong influence on the behaviour of applicants. National validations of patents granted by the EPO are estimated to increase between 29 per cent and 59.3 per cent due to less stringent translation requirements such as those from the London Agreement.

Similarly, Harhoff et al (2009b) assess to what extent validation, renewal and translation costs affect the validation behaviour of applicants to the EPO. In contrast to Harhoff et al (2009a), their study is based on a gravity model that aims at explaining patent flows between inventor and target countries within the European patent system. They find that validation, renewal and translation costs have a substantial negative impact on the patenting behaviour of applicants.

2.4 Economic studies on patent litigation

This section reviews the economic literature on patent litigation practices with a particular focus on litigation activity that takes place within EPC countries. We do not cover literature from the legal field in this report.

Hall and Harhoff (2012) point out that patent litigation, both in the form of opposition and infringement suits, is a relatively rare event in most jurisdictions. However, when it occurs, it tends to involve the patents that have the greatest private value. The rate of patent litigation in the U.S. in recent years has been approximately one to two per cent of patents. They note that the infringement filing rate for EPO-granted patents in Germany has been estimated to be 0.9 per cent and is thus slightly lower than that in the U.S., even though litigation is considerably less costly in Germany. Several studies on US patent litigation show that only about five per cent of suits go to trial, with the remainder being settled before going to trial.

A recent study (Cremers et al, 2013) compared patent litigation cases across four European jurisdictions – Germany, France, the Netherlands and the UK – between 2000 and 2008. The authors found that case loads differed significantly across countries, as did outcomes, the share of cases that is appealed and the characteristics of litigants and litigated patents. They also found that while a considerable number of patents are litigated in multiple jurisdictions, the majority are subject to litigation only in one of the four jurisdictions included in the study.

2.4.1 Opposition

Harhoff and Reitzig (2004) note that opposition at the EPO is the most important mechanism through which the validity of a European patent can be challenged. They analyse the determinants of opposition to biotechnology and pharmaceutical patents granted by the European Patent Office (EPO) between 1978 and 1996. The paper finds that likelihood of opposition increases with patent value and that opposition is particularly frequent in areas with strong patenting activity and with high technical or market uncertainty.

Harhoff et al (2002) analyse data obtained in a 1996 survey of German patent holders. They find that patents which are upheld in opposition and annulment procedures and patents representing large international patent families are particularly valuable. They argue that these findings would apply similarly to the EPO and other national patent offices in European countries, as the opposition procedures are similar to the German patent system.

2.4.2 Litigation by sector

Levels of litigation vary substantially across industrial sectors. Cremers et al (2013) noted significant differences between the four European countries included in their study with respect to the industrial distribution of litigants. While all countries exhibited a distribution of litigants across industries, they found that pharmaceutical companies are overrepresented as litigants in the UK, while in Germany there are a disproportionately large number of litigants in the machinery industry. In the Netherlands, a relatively large proportion of litigants belong to the finance and insurance sector. In France, however, the authors found that litigation does not appear to be concentrated in any specific industry. In general, Cremers et al (2013) found that the sector distribution of litigants matches the distribution of litigated patents across broad technology areas and hence these results appear to indicate that the *propensity* to litigate is reasonably constant across industries in the four countries studies.

Other research, however, has found significant differences in the propensity to litigate across industries. For example, Table 2.3 presents the results of Bessen and Maurer (2005), which break down the propensity to litigate in different industries for data from the United States between 1984 and 1999. The results

suggest that instruments and chemicals/pharmaceuticals companies are more likely to litigate than are those that are active in other sectors.

Table 2.3: Litigation Hazards for firms with Patent Portfolios and Positive R&D

	As Patentee Litigant		As Alleged Infringer	
	Expected Suits per year	Suits per 1000 patents	Expected Suits per year	Suits per $billion R&D
All Firms	0.223	11.8	0.185	2.5
1987	0.198	10.5	0.116	1.7
1999	0.271	11.7	0.256	2.9
Small firms (employment<500)	0.079	42.5	0.064	12.3
Large firms (employment>=500)	0.304	10.7	0.254	2.2
New firms	0.114	30.3	0.095	5.9
BY INDUSTRY				
Chemicals/ pharmaceuticals	0.334	14.4	0.229	2.1
Machinery/computers	0.217	13.0	0.170	2.3
Electronics	0.202	8.8	0.194	3.6
SIC 3674	0.216	7.8	0.225	3.2
Instruments	0.216	17.6	0.191	6.4
Other manufacturing	0.230	10.3	0.188	1.8
Business svcs/software	0.108	8.4	0.103	1.3
Retail/wholesale	0.021	5.9	0.111	10.9
Other non-manufacturing	0.141	8.0	0.152	2.1

Source: Europe Economics, adapted from Bessen and Maurer (2005).
Note: 20,522 observations from 1984-99 for firms with positive patent portfolio size and positive R&D. R&D figures are deflated by the GDP deflator. Raw hazard rates have been adjusted for underreporting (divided by .64).

Similarly, a report by PWC analyses data for the US in 2012. They find that the median damages awarded in the telecommunications industry were significantly higher than that of other industries. Biotechnology, pharmaceuticals, medical devices, and computer hardware/electronics also had higher relative median damages awards than did other industries. The table below summarises some key litigation statistics for these sectors, where each entry of the table shows the ranking of the sector with respect to the criterion noted at the top of each column (a ranking of 1 shows that the sector has the highest value of all sectors considered):

Table 2.4: Litigation statistics by sector in the US, 2012

Sector	# of decisions (07-12)	Volume of damages	Success rates
Computer Hardware/electronics	3rd	4th	4th
Medical devices	5th	2nd - 3rd	1st
Telecom	low	1st	low
Consumer products	1st	low	3rd

Source: Europe Economics, adapted from PWC.

2.5 Impact of the UP/UPC

A few recent studies have attempted to assess the likely impacts of the UP and UPC. The impacts identified by these studies can be divided in the following categories:

- Impacts related to a reduction in costs.
- Wider economic impacts.

- Behavioural impacts.
- Revenue impacts to the EPO, NPOs and patent professionals.
- Potential unintended consequences.

Costs savings

Given the fragmented nature of the current European patent system, most studies contend that the introduction of the UP/UPC would lead to benefits in the form of reduced patenting costs and savings from the avoidance of duplication in litigation procedures.

For example, the European Commission's Impact Assessment of the introduction of a unitary patent finds that the translation costs under the UP would amount to approximately €680 per patent, and would replace all other translation and validation costs (excluding attorney fees). Namely, instead of more than €32,000 in validation costs for the coverage of the whole EU or €4,700 for the five largest Member States, the costs for the UP would be reduced to €680 (i.e. two per cent of the current validation cost for the EU-27).

It should be stressed however, that these figures are based on the assumption that European patents are validated in all EPC Member States. Depending on the level of the renewal fee set for the UP, cost savings associated with validation fees that may occur under the UP regime may be significantly lower than those estimated by the European Commission.

Harhoff (2009) finds that between 146 and 311 infringement cases are duplicated annually in the EU Member States. The author then estimates that the total private savings from having access to the UPC would be between €148m and €289m. An upper-bound estimate of the operating costs of the proposed Unified Patent Court, with a capacity of 940 cases, indicates that the Court would have operating costs of €27.5m. Hence, the cost-benefit assessment focusing on avoided duplication leads to a highly positive evaluation of the proposal. Harhoff (2009) further argues that the availability of a low-cost litigation path offered by a UPC is likely to lead to additional activity from parties in countries which currently do not use the European patent system extensively. He also argues that would be beneficial if the unified patent litigation system puts emphasis on fast and low-cost proceedings as particularly strong positive welfare contributions can be expected if an effective and rapid, low-cost revocation procedure is available.

Similar cost savings figures have been provided by Danguy and van Pottelsberghe (2009). The authors estimate that the UP would result in total financial surpluses of €250 million for the business sector thanks to a reduction in procedural costs (e.g. fees, translation, cost of legal representation, etc.) and avoidance of parallel litigation.

Wider benefits of the UP/UPC

Other impacts are wider in nature and relate to a more efficient market for technological transfers and increased incentives for competition and innovation.

Straathof and van Veldhuizen (2010) claim that the UP would make it easier for firms to relocate their activities or to sell their patent portfolio to foreign firms. In addition, they claim that it would bring the following benefits:

- Firms in smaller Member States currently run only a small risk of infringing a patent as long as they do not operate in large countries. This promotes a climate of imitation rather than innovation. Adoption of the UP would penalise strategies based on imitation and will induce firms in small countries to be more innovative.
- The use of the UP would prevent strategic validation intended to avoid legal action by competitors. Under the current segmented system firms might choose not to validate a patent in Member States where a competitor is active, because by doing so the firm reduces the probability that the competitor will oppose the patent. Incentives for minimising the probability of opposition are significant; if a Patent

Office decides to revoke a patent, then it is likely that that patent will be declared invalid in all countries. The result is a tacit agreement to carve up the Single Market geographically. By making such strategic behaviour impossible, the UP will make it harder for firms to geographically segment the Single Market.

The European Commission (2011) argues that the UP would have a positive impact on:

- innovation - since knowledge from published patents would be more easily accessible;
- competitiveness - since the European Union would become a more attractive place to create and innovate; and
- employment - since cheaper patents would facilitate the creation of SMEs, which have a major role in job creation.

Behavioural changes in patenting

Given the alleged reduction in cost of patenting, the introduction of the UP is expected to lead to a surge in patent filings. For example, Danguy and van Pottelsberghe (2009) argue that the lower cost for the business sector would result in an increase of about 18 per cent in the demand for patent protection.

However, the report by BASF (Popp, 2013) notes that the expected participation rate in the UP is sensitive to renewal fees. It estimates that a UP renewal fee set at the sum of the existing fees for validation in three, four or seven Member States would result in an expected participation of 50, 25 and 11 per cent, respectively.

Financial and operational consequences

The introduction of the UP/UPC would have also direct consequences on the financing aspects of the EPO and the profits of patent-specialised professionals.

Van Pottelsberghe and Danguy (2010) claim that the reduced costs of patenting associated with the introduction of the UP would lead to an increase in patenting in the EU and thus to an increase in renewal fee revenues for the EPO. The authors estimate that as a consequence of the UP, the EPO may receive an income 130 per cent higher than the current total income. In contrast, due to a sharp decrease in parallel litigations and a more streamlined patent system, total losses to patent attorneys and patent translators could be in the region of €270 million and at least €121 million for patent lawyers.

Precedents to the UPC

Implementation of the UPC is expected to reduce the costs of protecting intellectual property and to apply uniform legal protection across member states. Some studies in the literature have examined similar reform which took place in the US with the formation of the Court of Appeals for the Federal Circuit (CAFC) in 1982. This court has jurisdiction on every appeal related to patents and replaced a former fragmented system. This literature attempts to draw parallels between the experience at the CAFC and the UPC. Galasso and Schankerman (2010) explore this research avenue and report two empirical findings. First, patent disputes in U.S. district courts were settled more quickly when infringers require access to fragmented external rights, but this effect was much weaker after the introduction of the CAFC. Second, the introduction of the CAFC was associated with a direct and large reduction on the duration of disputes, which the model attributes to less uncertainty about the outcome if the dispute goes to trial. They suggest that a centralized court is likely to facilitate transactions in the European market for innovation.

2.6 Patenting areas potentially affected by the UP/UPC

The term patenting activity refers to a wide range of activities, starting from investment in R&D activities and up until the elapse or statutory expiration of patents that cover the innovative products. Whilst the UP/UPC will have a direct impact on some stages of the patenting activity, its impact on other stages is likely to be absent or at most indirect. The strongest direct impacts will play a role at the

validation/registration, renewal, and litigation phases, as all of these phases will be significantly reshaped by the introduction of the UP/UPC. However an indirect impact may be present within the following phases:

- Application phase — some patent users may be attracted by the streamlined and simplified nature of a patent with unitary effect in Europe and as a consequence of this, may decide to file some patent applications that would have not be filed under the current system. Therefore, the introduction of the UP/UPC may be associated with an increase in the number of applications from some patent users.
- Opposition phase — the centralised litigation procedure provided by the UPC may render the current EPO opposition procedure less attractive and some patent users may prefer to litigate directly at the UPC. Therefore, the introduction of the UPC may decrease the instances of opposition before the EPO.

Notwithstanding the potential presence of such indirect effects, we note that they are necessarily more speculative in nature and, for the purpose of the current study, more difficult to quantify.

2.7 Categorisation of potential benefits and costs

We provide below a categorisation of potential benefits and potential costs for each of the phases identified above in which the UP and/or UPC might have a direct impact.

2.7.1 Validation/registration phase

- Potential benefits:
  - Reduction in translation costs.
  - No publication/printing fees payable at National Patent Offices (NPOs).
  - Decrease in legal fees for the validation activity and/or patent transfer activity, since patent holders will no longer need to register patent transfers in each MS (this applies to users who validate patents and/or register patent transfers via patent attorneys).
  - Decrease in administrative burden associated with validation activity and/or patent transfer activity (this applies to users who validate patents and/or register patent transfers directly at NPOs).
  - Easier access to finance and licensing-out opportunities/agreements because broader geographical coverage of the UP may make licensing more attractive.
- Potential costs — Given that the centralised validation procedure associated with the UP constitutes a significant simplification relative to the current validation procedure, we do not expect any direct cost to arise in this area.

2.7.2 Renewal phase

- Potential benefits:
  - Reduction in translation costs for communication with NPOs in the renewal phase.
  - Decrease in fees for renewal activity (for patent users who renew patents via patent-attorneys).
  - Decrease in administrative burden for the renewal activity (for patent users who pay renewal fees directly at NPOs).
  - Reduction in overall renewal fees. Such benefits would be greater for users who validate patents in a large number of countries. The realisation of this benefit relies on the assumption that the new centralised renewal fee schedule is not excessively high.
- Potential costs:

- Lack of renewal flexibility (i.e. it is impossible to let a patent lapse in some jurisdictions whilst maintaining it alive in others).
- Overall increase in renewal fees. Such a cost increase would affect primarily users who validate patents in a small number of countries, but would become material only after the transitional period. Users who validate patents in a small number of countries could still choose to use the traditional route. Similarly, by revealed preferences, users choosing the unitary patent would be better off than choosing a classical European patent because the higher renewal fees would then be more than compensated by higher marginal revenues associated, e.g., with the improved business opportunities offered by the unitary patent.

2.7.3 Infringement litigation phase

- Potential benefits:
  - Overall increased legal certainty due to a one stop shop litigation which replaces multiple litigations in different jurisdictions.
  - Decisions would be quicker, fairer and of higher quality because of the high qualification, reputation and international composition of the panel of judges.
  - Increased legal certainty due to avoidance of contradictory judgments in different jurisdictions relating to the same European patent.
  - Lower attorney fees due to the centralised nature of the litigation procedure (only one advocate is needed).
  - Lower legal fees due to introduced competition between European patent attorneys and patent lawyers.
- Potential costs:
  - Higher legal fees associated with centralised litigation (legal representatives acting before the UPC would be more expensive — e.g. due to higher qualifications — than those acting before National Courts). However, as noted above, this potential cost could be counterbalanced by the increased competition between attorneys and patent lawyers.
  - Complexity of the language system.
  - Single action invalidation. This cost may be significant for the patent holder in case of a direct revocation action or a counterclaim for revocation in a patent infringement case.

2.7.4 Potential costs and benefits associated with specific aspects/provisions of the UP/UPC

There is another set of potential costs and benefits that need to be distinguished from those listed above. These include costs and benefits that are not directly related to the functioning of the UP/UPC, but rather stem from the inexperience of patent users with the new unitary system and from temporary provisions that will be made available in the early years after its introduction. Such costs/benefits include, for example:

- Potential benefits:
  - Flexibility of the transitional period — for the transitional period, patent users will be given the possibility of opting out of UPC jurisdiction with the option of opting in again at any time in the future and at no additional cost. This would give patent users the option of obtaining information regarding the intrinsic value of a patent in its early life and then to decide whether to opt for unitary protection later on.
  - Discounts — under the UP, reduced fees could be provided for organisations such as SMEs, universities and individual inventors.

- Potential costs:
  - Limited geographical coverage — a number of countries (e.g. Spain and Italy) are currently not participating in the Unitary Patent System. Therefore, the UP/UPC would deliver limited additional benefits to users who need protection primarily in these markets.
  - Inexperience with and complexity of the system — because the new Unitary system and the classic system will coexist in parallel, some users may perceive an increased overall complexity due to the additional strategic decisions (e.g. whether to opt for the classic protection or the unitary protection) that need to be made.

2.8 "Prior theories"

We provide here a set of "prior theories" (i.e. working hypotheses) that will in later sections be compared with the results of our survey. These prior theories/ hypotheses are based on the lessons learned from the literature reviewed and have been constructed by mapping stylised profiles of patenting behaviour to companies' characteristics (e.g. size, type of organisation and technological sectors) and by inferring what the cost and benefits might be for each of the profiles. Prior theories are developed for SMEs, pharmaceutical companies, biotechnology companies and electronics companies.[10]

We do not produce theories relating to a comprehensive set of organisations based on characteristics such as patenting behaviour, average turnover, proportion of SMEs and so on. Rather, the rationale for choosing the types of organisations we do consider is that they may be particularly affected by the introduction of the UP and UPC and so can provide interesting and relevant case studies of the potential impacts of the UP and UPC.

For example, pharmaceutical and electronics companies are highly active in patent litigation (see Table 2.3) and hence may be particularly affected by the introduction of the UPC. SMEs and biotechnology firms are frequently involved in licensing agreements and so may benefit significantly from the UP if its broader geographical scope makes such agreements more attractive to potential licensees. Furthermore, SMEs make comparatively little use of litigation (especially at the European level) and more limited use of the patent system than do companies involved in the selected fields of technology.

[10] For the purpose of this analysis we define 'electronics' companies to be those that are active in the following fields of technology: audio-visual technology, telecommunications, digital communications, computer technology and semi-conductors.

Table 2.5: Stylised typologies of patent users

	User's Characteristics	SME/University	Pharmaceutical	Electronics	Biotechnology
Patenting activity	**Commercialisation of innovative products protected by patent rights**	Limited to the domestic market	Across most European countries	Across few member states	Limited but the scope could potentially be wider
	Importance of patent licensing activity	Key to monetise innovation, e.g. by transferring patent rights to larger firms operating in European markets the SME has no access to	Key in the context of litigation	Essential given the importance of standards	Licensing is important but it is currently challenging to find potential partners
	Ease of access to external funds	Sometimes problematic	Not an issue	Not an issue	Could be improved if the market of technology transfers was more effective
	Ease of identification of potential licensees	Problematic because it is time consuming and difficult to find parties potentially interested	Easy because licensing often happens in the context of litigation	Easy because of the presence of blocking patents among competing firms.	Significantly challenging
	Number of countries where patents are validated	Few	Most European countries	Only the largest member states	Limited but the scope could potentially be wider
Validation and renewal activity	**Use and access to network of patent attorneys/specialised firms**	Access is costly. However, outsourcing patent validation and maintenance activity remains the only option given the lack of in-house resources.	Not an issue. Patent validation and maintenance activity are often outsourced to external patent attorneys and specialised firms for convenience.	Not an issue. Patent validation and maintenance activity are often outsourced to external patent attorneys and specialised firms for convenience.	Access is costly. However, outsourcing patent validation and maintenance activity is used given the large number of patent applications filed.
	Availability of in-house resources to manage patents (e.g. validation, renewal, etc.)	Limited/non–existent	Not an issue. Have in-house patent attorneys; however, patent validation and maintenance activity are often outsourced for convenience.	Not an issue. Have in-house patent attorneys; however, patent validation and maintenance activity are often outsourced for convenience.	Limited as most of the staff is dedicated primarily to R&D activity
	Impact of validation costs (e.g. validation fees, translations costs, legal fees) on the organisation's finances	Material given the small size of the organisation	Material given the size of the patent portfolio and the large number of countries where patents are validated	Moderate given most patents are validated only in the largest member states.	Significant given the large number of patent applications filed.
	Impact of renewal fees on the organisation's finances	Material, given the small size of the organisation, and especially for long-lived patents	Limited importance given that a large number of patents are maintained alive only for few years.	Material given that most patents are maintained alive for several years.	Material given the size of the patent portfolio
	Importance of renewal flexibility	Limited, given the small number of countries where the patents	Limited importance given that a large number of patents are	Moderate given most patents are validated only in the largest	High importance given that a large number of patents are

	User's Characteristics	SME/University	Pharmaceutical	Electronics	Biotechnology
		are validated	maintained alive only for few years.	member states.	maintained alive only in some countries for strategic purposes.
Litigation activity	**Experience with litigation activity**	Limited experience and only at the National Court of the domestic market	Litigation is an integral part of the business and is often conducted in multiple jurisdictions. Many patents in the portfolio have a strategic defensive purpose for litigation.	Litigation is an integral part of the business. Many patents are used as a way of improving the negotiating position against competitors, for example, in cross-licensing cooperation	Litigation is an integral part of the business. Many patents in the portfolio have a strategic blocking purpose to discourage competitors.

Table 2.6: Hypothetical cost/benefit for the two stylised typologies of patent users

	Potential Costs/ Benfits Of UP/UPC	Relevance For SME	Relevance For Pahramceutical	Relevance For Electronics	Relevance For Biotechnology
Validation and renewal phase of the UP	**Increased access to finance and licensing opportunities**	**Clear benefi**t: the broader geographical coverage of the UP may make licensing and/or financing opportunities more attractive.	**Limited relevance**: access to finance or licensing opportunities is currently not an issue	**Moderate relevance**: access to licensing opportunity is dictated by the presence of blocking patents among competing firms.	**Clear benefi**t: the broader geographical coverage of the UP may make financing and licensing opportunities more attractive.
	Reduction in translation costs, validation/publication fees payable at NPOs and legal fees for validation activity	**Clear benefit.** Patents are currently validated in few markets so, in absolute terms, the benefits are moderate, However, since these activities are outsourced to external attorneys/specialised firms this has a significant cost impact on the organisation	**Clear benefit.** Given the size of the patent portfolio and the large number of countries where patents are validated the benefits would be large in absolute terms.	**Moderate benefit.** Given the patents are validated only in the largest markets	**Clear benefit.** Given the size of the patent portfolio benefits would be material
	Decrease in administrative burdens for validation/renewal	**Clear benefi**t. The fragmentation of the current system and the limited in-house resources imply that renewal and validation activities are outsourced. However, the simplification of these procedures under the UP would make it possible to conduct most of these activities	**Moderate benefit.** Renewal and validation activities are often outsourced for convenience. However, with a decrease in the administrative burden involved, some of these activities may be conducted in-house in the future which would lead to some cost savings.	**Moderate benefit.** Renewal and validation activities are often outsourced for convenience. However, with a decrease in the administrative burden involved, some of these activities may be conducted in-house in the future which would lead to some cost savings.	**Clear benefi**t. The fragmentation of the current system and the fact that in-house staff is dedicated primarily to R&D activity imply that renewal and validation activities are outsourced. Therefore, a decrease in these outsourcing costs would be beneficial.

	Potential Costs/ Benfits Of UP/UPC	Relevance For SME	Relevance For Pahramceutical	Relevance For Electronics	Relevance For Biotechnology
		in-house with significant cost-savings.			
	Introduction of a centralised renewal fee	**Moderate/no benefit.** Currently patents are validated in few markets, so the benefits are moderate. Moreover, the new centralised renewal fees would need to be significantly lower than the sum of the fees currently paid in these markets for the UP to be attractive. However, if SMEs were eligible for discounts some benefits may arise and SMEs may decide to seek a wider geographical market protection compared to the current situation.	**Clear/moderate benefit**. Given the size of the patent portfolio and the large number of countries where patents are validated, benefits are material since it is likely that the centralised renewal fee schedule will be cheaper than the sum of renewal fees currently paid. However, the lack of renewal flexibility may limit the extent of such benefits	**No benefit**. Given patents are validated only in the largest markets but are maintained alive from several years it is likely that the new centralised renewal fee will be more expensive than the cost we currently incur.	**Clear benefit**. Since it is likely that the centralised renewal fee schedule will make EU-wide protection cheaper, we would benefit from wider protection as this increases the blocking-impact of our patent portfolio.
Litigation at the UPC	**Overall increased legal certainty due to uniform decisions applied in Europe**	**Clear benefit**: a more certain environment would improve financial planning	**Clear benefit**: a more certain environment would improve financial planning	**Clear benefit**: a more certain environment would improve financial planning	**Clear benefit**: a more certain environment would improve financial planning
	Decisions would be quicker, fairer and of higher quality because of the high qualification, reputation and international composition of the panel of judges.	**Clear benefit**. Even if the amount and geographical scope of litigation is currently limited an SME would benefit from quicker and better decisions.	**Clear benefits**. Anyone would benefit from quicker and better decisions.	**Clear benefits**. Anyone would benefit from quicker and better decisions.	**Clear benefits**. Anyone would benefit from quicker and better decisions.
	Lower legal fees due to the centralised nature of the litigation procedure (only one advocate is needed).	**Moderate benefit**. Given the amount and geographical scope of litigation is currently limited the benefits would not be material. However, the reduced costs of litigation at UPC may induce SMEs to do more litigation in the future.	**Clear benefit**. Given the high amount litigation activity the benefits would be material	**Moderate benefit**. Given litigation activity has a limited geographical scope benefits would be moderate	**Clear benefit**. Given the importance of litigation activity the benefits would be material
	Lower legal fees (due to introduced competition between European patent attorneys and patent	**Moderate benefit**. Given the amount and geographical scope of litigation is currently limited the benefits would not be	**Clear benefit**. Given the high amount litigation activity the benefits would be material	**Moderate benefit**. Given litigation activity has a limited geographical scope benefits would be moderate	**Clear benefit**. Given the importance of litigation activity the benefits would be material

Potential Costs/ Benfits Of UP/UPC	Relevance For SME	Relevance For Pahramceutical	Relevance For Electronics	Relevance For Biotechnology
lawyers)	material. However, the reduced costs of litigation at UPC may induce SMEs to do more litigation in the future.			
Complexity of the language system	**Clear cost.** We assume that the majority of SMEs' limited current litigation is at the domestic National Court and so there may be a language disadvantage in litigating before the UPC	**No cost**. Language barriers are not an issue	**No cost**. Language barriers are not an issue	**Unclear**. This would depend on the availability of in-house language skills.
Single action invalidation	**Unclear**. Given limited experience with litigation	**Unclear.** This would be a benefit if we are the patent holder in an infringement case, but a clear cost if we are the alleged infringer. It would be a clear cost for the patent holder in an invalidity case but a clear benefit for the applicant for revocation.	**Moderate cost.** The biggest threat in litigation activity is represented by infringements suits initiated by patent trolls. The threat of single action validation can therefore increase trolls' bargaining power. However such costs could be mitigated by the possibility of reacting with a single validity counter-claims (if the case is won this would prevent subsequent infringement suits in all countries where we operate). However, patent trolls are at risk of facing a central invalidity action which would result in their patents ceasing to apply in multiple countries.	**Benefit.** The possibility of single action invalidation increases the deterrence effects of holding patents for blocking purposes.

3 Survey Methodology

To understand in more depth how stakeholders are likely to react to the potential benefits and costs of the UP and UPC we have gathered information directly from stakeholders.

To that end, we designed a questionnaire to extract information from patent users that could be used in our assessment of the economic value of the Unitary Patent and Unified Patent Court. It was also designed to address their impact on the incentives and behaviour of individual and organisations that file and hold patents in the Member States which subscribe to the EPC. To enable the results to be disaggregated by different types of patent users the survey included numerous questions on the current patenting and litigation practices of the respondent's organisation and the characteristics of that organisation.

3.1 Questionnaire design

A number of the questions asked in the survey are likely to have required the respondent to refer to records, consult with colleagues or spend some time considering the response. It is more difficult to obtain accurate feedback on these topics in a one-to-one telephone interview where the respondent may feel they have to give instant and less than fully considered responses. An online approach enhanced the quality of responses by taking account of these factors in designing the questionnaire interface. Respondents had the opportunity to suspend completion and log on at a later time without losing previously entered data.

The online self-completion survey was also designed to help to address the problem of other self-completion methodologies, such as postal, where the effort of completing and posting can deter respondents. These are more likely to attract respondents who can be atypical of the survey population as they tend to be more positively or negatively motivated to respond. In addition, as some respondents may regard the topic to be commercially sensitive, this may discourage participation. With the online methodology, a number of steps were taken to minimise this kind of survey bias and enhance completion rates. The approach used in the survey was as follows:

- email invitations and letters were sent with a link to the survey questionnaire. In order to encourage participation the email and letters included the following:
  - emails contained a link to a statement of authority hosted on EPO's website. A letter of authority was enclosed with the letter invitation. The statement included a contact email address at EPO who could answer any queries about the research;
  - an email address for the UK's Market Research Society was provided so that they could provide further proof that Accent and Europe Economics are bona fide research providers;
  - information was given highlighting that the email link is secure;
  - a statement was included guaranteeing respondent confidentiality;
  - contacts at Accent and Europe Economics were given if the respondent had any queries;
  - when a respondent clicked on the link they saw a message making it clear that they were being transferred to a secure 'https' type website – this was to further enhance confidence in the confidentiality of the research;
  - clear instructions were given on how to proceed through the questionnaire using appropriate signposting; and
  - where the respondent requested it, a Word version of the questionnaire was sent for them to review the questions in advance and if necessary complete the survey as a Word document.

3.2 Sample selection and questionnaire dissemination

The EPO provided Accent with a simple random sample of companies that had filed at least one patent application at the EPO during 2012 (direct filings and Euro-PCT regional phase applications).[11] This strategy can result in the same company being selected more than once but any such duplicates (identified using the raw name of the applicant) were removed by the EPO prior to sending the sample to the consultants. Indeed, the EPO achieved a total of 5,020 unique companies based on a random sample of 10,000 applications.[12] Following further review by Accent, a number of perfect duplicates (i.e. users with identical addresses and names) were removed from the original sample of 5,020 contacts. This left 4,862 companies to which the questionnaire was distributed.

Email addresses were available for only 2.9 per cent of the sample supplied and there were named contacts for an additional 2.8 per cent. The remaining records contained unnamed contacts. In light of this data constraint and in common with previous research conducted by the EPO, the vast majority of survey dissemination was completed by letter. More specifically, the initial fieldwork consisted of a mixed email and postal survey where invitations were sent as follows

- 148 e-mails and three reminders per recipient;
- 136 postal invitations to named contacts and a single wave of 124 postal reminders to this same group; and
- 4,578 postal invitations to unnamed contacts and a single wave of 4,513 postal reminders to this same group.

Each letter and email contained a unique link to the questionnaire, which was hosted online on Accent's in-house platform.

The initial response rate was lower than anticipated and so Accent sought to boost the response rate by using telephone calls to identify email addresses for the relevant individuals in the companies contained in the sample. The strategy employed was as follows:

- Accent first conducted an online search for the telephone numbers of non-respondents;
- records where a telephone number could not be found were passed to EPO who conducted a search of their records;
- telephone numbers were called in local office hours to find the email addresses of suitable contacts;
- the EPO did a further search of records of contacts whose telephone numbers were found not to work or which were not answered; and
- with the information received from EPO, these numbers were redialled.

Using this strategy, telephone numbers were successfully identified for 4,018 of 4,761 non-respondents. All numbers were dialled on average of 3.9 times at different dates and times to increase chances of making contact. The telephone search yielded 1,594 additional email addresses. All were sent an email invitation and all contacts with email addresses were sent three reminders.

Between the commencement of fieldwork on 4 November 2013 and the time that the survey closed on 10 February 2014, the responses received were as follows:

Total responses	Of which complete	Of which incomplete
985	439	546

[11] Due to the sampling strategy, non-users of the EPO were not included in the sample and hence their views could not be analysed.

[12] We note that this sampling strategy means that the likelihood on inclusion in the random sample is increasing in the number of filings made at the EPO during 2012. We discuss this point in more detail below.

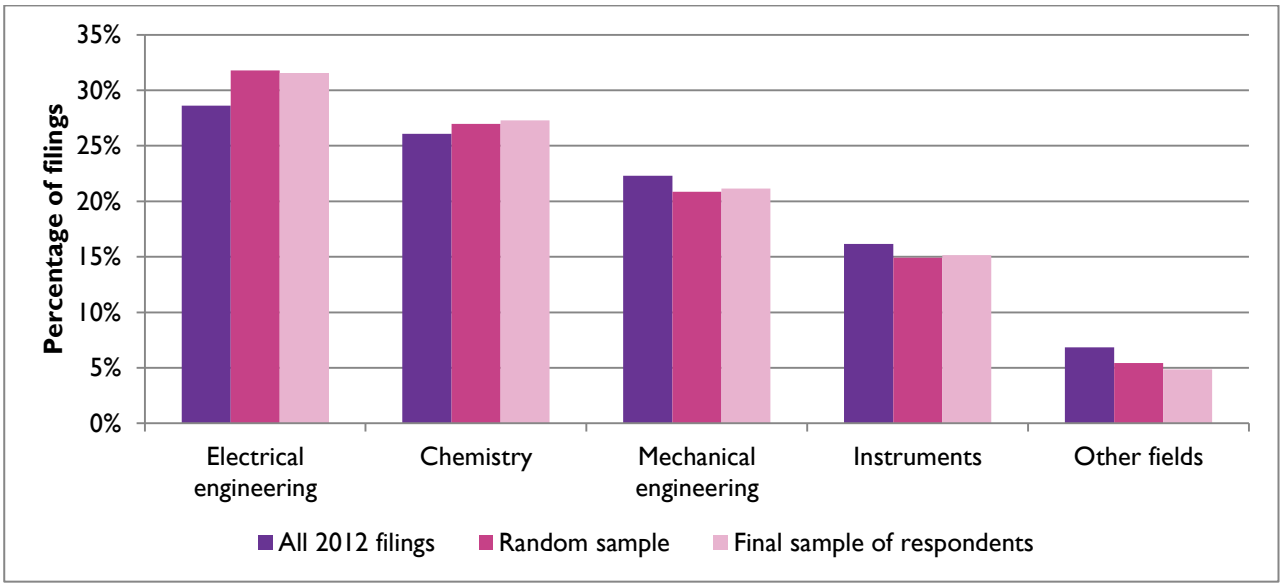
3.3 Characteristics of respondents

An important consideration in any survey is the extent to which the characteristics of respondents are representative of the population. To check the representativeness of respondents to the survey we have compared the three following samples;

- the total number of applications to the EPO during 2012 (EP direct applications and Euro-PCT regional phase applications) broken down by WIPO technological clusters;[13]
- a random sample of 5,020 unique patent applicants drawn from the set of applications made to the EPO in 2012 (Euro-direct excluding divisional and Euro-PCT regional phase), also broken down by WIPO technological clusters. This random sample was provided by the EPO and constitutes the reference sampling population for the survey; and
- the final sample of respondents (broken down by WIPO technological clusters) containing the 439 patent users that completed the survey.

The figure below shows the percentage of filings in each technological cluster for the three samples.

Figure 3.1: Representativeness of the complete survey responses



The figure above shows that the 'final sample' and 'respondents' figures are extremely similar, suggesting that those that responded to the survey are representative of those that were approached. The degree of similarity between the 'respondents' and 'all 2012 filings' figures is slightly lower: relative to all 2012 filings, there is a slight over-representation of respondents from the electrical engineering and chemistry clusters.

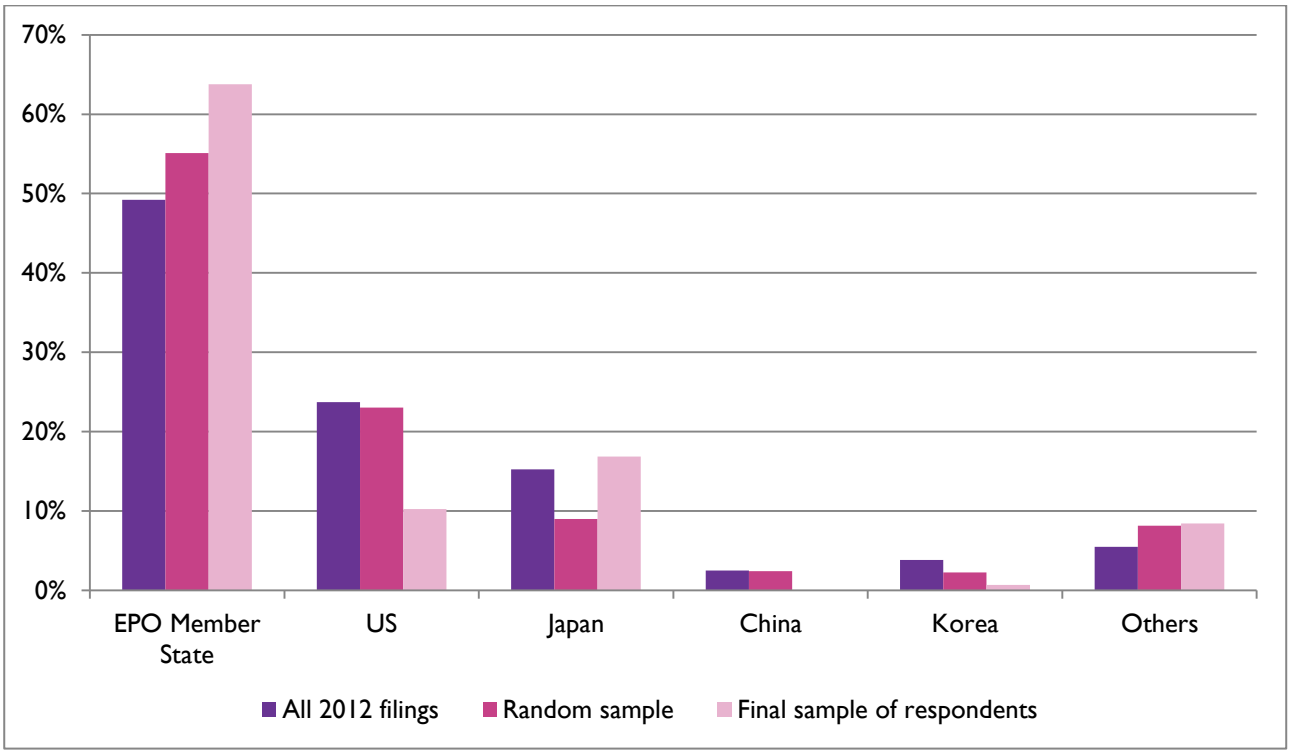
Unfortunately, it is not possible to complete this analysis for type of organisation (large firm, SME, university etc.) as such information is not recorded in the EPO's database. Therefore, we cannot identify the degree to which respondents to our survey are representative of the all applications to the EPO during 2012 in respect of organisational type.

The sample of respondents includes both those with headquarters in the EU and those with headquarters in the rest of the world. The figure below shows the location of headquarters for those that provided a

[13] The 35 WIPO technological fields, and the clusters to which they belong, are identified in the following document: http://www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/wipo_ipc_technology.pdf. The document also presents an initial concordance between technological field and the International Patent Classification system.

complete response to the survey relative to the characteristics of the random sample of 5,020 patent applicants and the population of all applications to the EPO during 2012.

Figure 3.2: Location of headquarters



The figure above shows that, relative to all 2012 applications, those with headquarters in an EPO Member State are over-represented in both the random sample and the final sample of respondents while the US is under-represented. The proportion of respondents with headquarters in Japan is approximately equal to the proportion of 2012 applications that originated in Japan. China and Korea are slightly under-represented in the final sample of respondents.

The results presented in later chapters of this report are based solely on complete responses to the survey. The core rationale for excluding the 546 incomplete responses are: that many of these incomplete responses answered only a very small number of questions; a desire to ensure the greatest possible comparability between questions; and to ensure that the sample on which the analysis is based is as representative as possible of the population of patent applicants. Because key questions were not completed we are unable to identify the characteristics of incomplete responses. By contrast, as shown in the figure above, the characteristics of those that completed the questionnaire are very similar to those of the sample received by Accent. In turn, these are very similar to the characteristics of all applicants to the EPO during 2012.

3.4 Weighting of results

We observe that this sampling strategy means that the likelihood of inclusion in the random sample is increasing in the number of filings made at the EPO during 2012. In essence, while the sample is random in respect of applications, it is not necessarily random in respect of applicants. Using a similar sampling approach applied to the EPO's annual future filing survey as a reference, this issue is accounted for by including Poisson weights in its filing-growth estimates, such that more weight is given to the self-reported

growth rates of respondents with relatively few filings than the absolute number of filings would imply. The relevant formulae are reported on the EPO's website.[14]

We have considered the value of including Poisson weights in reporting the findings of the unitary patent and unified patent court survey. After detailed consideration, we concluded that it would not be appropriate to include such weights. To be sure, using the data available to us we can calculate Poisson weights for each respondent using the same formula as is used in the future filings survey. However, most of the key questions in our survey require respondents to specify their views on a scale of one to five (ordinal responses). The formula specified for calculating a weighted average using Poisson weights is not valid in such cases. In particular, it does not make sense to divide an ordinal response by the number of filings during 2012 and then take a logarithm of the resulting ratio, whereas taking a logarithm of a growth index (as is the case for the future filings survey) makes perfect sense.

Given the decision not to use Poisson weights, we have taken two different approaches to ensure that our reporting is not unreasonably biased against those that file relatively few patents:

- When reporting results by type of firm and location of headquarters we have broken responses down by type of organisation (large company, SME, public research organisation/university and individual/other). This ensures that the responses of those that typically file relatively few patents (e.g. universities and public research organisations) are given sufficient prominence.
- When reporting results by technological cluster we calculate weighted averages where the weights are designed to reflect the extent to which a firm's response applies to each technological cluster. Under this weighting scheme the response of a company that has applied for 100 per cent of its patents in, say, the chemistry cluster would be given greater weight in the calculation of the average for the chemistry cluster than would the response of a company that has filed only five per cent of its patent applications in that cluster.

  Specifically, the weights are calculated as follows. For each respondent, the EPO provided information on the distribution of technological fields (35 in total) in which the applicants had filed in 2012. We first aggregated these shares into five broader technological clusters (electrical engineering, instruments, chemistry, mechanical engineering and other fields), and obtained the percentage share weights for each applicant, $w\_(i,t)$, where i is the applicant and t is the technological cluster. For each applicant, the sum of the weights across clusters equals one:

  $$\sum_t w_{i,t} = 1$$

  We then calculated individual weights for each technological cluster by dividing the individual first stage output by the sum of the first-stage outputs within that technological cluster. These weights ensure that the responses of each respondent are weighted in proportion to its share of patent fillings in that cluster. So, the weights used are:

  $$w_{i,t} = \frac{w_{i,t}}{\sum_i w_{i,t}}, \text{ and thus } \sum_i w_{i,t} = 1$$

3.5 Presentation of results

The following two chapters of this report are devoted to presenting the survey findings and drawing implications of these findings for the Unitary Patent and Unified Patent Court. One chapter identifies the extent to which opinions concerning the Unitary Patent and Unified Patent Court differ by type of organisation and the location of the respondent's headquarters, while the second chapter considers differences in responses between technological clusters.

[14] See http://www.epo.org/service-support/contact-us/surveys/patent-filings/methodology.html).

When reading the tables and charts presented in the following chapters it is important to bear in mind both the structure of the questionnaire and the analytical approach taken to summarise the results.

With respect to the structure of the questionnaire, respondents had the option to select 'unsure' or 'prefer not to answer' for each specific element of each question. Therefore, it is typically the case that the number of responses achieved differs between different parts of a single question.

With respect to the analytical strategy, the results presented are averages across all those that responded to the question (excluding 'unsure' and 'prefer not to answer' responses) within the relevant sub-sample of respondents (e.g. an average across all SMEs). As noted above, simple averages are calculated where results are broken down by type of organisation and location of headquarters, while weighted averages are calculated where results are broken down by technological cluster.

It should also be noted that questions on the Unified Patent Court were answered only by those that had experience of the relevant type of litigation, whereas questions on the Unitary Patent were open to all respondents. Therefore, the total number of respondents for each of the latter group of questions is greater than that for the former group.

4 Survey Results by Organisation Type and Location of Headquarters

In this chapter we present the key results of interest for a study of the economic impact of the Unitary Patent and Unified Patent Court by type of organisation and location of headquarters. Additional survey results and the questionnaire on which the results are based are available in the Appendices.

The characteristics of respondents by type of organisation and location of headquarters are presented below.

Table 4.1: Responses by type of organisation

	Number	Percentage
Large company	262	60%
University	26	6%
Individual	12	3%
SME	96	22%
Public research organisation	15	3%
Other	20	5%
Unsure	2	0%
Prefer not to answer	6	1%

It should be noted that not all respondents provided information for some of the questions in the survey and so not all tables and charts presented in this section are based on the sample of respondents. Furthermore, respondents had the option to select 'unsure' or 'prefer not to answer' for each specific element of each question. Therefore, it is typically the case that the number of responses achieved differs between different parts of a single question. As a result, we do not provide information on the number of respondents to each element of each question in this report, though a summary of response rates by question is included in Appendix 5.

4.1 Overview of patent users characteristics

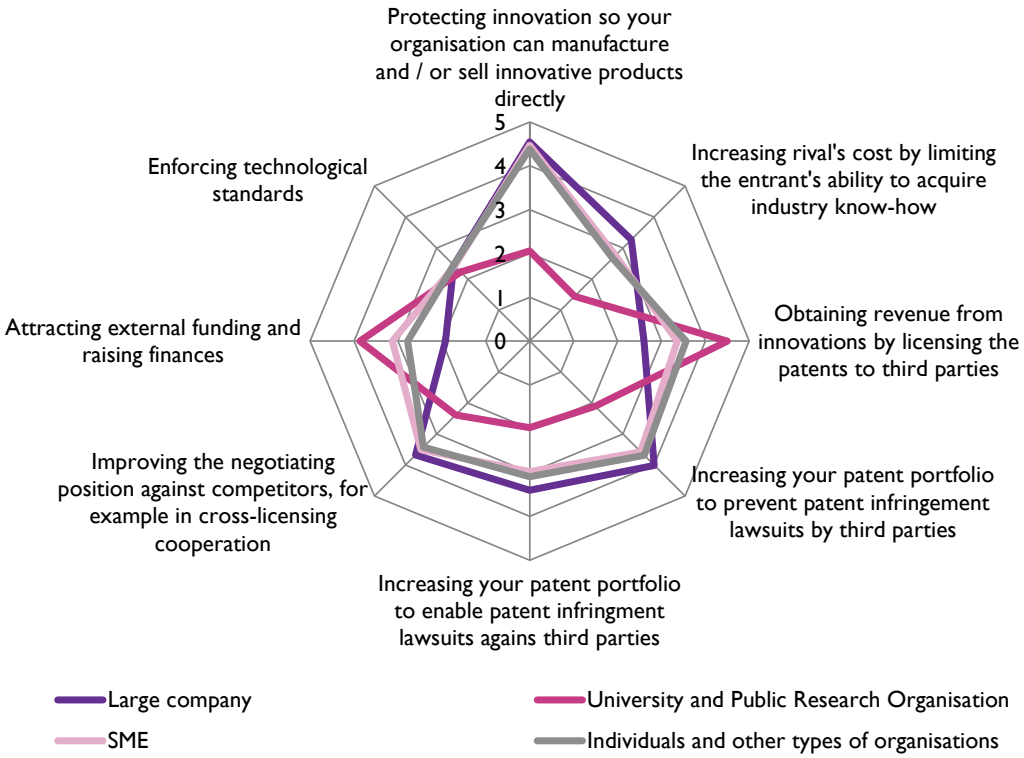
The goal of this sub-section is to illustrate how different typologies of patent users (e.g. different types of organisations and users with different geographical origin) differ with respect to certain patenting behaviours. More specifically, we illustrate below how patent users differ across the following characteristics:

- Main rationale for patenting.
- Validation activity, e.g.:
  - number of countries in which EPO patents are typically validated;
  - means through which patent are validated; and
  - key factors driving the choice of the country in which patents are validated.
- Renewal decisions, e.g.:

- typical lifetime of patents;
- means through which patents are renewed; and
- importance of different typologies of renewal costs.

4.2 Rationales for patenting

Figure 4.1: Rationale for patenting across different typologies of patent users



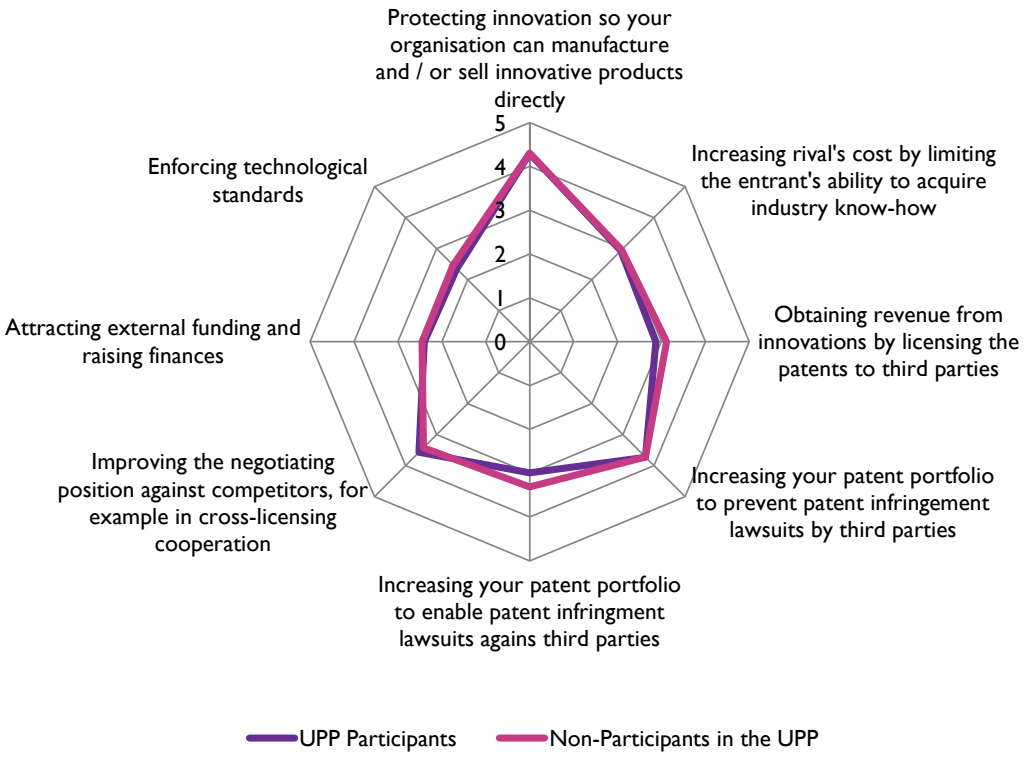
Note: 1=not important factor in deciding whether or not to apply for EPO patent; 5= very important factor in deciding whether or not to apply for EPO patent.

Figure 4.1 depicts the importance (from a scale of 1 — "Not important" to 5 — "Very important") of different rationales behind the decision of whether or not to apply for EPO patent. The most distinctive profile is that of universities and public research organisations. For this typology of users the two most important rationales for patenting are the possibility of obtaining revenues from licensing agreements and the possibility of attracting external funds and raising finance. In contrast, other motivations play a significantly less important role. This observation is consistent with the intuition that neither universities nor public research organisations may possess the infrastructures needed to exploit innovation through more traditional means (e.g. manufacturing, marketing and commercialisation). For other typologies of users the traditional rationale for patenting (e.g. protecting innovation in order to manufacture and commercialise innovative products), appears to be the predominant one. Other strategic rationales (e.g. increasing rivals' costs, increasing patent portfolios — to prevent patent lawsuits by third parties or to facilitate lawsuits against alleged infringers — and improving bargaining positions in cross-licensing agreements) tend to be considered more important for large companies than for SMEs. This may be explained by the higher sophistication of the former relative to the latter.

The relative importance of different rationales for Member States that participate in the enhanced cooperation on the unitary patent protection (UPP participants) and countries that do not participate (non-

participants in the UPP) is depicted in Figure 4.2. The figure suggests that the rationales are broadly similar across the two categories of users.

Figure 4.2: Rationale for patenting: differences between Member States that participate in the enhanced cooperation on the UPP and countries that do not participate.



Note: 1=not important factor in deciding whether or not to apply for EPO patent; 5= very important factor in deciding whether or not to apply for EPO patent.

4.2.1 Validation activity

The table below illustrates the extent to which the average geographical scope of protection varies across patent users.

Table 4.2: Average number of countries where different types of users validated their patents in their last five years[15]

	Average number of countries in which patents were validated
Whole sample	8.07
Large company	9.39
University and Public research organisation	7.51
SME	5.67
Individuals and other types of organisations	5.81

[15] The statistics provided in Table 4.2 represent the average number of countries in which users validate their patents, not the average number of countries in which a patent is validated.

The table shows that, on average, large companies tend to validate in more countries than SMEs. This is not surprising since large companies are likely to have a commercial presence (e.g. production lines, access to distribution channels etc.) in more markets compared to SMEs. Interestingly, universities and public research organisations tend to validate in a relatively larger number of countries compared to SMEs. This may be explained by the fact that patents with a wide geographical patenting scope may play a key role in attracting external funding and in enabling patent holders to monetise through licensing (these being the primary rationales for patenting for these users).

In a later section (see Figure 4.5) our survey results confirm the well-known fact that the majority of EPO patents tend to be validated in the largest European markets, with a low number of patents being validated in all EPC Member States.

As shown in the table below, on average, the non-participants in the UPP surveyed tend to validate their patent in a smaller number of countries compared to UPP participants.

Table 4.3: Average number of countries in which UPP participants and non-participants validate European patents

	Average number of countries in which a patent was validated
UPP participants	8.61
Non-participants in the UPP	7.60

The table below indicates that the use of patent attorneys is, on average, the most common means through which patent users validate their patents. The use of specialised companies appears to be more frequent among universities and public research organisations and less so for SMEs. Large companies are the least likely to rely on this means for validation activity.

Table 4.4: Methods of validations for different types of users

	Validated directly by your organisation	Validated by an independent patent attorney in the countries where you achieved patent protection	Validated by a European patent attorney representing the European application	Validated using specialised company dealing with the validation process	Unsure	Prefer not to answer
Whole sample	11%	20%	43%	14%	8%	3%
Large company	12%	19%	47%	13%	7%	2%
University and Public Research Organisation	15%	11%	40%	18%	11%	5%
SME	10%	26%	38%	16%	9%	1%
Individuals and other types of organisations	9%	25%	31%	17%	13%	4%

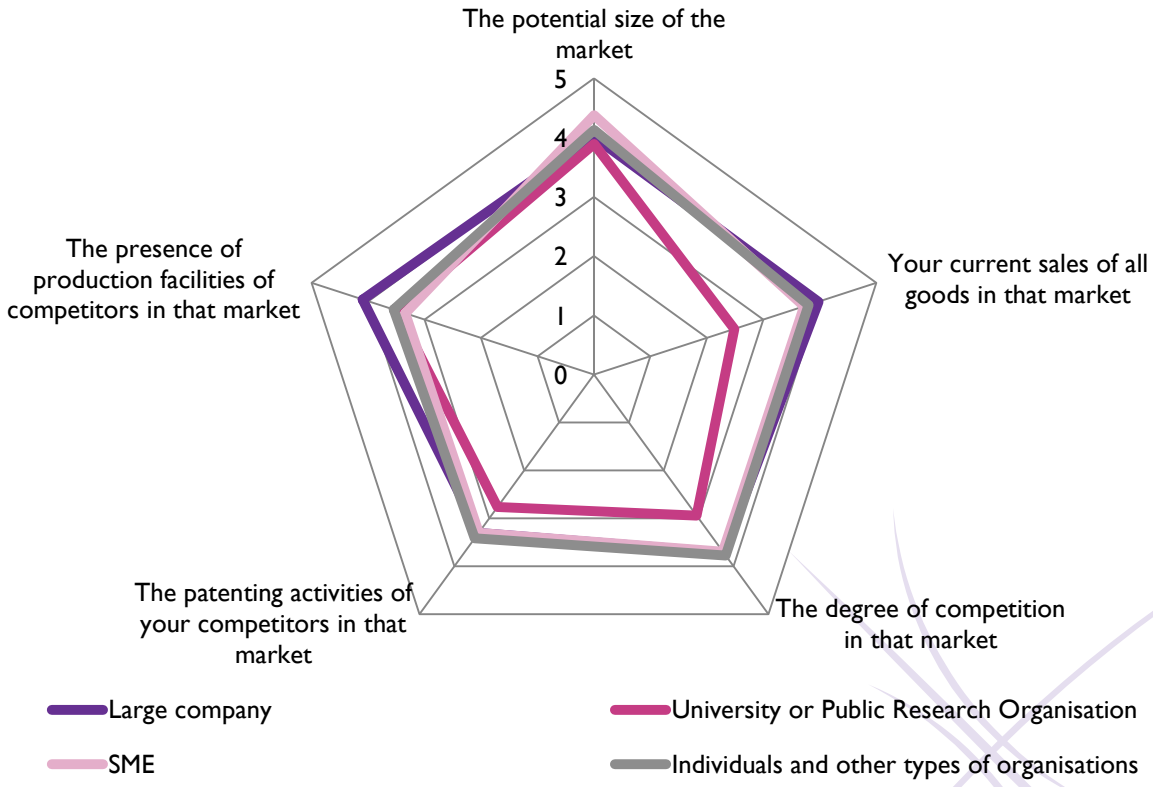
When comparing methods of validation across UPP participants and non-participants (see Table 4.5) the most striking difference (besides the higher percentage of UPP participants using a specialised company) is that European patent attorneys tend to be used more frequently by non-participants than by UPP participants.

Table 4.5: Methods of validations for UPP participants and non-participants

	Validated directly by your organisation only	Validated by an independent patent attorney in the countries where you achieved patent protection	Validated by a European patent attorney representing the European application	Validated using specialised company dealing with the validation process	Unsure	Prefer not to answer
UPP participants	16%	21%	35%	18%	7%	2%
Non-participants in the UPP	7%	19%	50%	10%	10%	3%

With regard to the key factors driving the choice of countries for validation Figure 4.3 below indicates that the potential size of the market is the most important factor in determining where users validate their patents. The presence of production facilities in a market is also an important factor for large companies. Commercial factors such as the local presence of sales, the degree of competition in the market and the patenting activity of competitors in the market, appear to be significantly less important for universities and public research organisations than for other typologies of users.

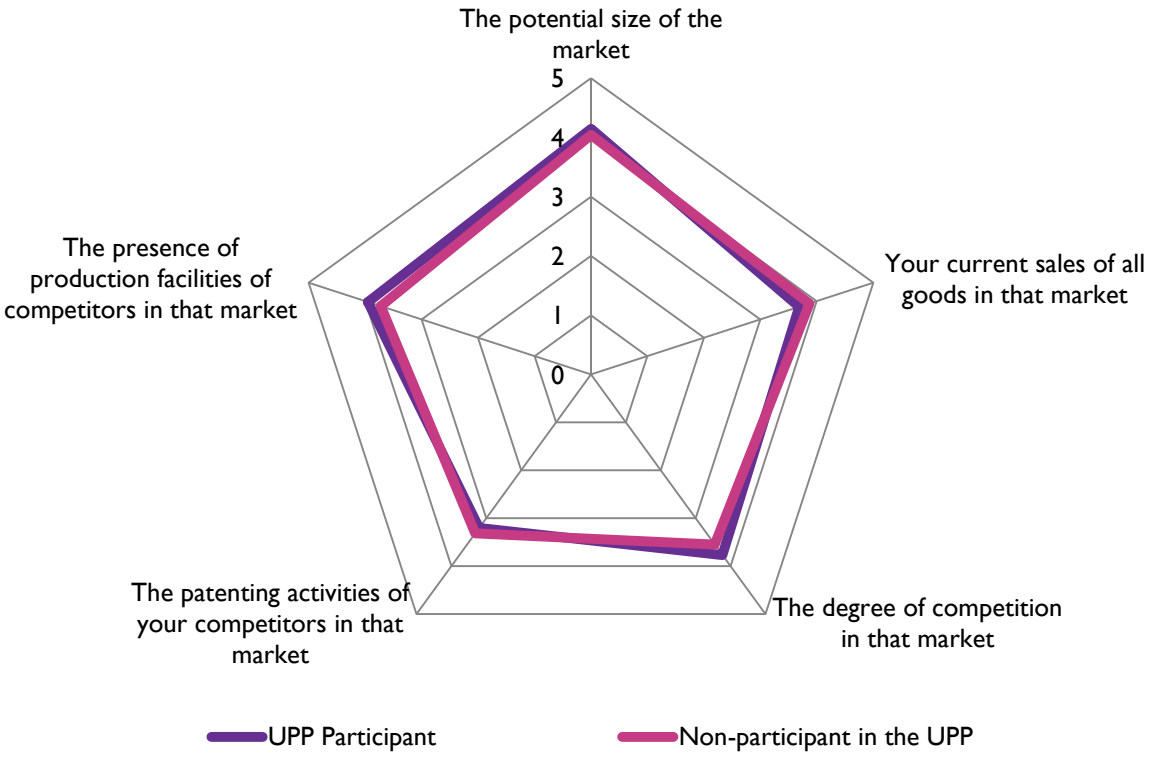
Figure 4.3: Importance of commercial factors in the decision of where to validate a patent (differences across types of users)



Note: 1=not important factor in deciding where to validate a patent; 5= very important factor in deciding where to validate patent.

As shown in Figure 4.4, the relative importance of different factors in the decision of where to validate a patent is broadly similar across UPP participants and non-participants.

Figure 4.4: Importance of commercial factors in the decision of where to validate a patent (differences between UPP participants and non-participants)



Note: 1=not important factor in deciding where to validate a patent; 5= very important factor in deciding where to validate patent.

4.2.2 Renewal decisions

The following table indicates the average life-time of patents for the different categories of patent users surveyed. On average, universities and public research organisations tend to have the shortest-lived patents with 91 per cent of the patents held living less than nine years. Surprisingly, SMEs tend to have the highest proportion of patents reaching statutory life (i.e. on average more than 43 per cent of the patents in their patent portfolios) compared to 'only' 27 per cent of patents reaching statutory life for large companies. However, compared to large companies, SMEs also tend to have a larger proportion of patents that do not reach five years of age (i.e. around 20 per cent for SMEs as opposed to around 11 per cent for large companies).

Table 4.6: Percentage of patents in the portfolio kept in force for different periods in at least one EPC member state (by different types of users)

	Less than 5 years in at least 1 MS	Between 5 and 9 years in at least 1 MS	Between 10 and 14 years in at least 1 MS	Between 15 and 19 years in at least 1 MS	Until the end of the term	Unsure
Whole sample	16%	18%	19%	17%	29%	1%
Large company	11%	18%	22%	21%	27%	0%
University and Public Research Organisation	58%	33%	8%	1%	0%	0%
SME	20%	12%	11%	11%	43%	2%

	Less than 5 years in at least 1 MS	Between 5 and 9 years in at least 1 MS	Between 10 and 14 years in at least 1 MS	Between 15 and 19 years in at least 1 MS	Until the end of the term	Unsure
Individuals and other types of organisations	22%	23%	19%	5%	26%	6%

Table 4.7 suggests that overall, there is no striking difference in the life-time profiles of patents held by UPP participants and non-participants.

Table 4.7: Percentage of patents in the portfolio kept alive for different periods (by UPP participants and non-participants)

	Less than 5 years in at least 1 MS	Between 5 and 9 years in at least 1 MS	Between 10 and 14 years in at least 1 MS	Between 15 and 19 years in at least 1 MS	Until the end of the term	Unsure
UPP participant	12%	22%	23%	16%	28%	0%
Non-participant in the UPP	20%	15%	16%	18%	30%	2%

Whilst patent attorneys tend to be the most common means through which patent users conduct patent validation activities, specialised companies appear to play a more important role with regard to patent renewal decisions. As indicated in Table 4.8 for large companies, SMEs and universities and public research organisations, respectively, 57, 41, and 27 per cent of patents were renewed through specialised companies (as opposed to only 13, 16, and 18 per cent of their patents being validated through this means, respectively).

Table 4.8: Percentage of patents renewed through different means (by different types of users)

	Renewed directly by your organisation by paying fees to the relevant NPO	Renewed by a patent attorney in the countries where the patent was in force	Renewed by a European patent attorney representing a European patent application	Renewed by a specialised company	Other /Unsure	Prefer not to answer
Whole sample	5%	10%	20%	50%	1%	11%
Large company	5%	7%	16%	59%	0%	11%
University and Public Research Organisation	8%	23%	21%	26%	0%	11%
SME	4%	15%	32%	40%	2%	8%
Individuals and other types of organisations	7%	13%	37%	19%	5%	13%

When comparing the renewal decisions methods adopted by UPP participants and non-participants (see Table 4.9), we notice a broad similarity between the two groups. The most distinctive difference lies in the greater reliance on specialised companies by non-participants in the UPP. This is also in contrast with validation activity, for which specialised firms were reported to have been involved in the validation of only 10 per cent of patents held by non-participants in the UPP (see Table 4.5).

Table 4.9: Percentage of patents renewed through different means (by UPP participants and non-participants)

	Renewed directly by your organisation by paying fees to the relevant NPO	Renewed by a patent attorney in the countries where the patent was in force	Renewed by a European patent attorney representing a European patent application	Renewed by a specialised company	Other /Unsure	Prefer not to answer
UPP participant	7%	11%	23%	44%	0%	11%
Non-participant in the UPP	4%	9%	18%	53%	1%	11%

4.3 Key findings: potential impacts of the Unitary Patent

A unitary patent would allow patent applicants to obtain a European patent through the EPO which would automatically provide uniform protection for an invention across 25 Member States. The unitary patent would coexist with the classical European Patent and could be combined with it if the applicant wanted to secure protection in additional countries.

In principle, the existence of a unitary patent may affect the number of applications that an organisation would make to the EPO. This effect might arise, for example, if a company faces lower total costs of securing protection across Europe for those innovations that would have been protected across Europe even in the absence of the Unitary Patent. In such cases, it may choose to apply for a European patent (classical or unitary) for innovations that would have been protected only at national level in the absence of the unitary patent.

However, the results presented in Table 4.10 provide limited support for this hypothesis. In all categories, the majority of respondents express the opinion that the Unitary Patent would have no effect on the number of patent applications filed by their organisation. Apart from the individual category, where 58 per cent of respondents consider an increasing impact as the most likely scenario, universities and public research organisations and SMEs provide the greatest support for an increase in number of applications (28 per cent) while large companies provide the weakest support (13 per cent).

The results are similar when we consider responses broken down by UPP participation. The majority of both groups of respondents consider that there will be no effect on the number of applications filed. The most important feature in this case is that approximately one out of six respondents with headquarters in non-participating countries is unsure about the outcome.

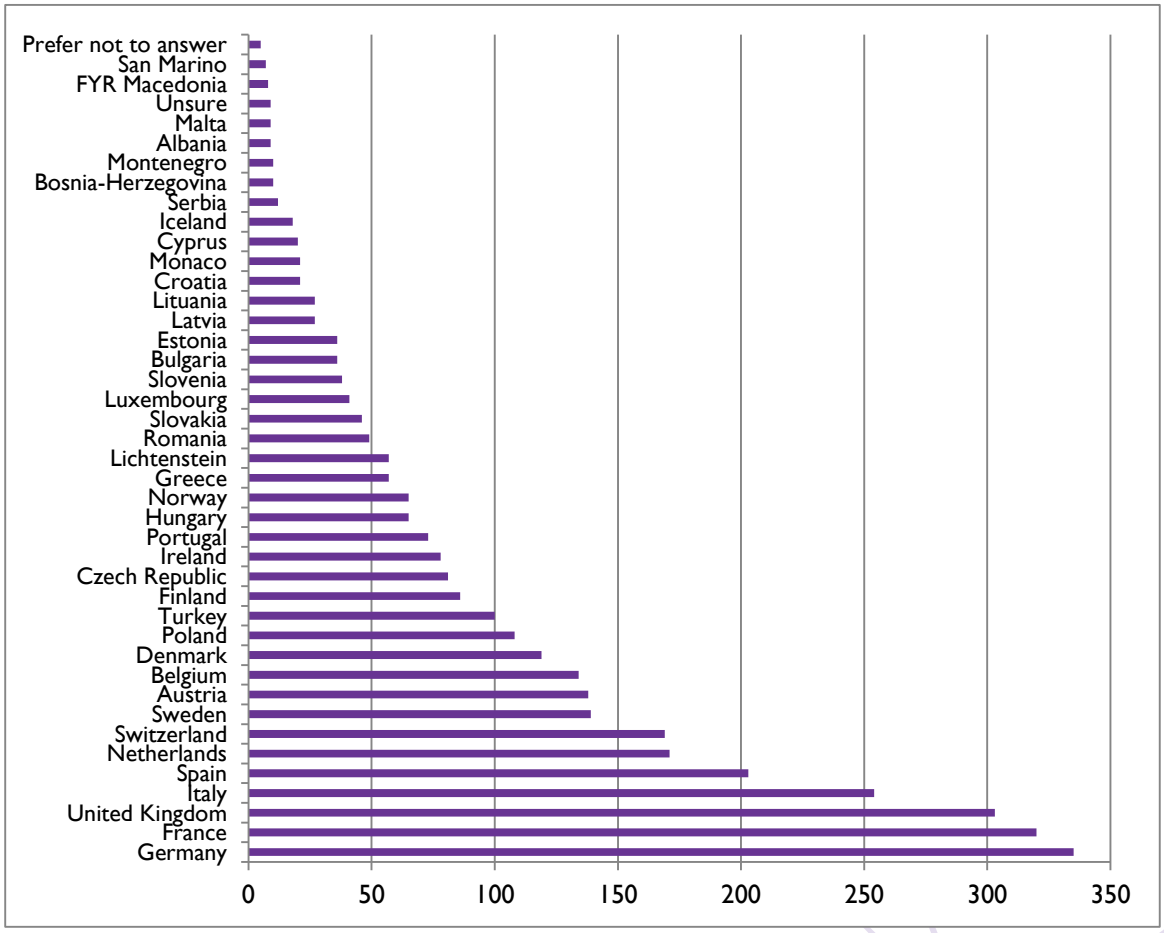
Table 4.10: Impact of Unitary Patent on number of patent applications filed at the EPO

	Increase	No effect/ remain the same	Decrease	Unsure	Prefer not to answer
Whole sample	19%	61%	6%	13%	1%
Large company	13%	68%	6%	13%	1%
University and Public Research Organisation	27%	51%	2%	17%	2%
SME	28%	53%	6%	11%	1%
Individuals and other types of	31%	53%	9%	6%	0%

	Increase	No effect/ remain the same	Decrease	Unsure	Prefer not to answer
organisations					
UPP participants	19%	66%	5%	9%	1%
Non-participants in the UPP	19%	58%	6%	16%	2%

While the introduction of the Unitary Patent may have relatively little impact on the number of patent applications received by the EPO it may have a significant impact on the average number of countries in which each granted patent is validated. Figure 4.5 shows that, at present, patents are significantly more likely to be validated in some Member States than in others.

Figure 4.5: Number of patents validated in each EPC Member State in the last 5 years



The distribution evident in Figure 4.5 would become less pronounced if a proportion of future patent applications use the Unitary Patent route rather than the classical European route. The extent to which the Unitary Patent route would be chosen over the classical route would depend on each patent user's assessment of whether the Unitary Patent route would lead to a net benefit for the firm relative to the classical route for the patent application in question.

There are many factors that would influence the choice of whether to use the Unitary Patent including the characteristics of innovation, the scope of protection envisaged, the perceived pros and cons of the unitary route relative to the classical route and the characteristics of the Unitary Patent itself (e.g. the level at which renewal fees are set). These issues are explored in the following paragraphs.

4.3.1 Innovation characteristics and protection requirements

Figure 4.6 illustrates the factors that would affect the likelihood that different types of organisations would choose a Unitary Patent over a classical European patent. Somewhat unsurprisingly, all respondents would be significantly more likely to choose a Unitary Patent where protection is sought in a large number of countries. The cost savings that would result from the Unitary Patent would be maximised where protection is required in many countries.

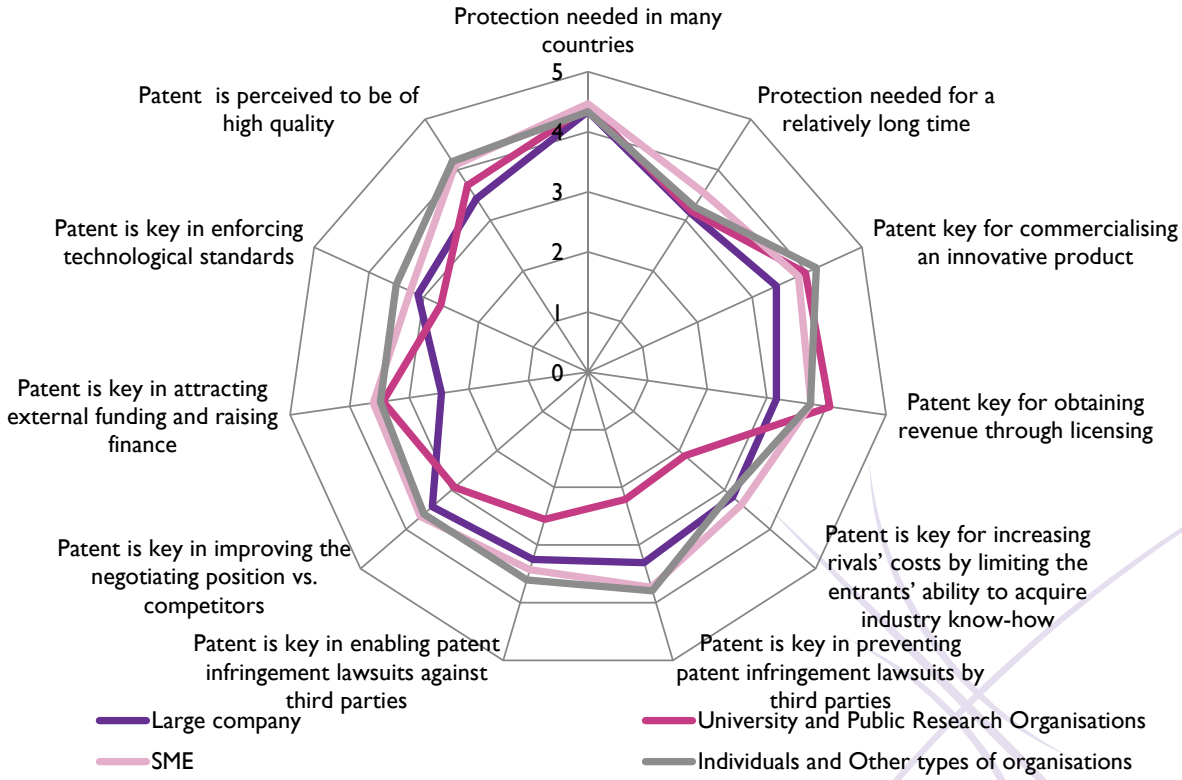
In the majority of factors considered, large companies are very similar to the other types of organisations only exhibiting significantly lower influence levels in areas where funding and revenue streams are concerned.

SMEs follow a similar pattern to large companies although they generally assign higher levels of influence in their responses. The most notable difference can be observed in the high significance assigned to attracting external funding and raising finance by SMEs.

Individuals and other types of organisations find most specified factors to be more influential compared to the other typologies. This may be explained due to individuals' decreased capacity for litigation, the significance they ascribe to licensing and the lack of substantial infrastructure.

Universities and public research organisations exhibit a high interest in increased licensing revenue. On the other hand, they are significantly less interested in litigation-related factors, as well as technological standards.

Figure 4.6: Influences of innovation characteristics and protection requirements on use of Unitary Patent (by type of organisation)

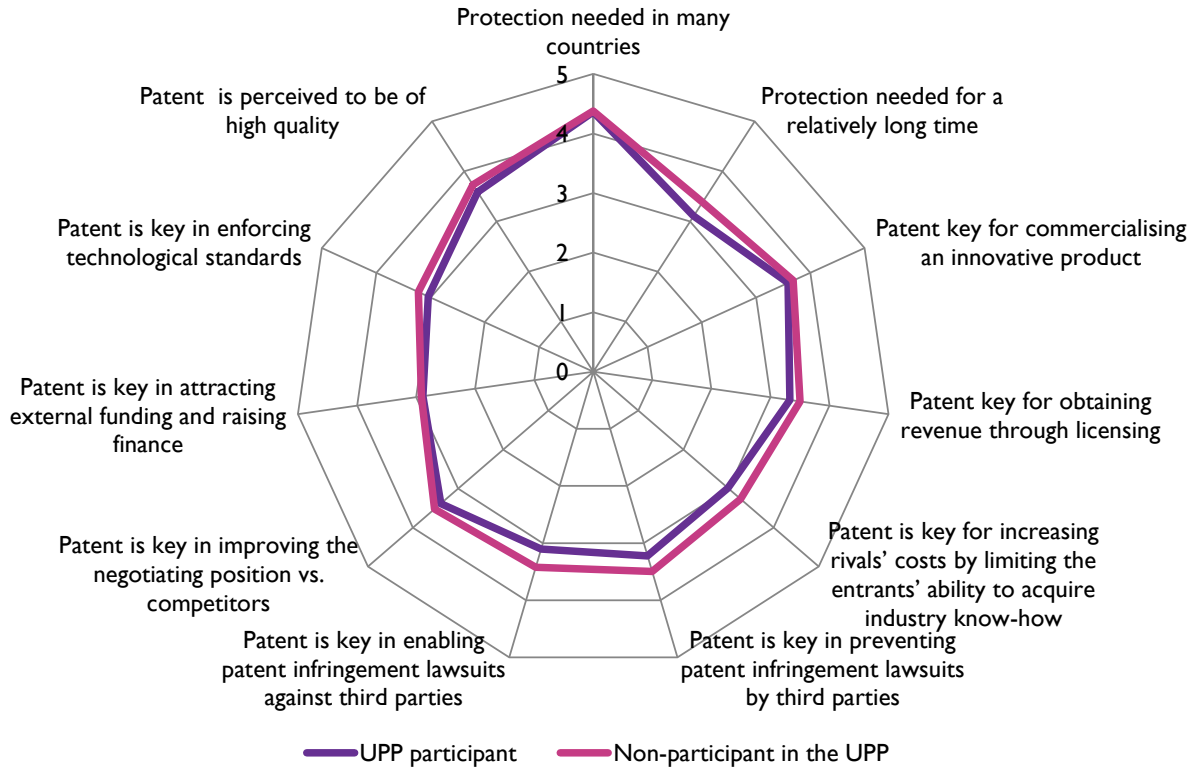


Note: 1=significantly less likely to use Unitary Patent; 5= significantly more likely to use Unitary Patent.

Figure 4.7 shows how the influences of innovation characteristics and protection requirements on the use of Unitary Patent differ across participants and non-participants of the UPP. Based on the information contained in this figure it appears that there is no significant difference between organisations which

participate in the UPP and those that do not participate with respect to the likelihood of using the Unitary Patent.

Figure 4.7: Influences of innovation characteristics and protection requirements on use of Unitary Patent (by participation in the UPP)



Note: 1=significantly less likely to use Unitary Patent; 5= significantly more likely to use Unitary Patent.

4.3.2 Costs of securing patent protection

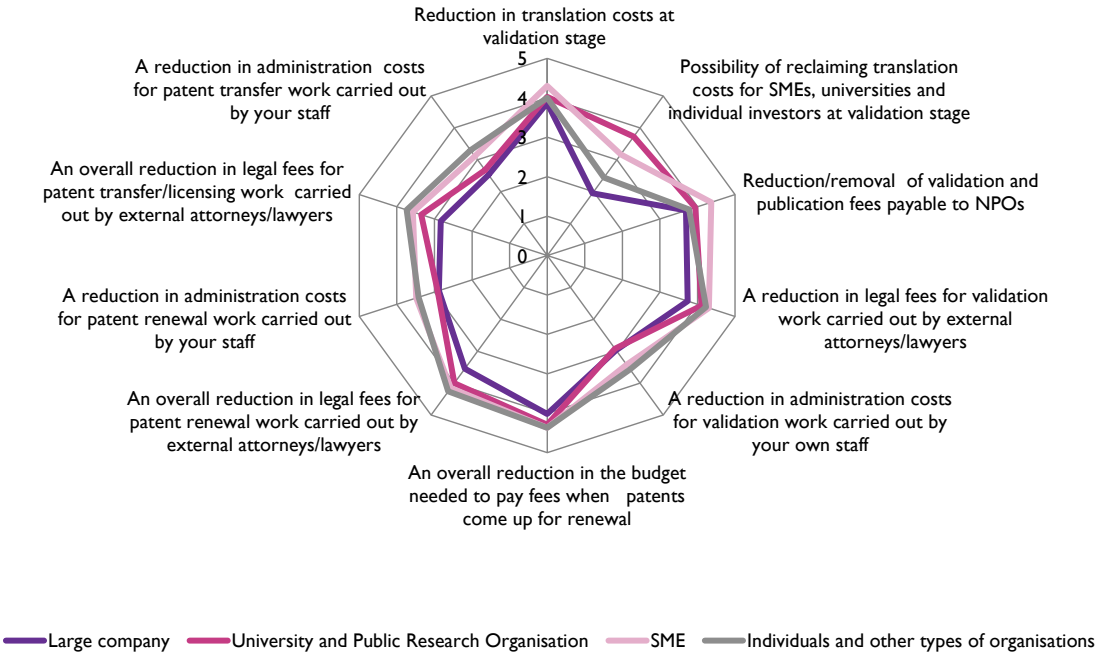
Figure 4.8 shows that the significance of the various costs that may be affected by the introduction of the Unitary Patent on an organisation's propensity to use Unitary Patent differs somewhat by type of organisation.

In general, however, the decisions of large companies over whether to apply for a Unitary Patent appear to be less influenced by cost factors than do those of SMEs, universities and public research organisations. While some factors appear to be less relevant for these organisations (e.g. universities and public research organisations report that a reduction in internal administrative costs would have a limited influence on the decision of whether to apply for a Unitary Patent but report sensitivity to external costs, suggesting that most work is external), even relevant factors have a weaker influence on their decisions of whether to use the Unitary Patent.

We also noticed that there are some additional insights that cannot be appreciated by inspection of the charts but could be gained through multi-variate statistical analysis. This can be found in Appendix 3.

The econometric analysis presented in Appendix 3 demonstrates that SMEs and universities/public research organisations consider the benefit of the possibility of reclaiming translation costs to be significantly greater than individuals and other types of organisation do. SMEs are also found to perceive the benefit of lower validation and publication fees to be significantly greater than individuals and other types of organisation do.

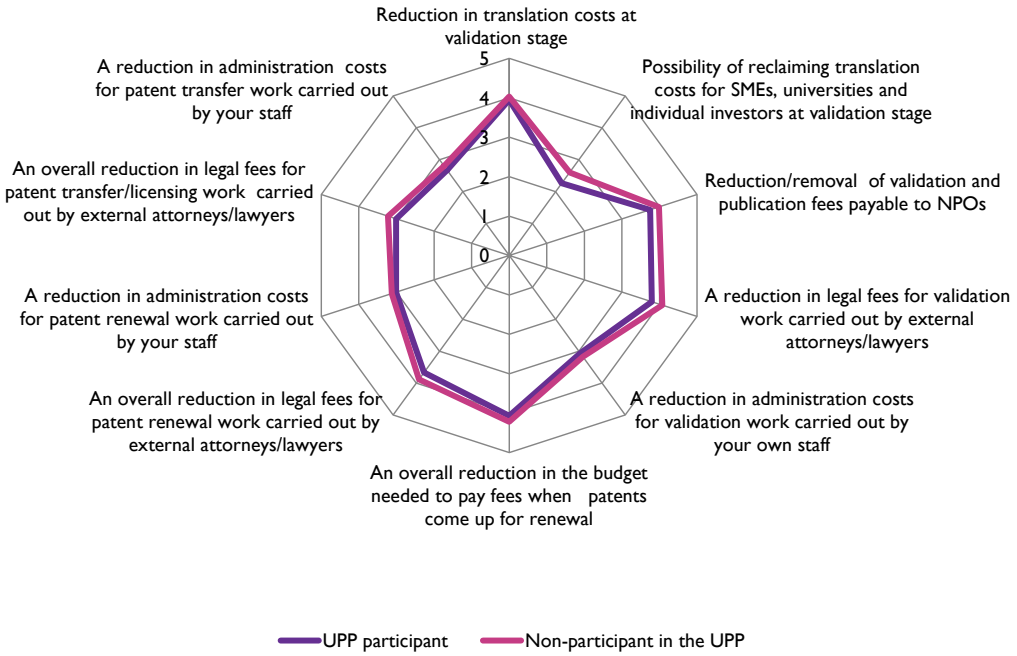
Figure 4.8: Influences of potential cost reductions on use of Unitary Patent (by type of organisation)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

Figure 4.9 shows that there are no considerable differences between companies that participate in the UPP and those that do not in respect of the extent to which the potential cost reductions associated with the Unitary Patent would affect the decision to use it.

Figure 4.9: Influences of potential cost reductions on use of Unitary Patent (by participation in the UPP)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

4.3.3 Business opportunities

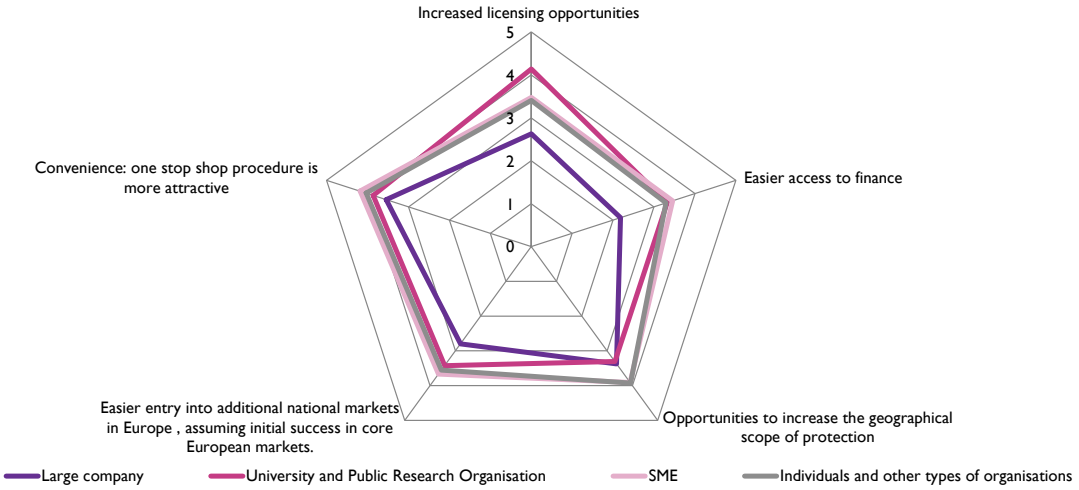
As illustrated in Figure 4.10 the influences of potential increased business opportunities on decisions to use the Unitary Patent differ significantly by type of organisation, reflecting differences in business models.

For example, the increased licensing opportunities that may be associated with the Unitary Patent are an important driver of whether such a patent would be chosen for universities and public research organisations but is relatively unimportant for large companies. This finding is confirmed by the econometric analysis presented in Appendix 3 and reflects the fact that public research organisations and universities are excellent innovators but are generally not equipped to exploit such innovations commercially. Licensing is therefore a crucial revenue stream for such organisations, whereas large companies are typically able to exploit their innovations and secure revenue by using the innovation to gain a competitive advantage over their competitors.

Similarly, raising finance is not a significant concern for large companies. Therefore, the finding that such an impact of the Unitary Patent would influence the decisions of other organisations to a greater extent than large companies (as shown in Figure 4.10 and confirmed by the econometric analysis presented in Appendix 3) is not surprising. The econometric analysis also identifies that the perceived benefit of easier access to finance is significantly greater for SMEs than for individuals and other types of organisation after controlling for other factors.

There is a consensus, however, that the one stop shop nature of the Unitary Patent would have a strong influence on decisions of whether to use the Unitary Patent.

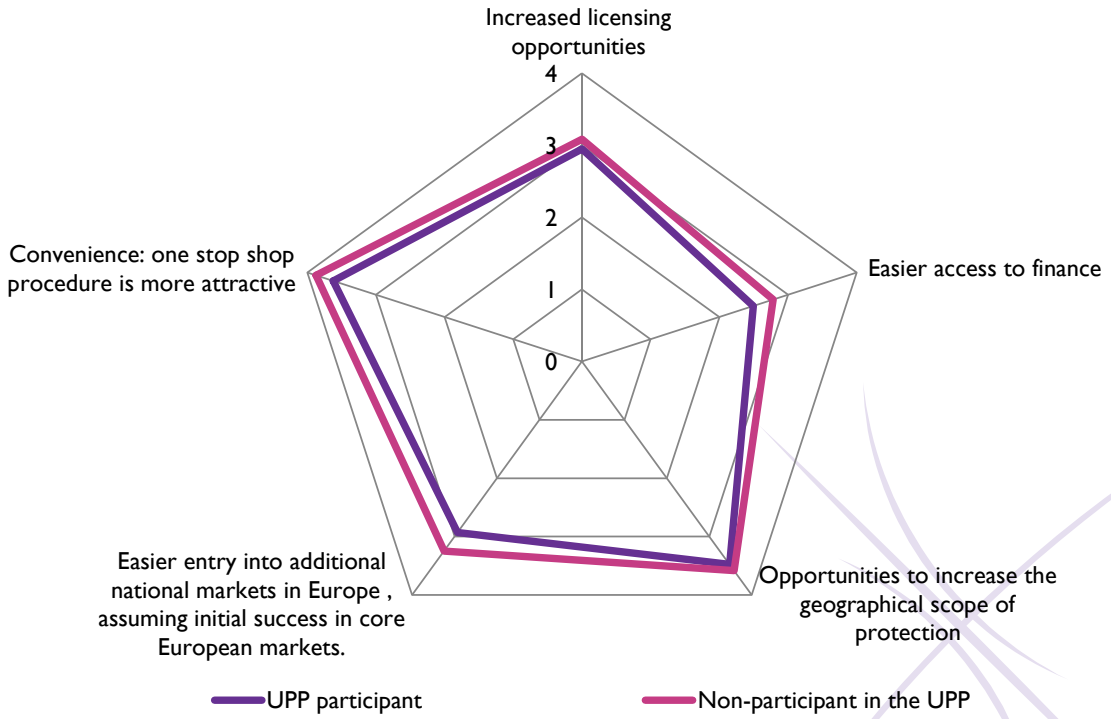
Figure 4.10: Influences of potential increased business opportunities on use of Unitary Patent (by type of organisation)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

The opinions of respondents that participate in the UPP and those that do not are consistent with respect to the influences of potential increased business opportunities on decisions to use the Unitary Patent, as shown in Figure 4.11. There is relatively little difference between the groups with respect to the strength of responses.

Figure 4.11: Influences of potential increased business opportunities on use of Unitary Patent (by participation in the UPP)



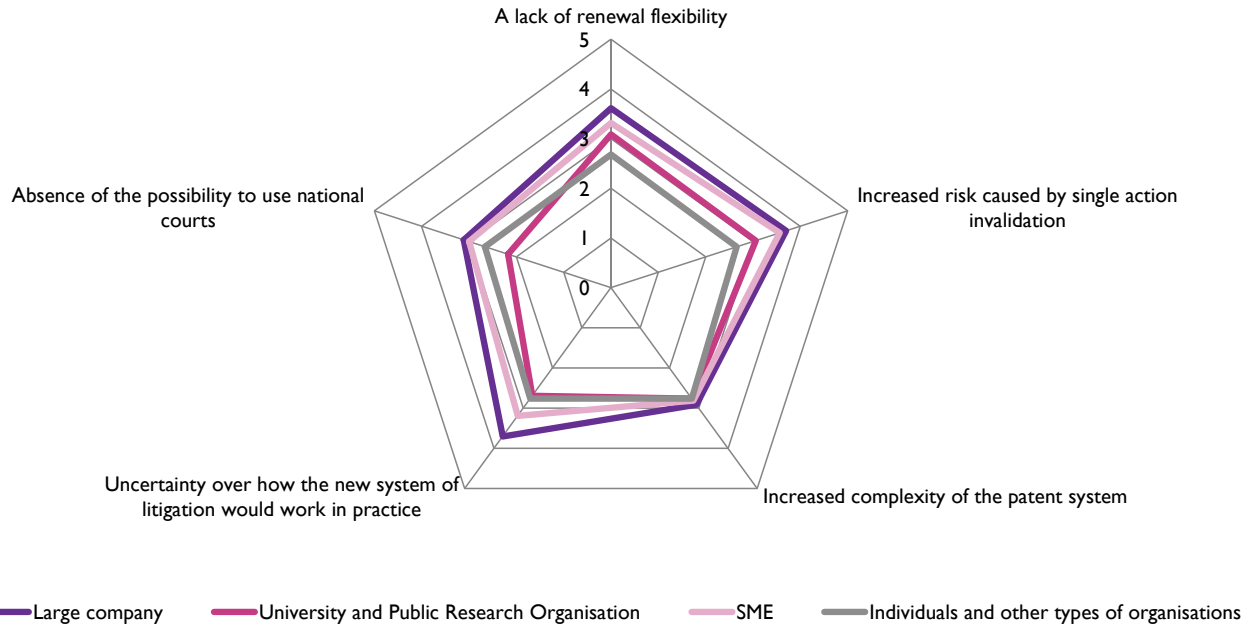
Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

4.3.4 Adverse influences

In addition to the potential benefits of the Unitary Patent analysed above it may give rise to a number of disadvantages relative to the classical European patent route. We asked survey respondents to specify the extent to which five such factors would influence their decision to use the Unitary Patent.

Figure 4.12 shows that the lack of renewal flexibility and risk of single action invalidation are significant concerns for large companies and SMEs but are less important for universities and public research organisations, presumably because the patenting strategy of universities and public research organisations differs significantly from that of commercial organisations. Moreover, large companies are considerably more concerned about the uncertainty over the practical aspects of the new litigation system. Both these findings are confirmed by the results of the econometric analysis presented in Appendix 3.

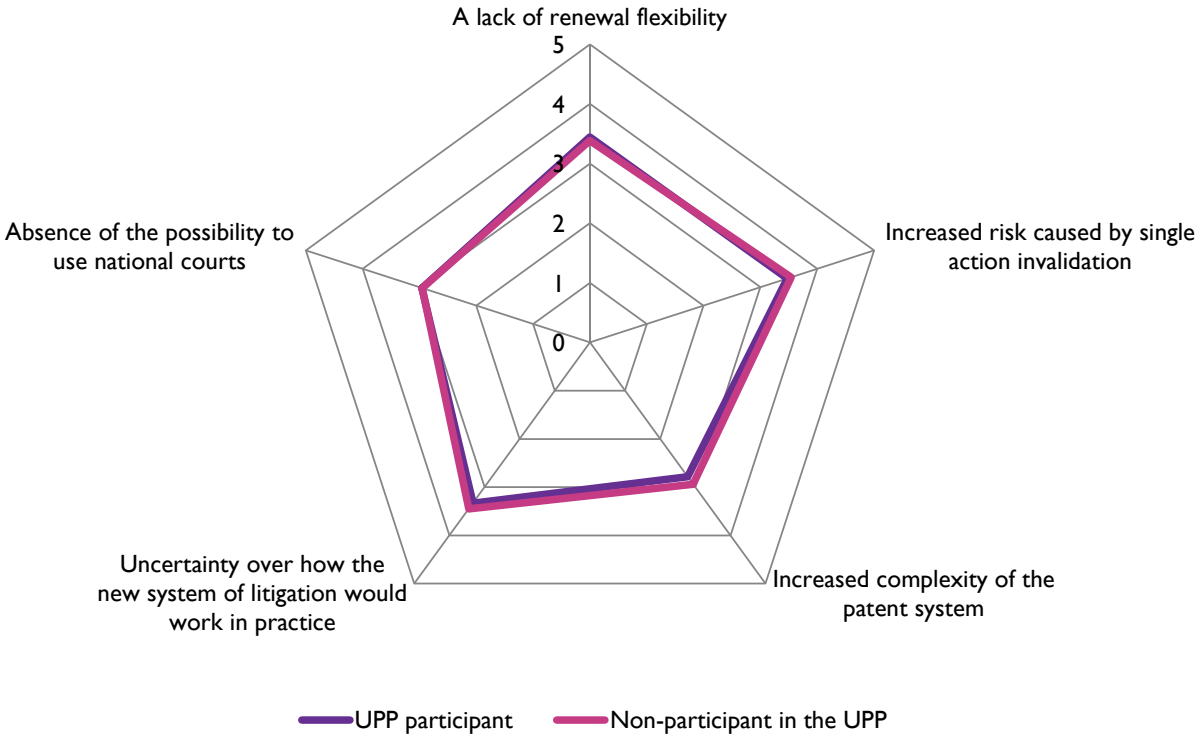
Figure 4.12: Influences of potential disadvantages on use of Unitary Patent (by type of organisation)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

In common with the impacts of the positive features of the Unitary Patent, the influence of potential disadvantages on decisions of whether to use the Unitary Patent is consistent across organisations whether they participate in the UPP or not. The high degree of consistency is clearly illustrated in Figure 4.13. Overall, the greatest adverse influence on decisions to use the Unitary Patent are uncertainty over how the new system would operate, and the risk of single action invalidation.

Figure 4.13: Influences of potential disadvantages on use of Unitary Patent (by participation in the UPP)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent

The table below presents evidence for the impact of different levels of renewal fees for the Unitary Patent on the extent to which patent users would choose the Unitary Patent over the classical European Patent. The results clearly indicate that the level of the renewal fee is likely to have an appreciable impact on the number of Unitary Patent filings, with a particularly large difference evident between scenarios one and two. This may reflect the fact that classical European patents are typically protected in Germany, France and the UK and hence a renewal fee in excess of the sum of those three countries would encourage patent users to file for a classical patent instead.

Table 4.11: Percentage of patents that would have been filed as a Unitary Patent during the past five years

	Percentage of European Patents that would have been registered as Unitary Patents (number)
	Raw results
Scenario 1: Renewal fee equal to the sum of the current renewal fees for Germany, France and UK	65%
Scenario 2: Renewal fee equal to the sum of the current renewal fees for Germany, France, UK, Netherlands, Sweden and Belgium	17%
Scenario 3: Renewal fee equal to the sum of the current renewal fees for, Germany, France, UK, Netherlands, Sweden, Belgium, Austria, Ireland and Denmark	11%
Scenario 4: Renewal fee equal to the sum of the current renewal fees for, Germany, France, UK, Netherlands, Sweden, Belgium Austria, Ireland, Denmark, Poland, Finland and Czech Republic	8%

We explored the robustness of these results by conducting an econometric analysis, set out in Appendix 2, in which we control for type and size of organisation, geographic scope of patent use and technological area. When we control for these factors the numerical results change slightly. However, the qualitative message remains that between renewal fees equivalent to the three-country case (Germany, France, UK) and the six-country case (including also the Netherlands, Sweden and Belgium) there is an anticipated drop-off of 30 percentage points.

In addition to estimating the impact of renewal fees on the uptake of the Unitary Patent, our econometric analysis explored the factors influencing such uptake. This analysis suggests that uptake would be affected by:

- firm size: in one of our models specification, large firms take up more;
- geographic scope: firms with wide geographic scope (i.e. that validate patents in more than seven EPC member states) take up more Unitary Patents; and
- the number of grants: those that have been granted more patents are likely to register more patents via the Unitary Patent but are likely to register a lower proportion of their patents via the Unitary Patent than are other patent users.

Other factors that may be important, but are not robustly so in our models, include the finding that those filing more patents in the chemistry technical cluster are more likely to apply for the UP.

Fees are robustly significant in all our models.

4.3.5 Summary

The results presented in this section suggest that the influences of potential increased business opportunities on decisions to use the Unitary Patent differ significantly by type of organisation, reflecting differences in business models (e.g. the increased licensing opportunities that may be associated with the Unitary Patent are an important driver of for individuals and universities but not for large companies).

In addition, our results show that the perceived benefit of the Unitary Patent is similar for those with headquarters in an EPO Member State that participates in the UPP and for those with headquarters in the rest of the world. The differences in responses observed between these groups of respondents are not significant.

4.4 Key findings: potential impacts of the Unified Patent Court

The introduction of the Unitary Patent will coincide with the establishment of the Unified Patent Court (UPC) which will have exclusive jurisdiction over Unitary Patents. Once the new system is in force the UPC will also have jurisdiction for existing and future traditional European patents. However, for a transitional period, patent holders will have the possibility to opt-out from the exclusive jurisdiction of the UPC and to still bring actions before national courts. One of the most important aspects of the new system is that, unless the patent holder has opted out, the Unitary Patent can be invalidated in a single action with effect for all participating Member States.

In this section, we explore the extent to which the introduction of the UPC would affect the opposition and litigation behaviour of patent users, as reported by those that have prior experience of opposing or litigating patents in Europe. We also identify the key pros and cons of the UPC for different parties to litigation actions:

- Claimant in infringement case (i.e. the patent-holder).
- Defendant against invalidity claim of third party.
- Defendant in infringement case (i.e. the alleged infringer).

- Claimant in invalidity case (i.e. alleger that patent is not valid).

The first two of these concern cases in which a party seeks to enforce the rights that it has obtained through patenting, while the latter two concern cases in which a party seeks to argue that a patent held by a third party cannot restrict its commercial activities. These groups of cases are considered in turn.

It should be noted that the results in this section are based on the responses of SMEs and large companies. The responses of individuals, public research organisations and individuals are not represented because of the very small number of responses that were received from these groups due to their lack of litigation experience. We refer to the appendix for details on the number of responses, on which the charts below are based upon,

4.4.1 Enforcing rights established by patent protection

The UPC will provide an alternative to the current national system of litigation in which claimants must file, say, a separate infringement case in each country in which it considers infringement has occurred. During the transition period patent holders will have a choice over where to take litigation action after a Unitary Patent has been granted, hence it is important to understand how patent holders would react in the best-case scenario for the UPC: if interest in the UPC is limited even in the best case scenario we may conclude that its economic impact would be rather limited.

Table 4.12 shows that if the UPC is efficient, timely, ensures high quality decisions and is cost effective compared with the cost of litigation at national level, 46 per cent of respondents would prefer to litigate through the UPC rather than through a national court (11 per cent). Additionally, 35 per cent of respondents are unsure. This suggests that in this best case scenario there is interest in litigating through the UPC. There is, however, significant uncertainty involved (35 per cent unsure and 7 per cent prefer not to answer), thereby weakening the supporting evidence provided by this question. A detailed breakdown of respondents by organisation type for Table 4.12 and Table 4.13 can be found in the appendices.

Table 4.12: UPC or national litigation preference if UPC is efficient, timely, ensures high quality decisions and is cost effective compared with the cost of litigation at national level

	Percentage of all respondents
Prefer litigating through the Unified Patent Court	46%
Prefer litigating through a National Court	11%
Unsure	35%
Prefer not to answer	7%

In addition to affecting litigation choices in the case of infringement and invalidity actions, the introduction of the UPC may also affect patent users' decisions of whether to oppose patents prior to grant or to take litigation action post-grant. On the one hand, the UPC may lead to a reduction in the number of opposition actions because it would become easier to take post-grant litigation action in all countries in which a patent was validated. On the other hand, the number of oppositions may rise because of the greater number of countries in which a European patent would be validated, on average, hence the potentially greater cost of post-grant litigation action for patents that would have been validated in only a few countries in the absence of the Unitary Patent. Table 4.13 shows that even if the UPC is efficient, timely, ensures high quality decisions and is cost effective compared with the cost of the opposition procedure, fewer respondents would prefer to litigate via the UPC than to file an opposition procedure. However, there is a significant amount of uncertainty among respondents with respect to their likely response, thus the finding should be treated with some caution.

Table 4.13: Litigation or opposition preference if UPC is efficient, timely, ensures high quality decisions and is cost effective compared with the cost of the opposition procedure

	Percentage of all respondents
Prefer litigating through the Unified Patent Court	23%
Prefer to file an opposition procedure	34%
Unsure	38%
Prefer not to answer	4%

These results provide some evidence on the likely use of the UPC by those that would seek to enforce their rights established by patent protection. However, it is important to understand the factors that underlie these findings, particularly with respect to the perceived pros and cons of the UPC for claimants in infringement cases and defendants in invalidity cases. We explore these issues in turn.

Claimant in infringement case (i.e. the patent-holder)

We asked those that had previous experience of being a claimant in infringement cases to consider how certain aspects of the UPC would be beneficial relative to their previous experience. Through this line of questioning we sought to identify the net benefit of the UPC.

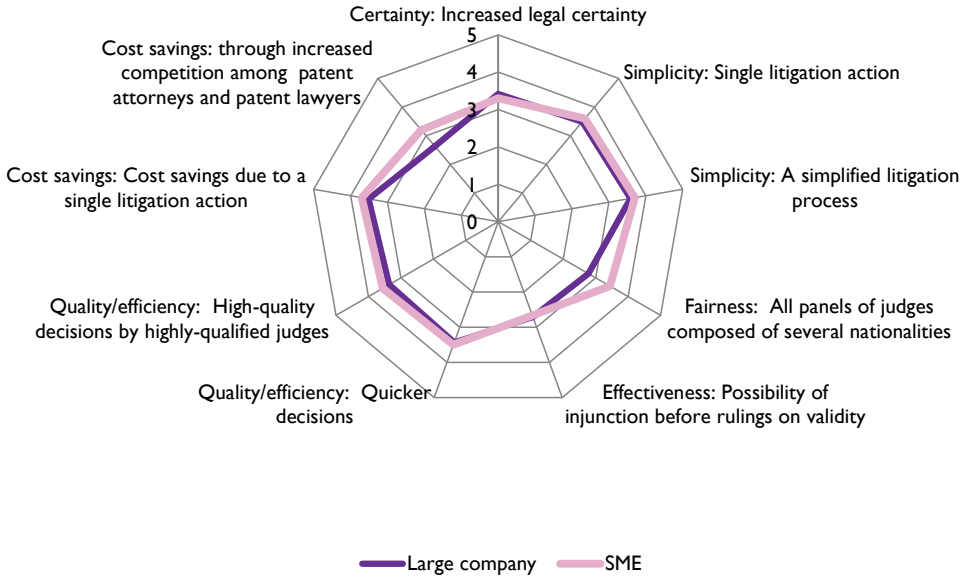
Additionally, we present the percentage of respondents broken down by organisation type which have taken legal action in any European National Court to defend its European patents against third-party infringements (Table 4.14). This information will enable us to deduce which organisation type is more likely to be a claimant in infringement cases and will assist us to interpret the factors underlying litigation dynamics. As shown in the table, large companies are by far the most likely to take legal action in order to defend their patents while few universities and public research organisations do so.

Table 4.14: Percentage of organisations that have taken legal action in any European National Court to defend their European patents against infringement of a third party.

	Yes	No	Unsure	Prefer not to answer
Whole sample	23%	60%	11%	6%
Large company	28%	51%	13%	8%
SME	10%	84%	5%	1%

Figure 4.14 breaks responses to these questions down by type of organisation and shows that, overall, the greatest perceived benefits arise from the simplified litigation process and the cost savings that are associated with a single litigation action. There is little difference in the responses of SMEs and large companies, with the exception of fairness.

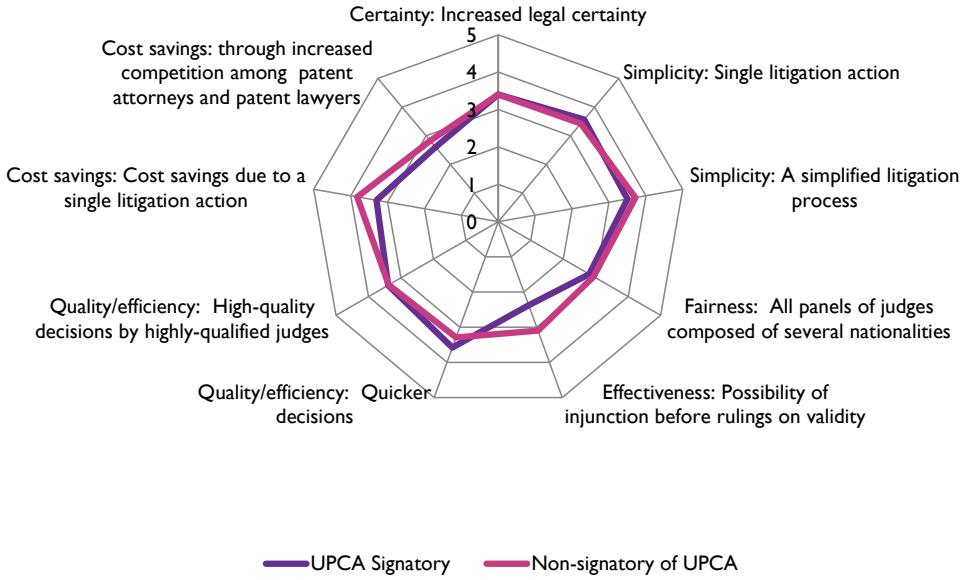
Figure 4.14: Aspects of UPC that would be beneficial for claimants in infringement cases (by type of organisation)



Note: 1=no improvement; 5=very significant improvement.

Figure 4.14 shows that organisations based in countries that have signed the Unitary Patent Court Agreement (UPCA signatories) and those based in countries that have not (non-signatory of UPCA) exhibit similarities in the perceived beneficial impacts for claimants in infringement cases. A notable point is that respondents based in UPCA signatories consider the benefits from the possibility of injunction before rulings on validity as having the most limited impact.

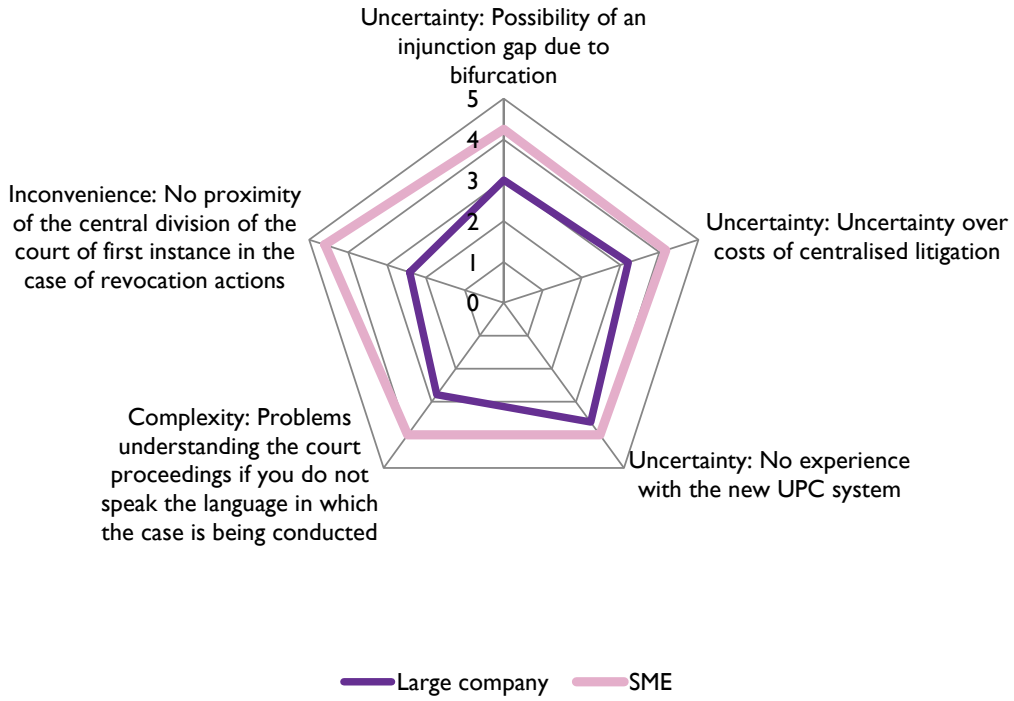
Figure 4.15: Aspects of UPC that would be beneficial for claimants in infringement cases (by signatory status of the UPCA)



Note: 1=no improvement; 5=very significant improvement.

The results presented in Figure 4.16 show the aspects of UPC that would be detrimental for claimants in infringement cases, broken down by type of organisation. Overall, larger firms seem to have fewer concerns with the UPC than SMEs and these are mainly associated with the uncertainty that may arise from a lack of experience with the UPC system and the costs of centralised litigation.

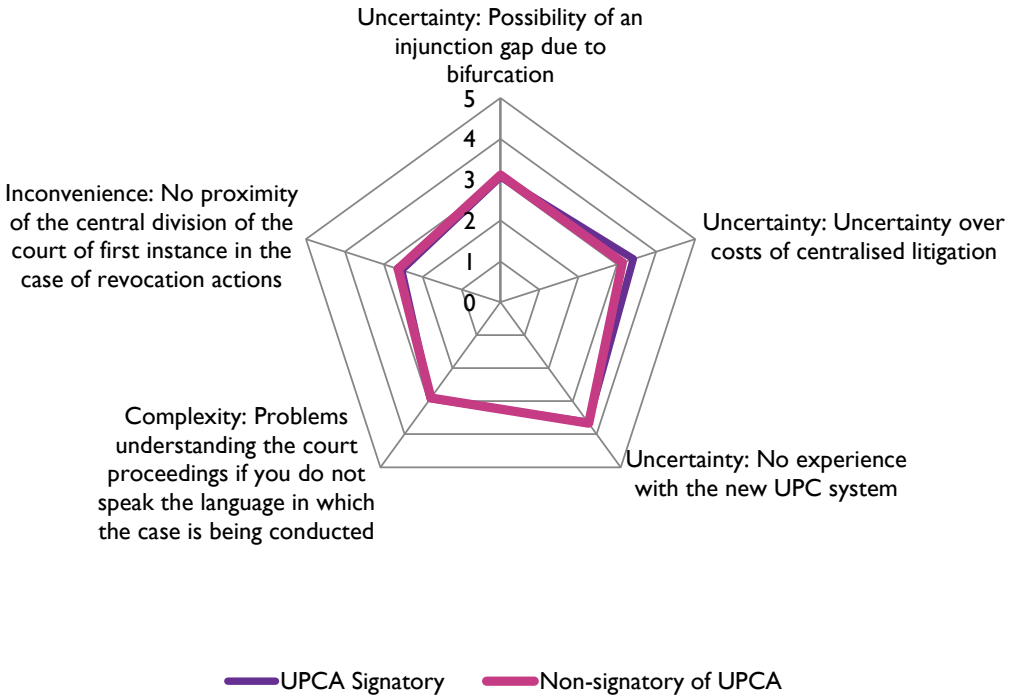
Figure 4.16: Aspects of UPC that would be detrimental for claimants in infringement cases (by type of organisation)



Note: 1=no detriment; 5=very significant detriment.

An analysis of detriment due to the UPC by signatory status of the UPCA is presented in Figure 4.17. Those based in countries that have signed the UPCA do not exhibit any significant differences of opinion compared to those based in countries that have not signed it.

Figure 4.17: Aspects of UPC that would be detrimental for claimants in infringement cases (by signatory status of the UPCA)



Note: 1=no detriment; 5=very significant detriment.

Defendant against invalidity claim of third party

The nature of the pros and cons associated with the UPC for defendants against invalidity claim of a third party are similar to those presented above for claimants in infringement cases. This is because the objective in both instances is to ensure that the rights to protection accrued through patent protection, hence any change that makes it easier to enforce rights across Europe would benefit both claimants in infringement cases and defendants in invalidity cases.

In the table below, much like when considering defending a company's patents against third-party infringement, we observe that large companies are most frequently involved in relevant litigation, followed by SMEs and individuals and other types of organisations.

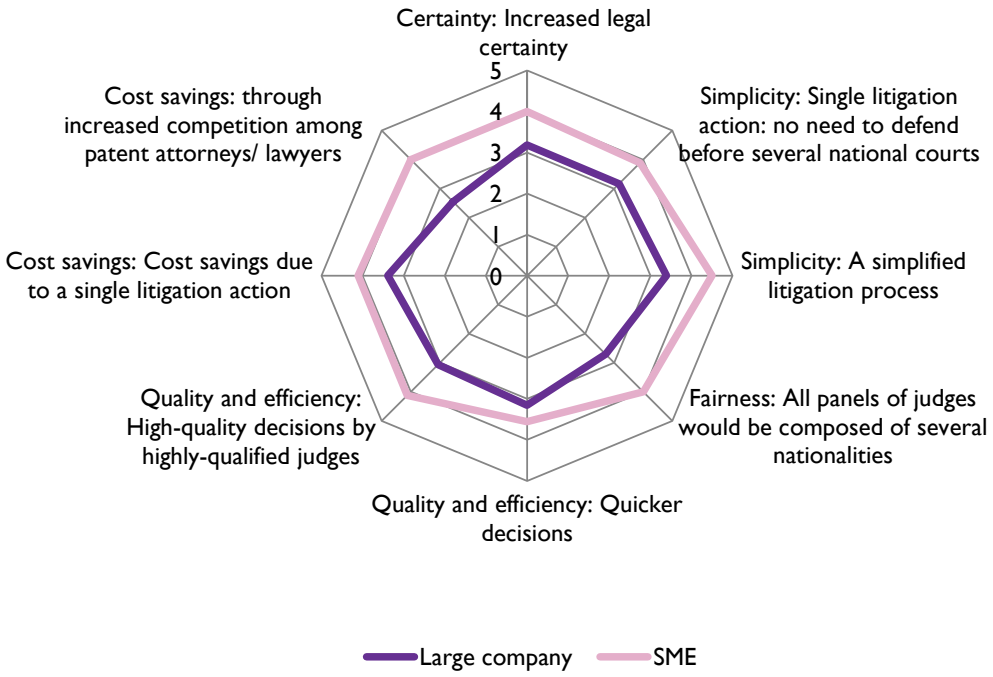
Table 4.15: Percentage of organisations that have taken legal action in any European National Court to defend against third-party claims of invalidity.

	Yes	No	Unsure	Prefer not to answer
Whole sample	19%	63%	11%	7%
Large company	23%	56%	13%	8%
SME	9%	83%	5%	2%

Figure 4.18 shows that SMEs generally consider that the benefits of the UPC would be greater than do larger companies and universities and public research organisations. The benefits associated with the single litigation action and simplified litigation process are considered to be particularly important by SMEs, while the speed of decision-making is considered to be relatively less beneficial. Larger firms, by contrast,

consider the speed of decision-making to be an important benefit of the UPC alongside the benefits associated with the single litigation action.

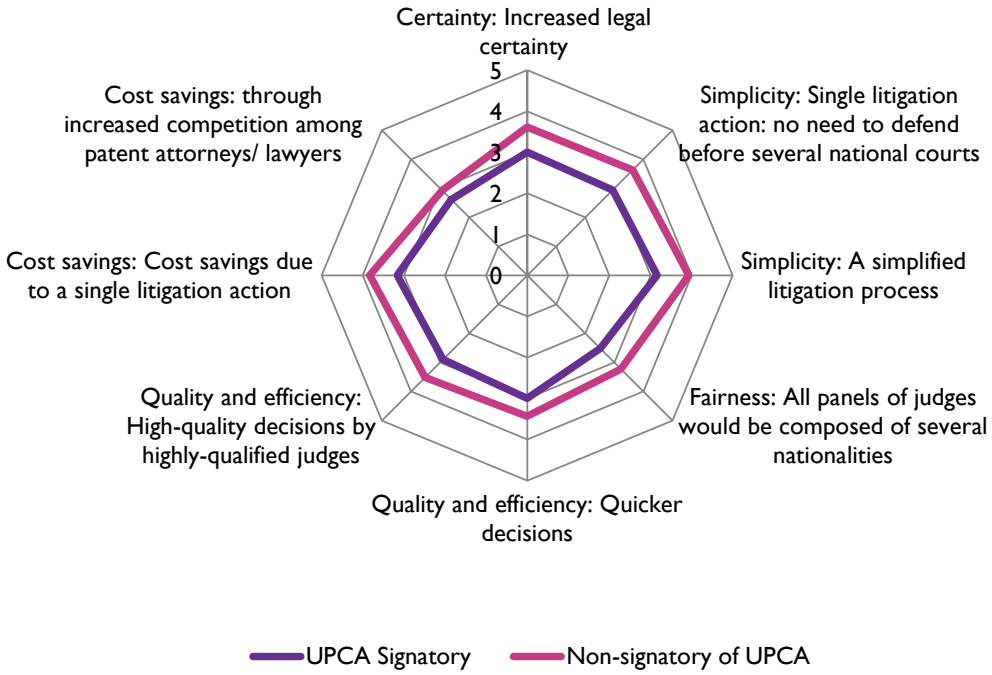
Figure 4.18: Aspects of UPC that would be beneficial for defendants in invalidity cases (by type of organisation)



Note: 1=no improvement; 5=very significant improvement.

Figure 4.19 shows that SMEs and large companies based in countries that have signed the UPCA consider that the benefits of the UPC for defendants in invalidity cases are slightly less significant than those perceived by organisations based in countries that have not signed the UPCA. The perceived strength of benefit is most consistent with respect to cost savings due to increased competition among patent attorneys and most divergent with respect to both cost savings due to a single litigation action and the simplified litigation process.

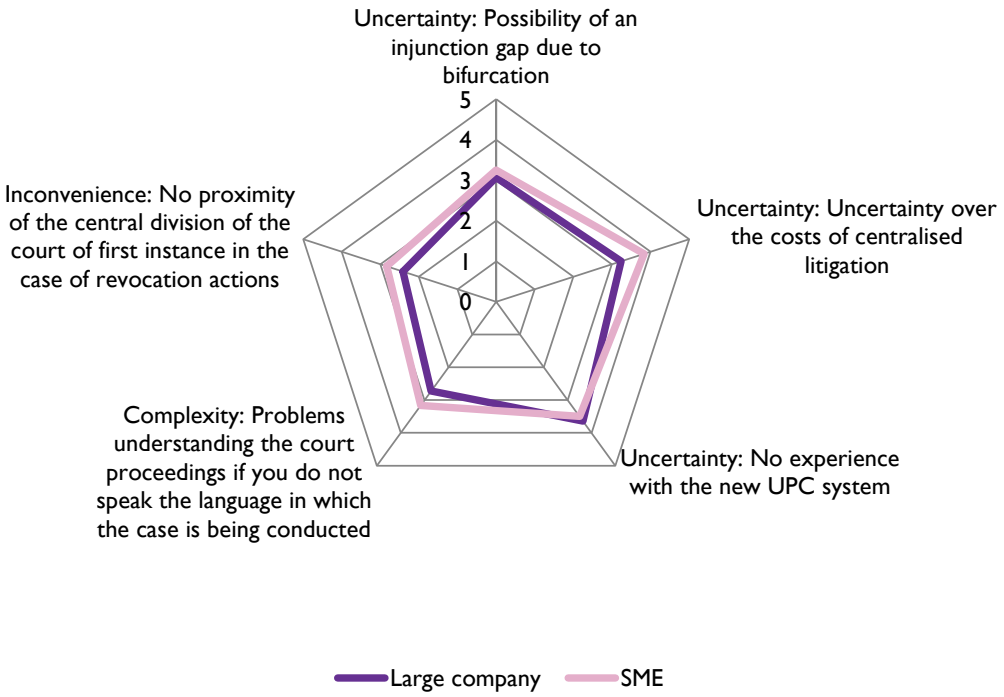
Figure 4.19: Aspects of UPC that would be beneficial for defendants in invalidity cases (by signatory status of the UPCA)



Note: 1=no improvement; 5=very significant improvement.

With respect to the potentially detrimental impacts of the UPC for defendants in invalidity cases we again find that the strength of impact perceived by SMEs exceeds that of larger firms. SMEs consider that each potentially detrimental aspect of the UPC will have either a significant or very significant adverse impact relative to their previous experience as a defendant in invalidity cases. The factor of greatest concern to SMEs is the uncertainty over costs of centralised litigation. Larger companies consider that there will be a modest detriment in most cases, although the potential detriment due to a lack of experience with the UPC system is considered to be more significant.

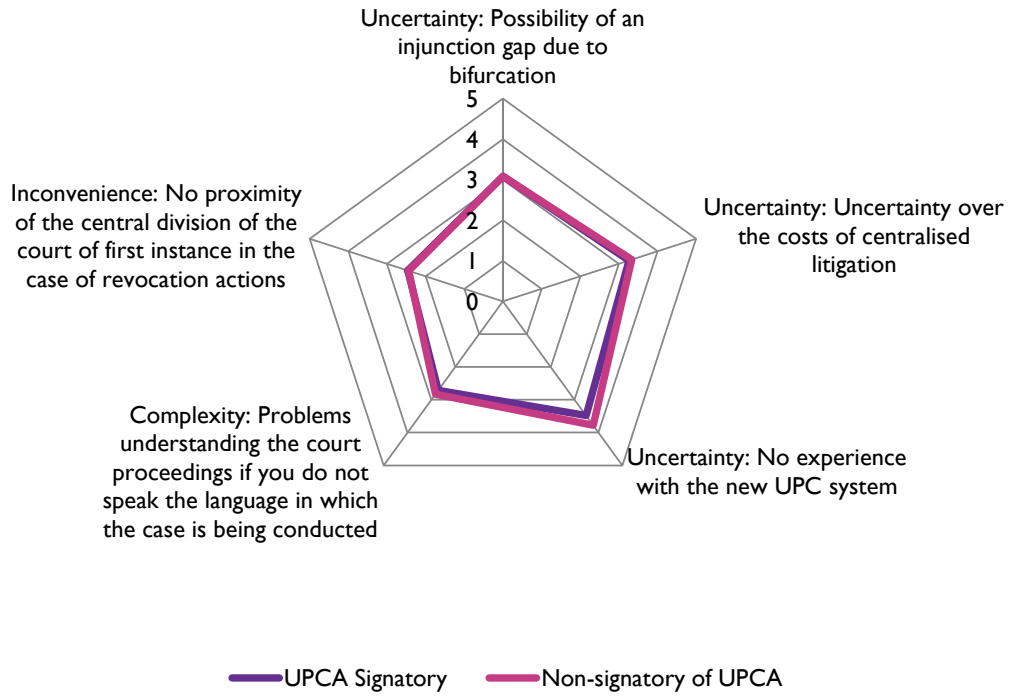
Figure 4.20: Aspects of UPC that would be detrimental for defendants in invalidity cases (by type of organisation)



Note: 1=no detriment; 5=very significant detriment.

Figure 4.21 shows that those respondents with headquarters in a country that has not signed the UPCA are somewhat more concerned about some aspects of the UPC than are those that have.

Figure 4.21: Aspects of UPC that would be detrimental for defendants in invalidity cases (by signatory status of the UPCA)



Note: 1=no detriment; 5=very significant detriment.

4.4.2 Countering the claims to patent protection of third parties

Defendant in infringement case (i.e. the alleged infringer)

Figure 4.16 shows that only large companies and SMEs have been the targets of litigation by third parties for infringing their patents. To be more specific, approximately one in four large companies has been involved in such legal actions, while for SMEs the relevant figure is eight per cent.

Table 4.16: Percentage of organisations against which legal action has been taken by third-parties for infringement of their European patent.

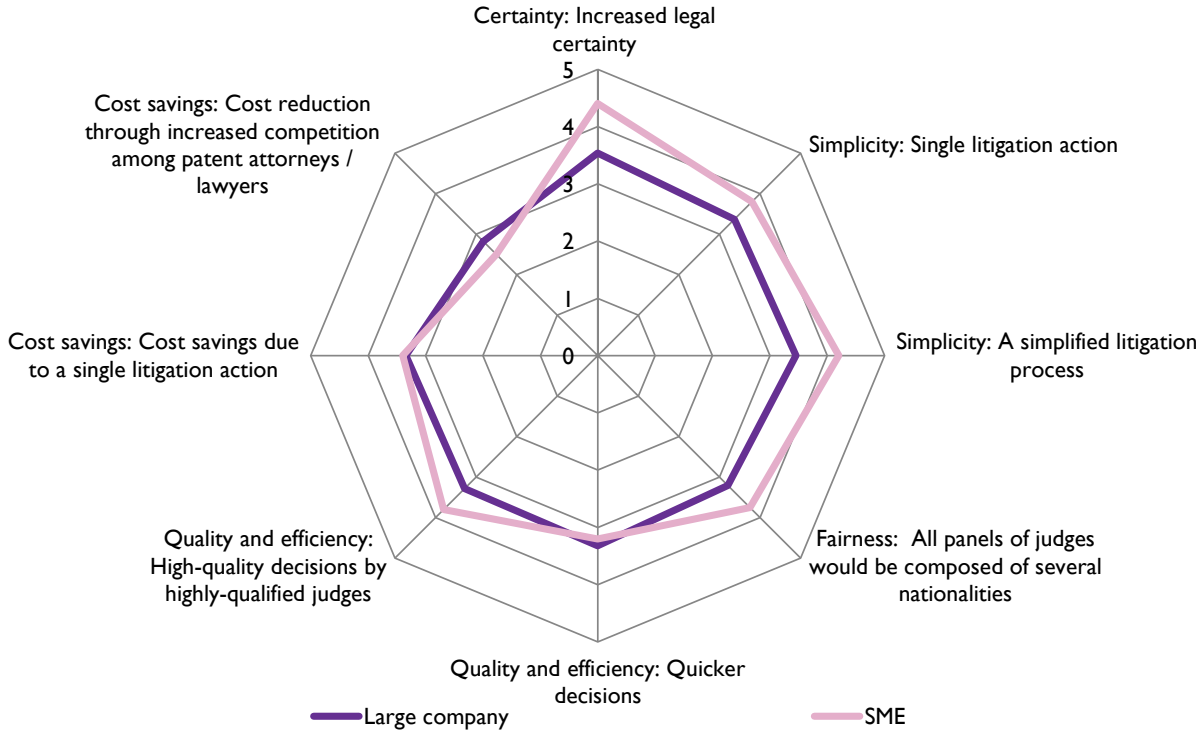
	Yes	No	Unsure	Prefer not to answer
Whole sample	20%	63%	10%	7%
Large company	24%	55%	12%	9%
SME	7%	85%	5%	2%

Figure 4.22 shows that SMEs are generally very appreciative of the UPC when acting as a defendant in an infringement case whereas large companies are somewhat less enthusiastic. Indeed, SMEs consider that all potential benefits of the UPC, other than cost savings and quicker decisions, would be very significant whereas larger companies consider that the benefits would be relatively modest.

This finding may, to some extent, reflect the typical roles of SMEs and large companies in infringement cases. If SMEs are typically defendants in such cases they will tend to be enthusiastic about any changes that would benefit defendants. If larger companies tend to be claimants in infringement cases then they may

dislike changes that would benefit them when acting as a defendant because they would be detrimental in cases where they act as a claimant. Overall, the possibility of strategic responses to this question cannot be ruled out.

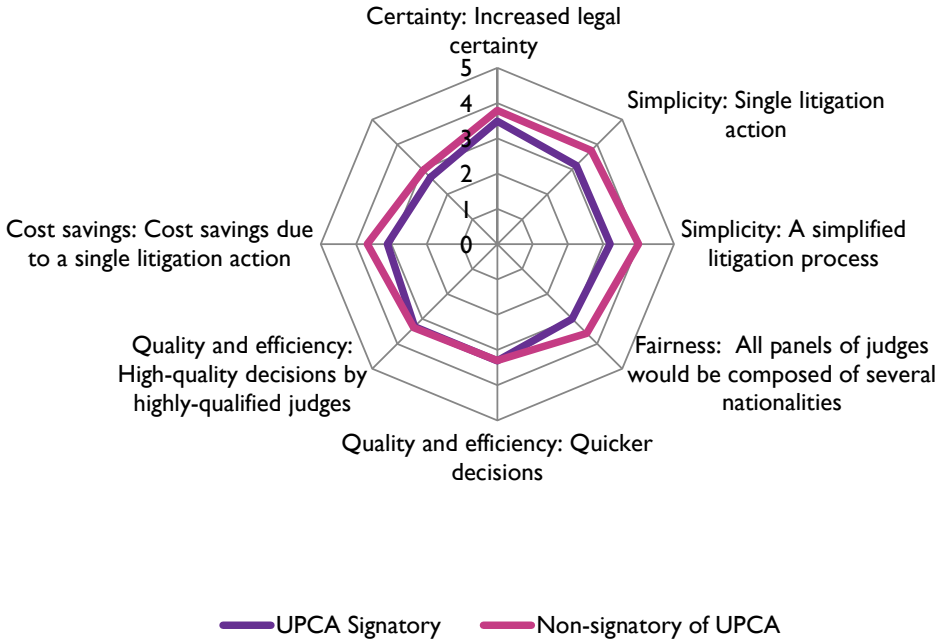
Figure 4.22: Aspects of UPC that would be beneficial for defendants in infringement cases (by type of organisation)



Note: 1=no improvement; 5=very significant improvement.

As shown in Figure 4.23, respondents with headquarters in a country that has signed the UPCA perceive some benefits of the UPC for defendants in infringement cases to be slightly lower than non-signatories, although perceptions concerning the quality and efficiency benefits are consistent across these groups.

Figure 4.23: Aspects of UPC that would be beneficial for defendants in infringement cases (by signatory status of the UPCA)

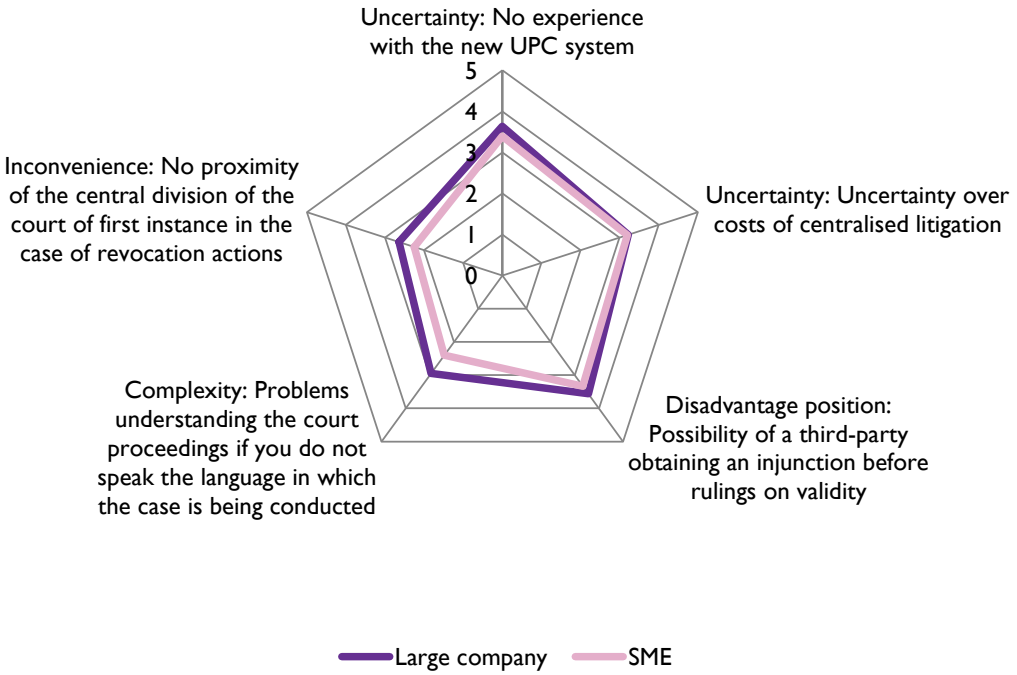


Note: 1=no improvement; 5=very significant improvement.

The detriment of the UPC for defendants in infringement cases perceived by large companies exceeds that perceived by SMEs. Figure 4.24 shows that this finding is particularly strong with respect to court proceedings language barriers.

The pattern of responses to this question is the inverse of that to the question of benefits of the UPC. This is driven largely by the fact that SMEs perceive detrimental impacts to be far less significant than beneficial impacts. The strength of impact perceived by large companies is reasonably consistent for benefit and detriment.

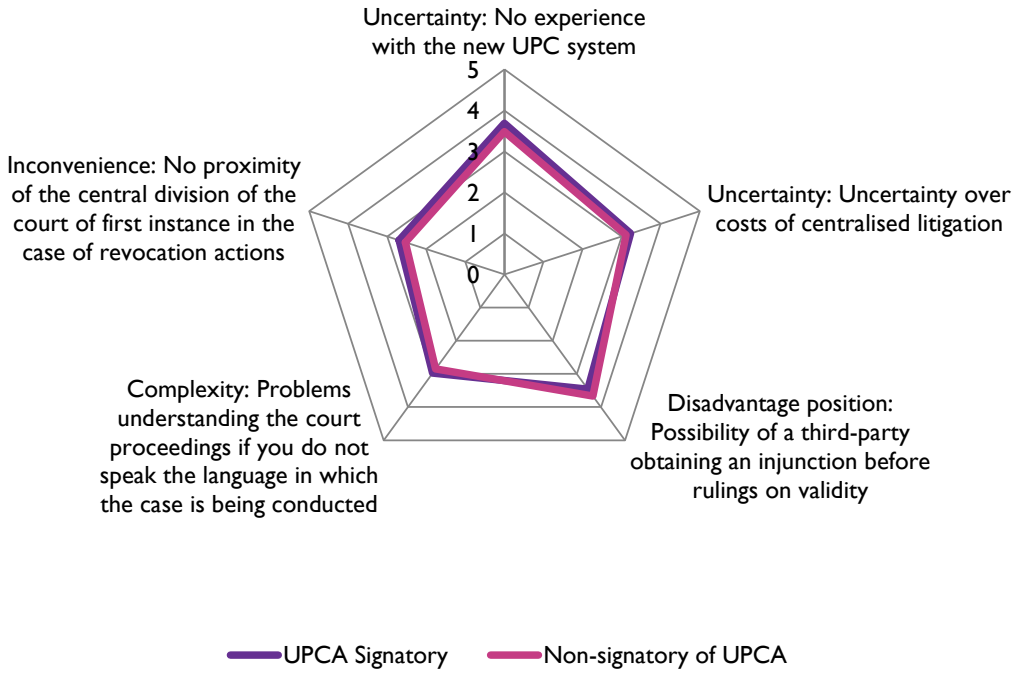
Figure 4.24: Aspects of UPC that would be detrimental for defendants in infringement cases (by type of organisation)



Note: 1=no detriment; 5=very significant detriment.

As shown in Figure 4.25, perceptions of the extent to which the introduction of the UPC would be detrimental for defendants in patent infringement cases do not differ significantly based on the UPCA signatory status of the country where the organisation is headquartered.

Figure 4.25: Aspects of UPC that would be detrimental for defendants in infringement cases (by UPCA signatory status)



Note: 1=no detriment; 5=very significant detriment.

Claimant in invalidity case (i.e. alleger that patent is not valid)

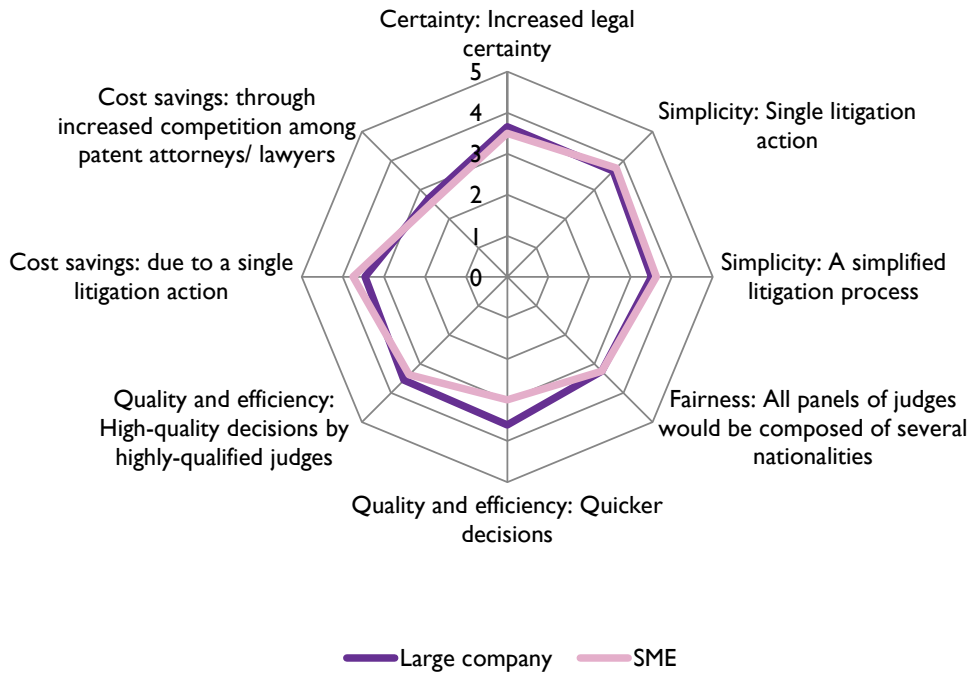
The percentage of companies that were involved in legal action, arguing that a third-party patent is not valid, is broken down by organisation type in the table below. As in the other three cases of legal action described above, large companies are the most frequently involved while SMEs are second in that respect. Universities and public research organisations have not taken any legal action against third-party invalidity.

Table 4.17: Percentage of organisations that have taken legal action in any European National Court to argue that a third party's European patent is not valid

	Yes	No	Unsure	Prefer not to answer
Whole sample	19%	64%	10%	6%
Large company	23%	57%	12%	8%
SME	9%	83%	5%	2%

Figure 4.26 shows that there is relatively little difference between SMEs and larger companies with respect to perception of the extent to which specified aspects of the UPC would benefit claimants in invalidity cases. The only significant difference between the groups relates to the speed of decision-making: large companies value this potential benefit of the UPC more highly than SMEs.

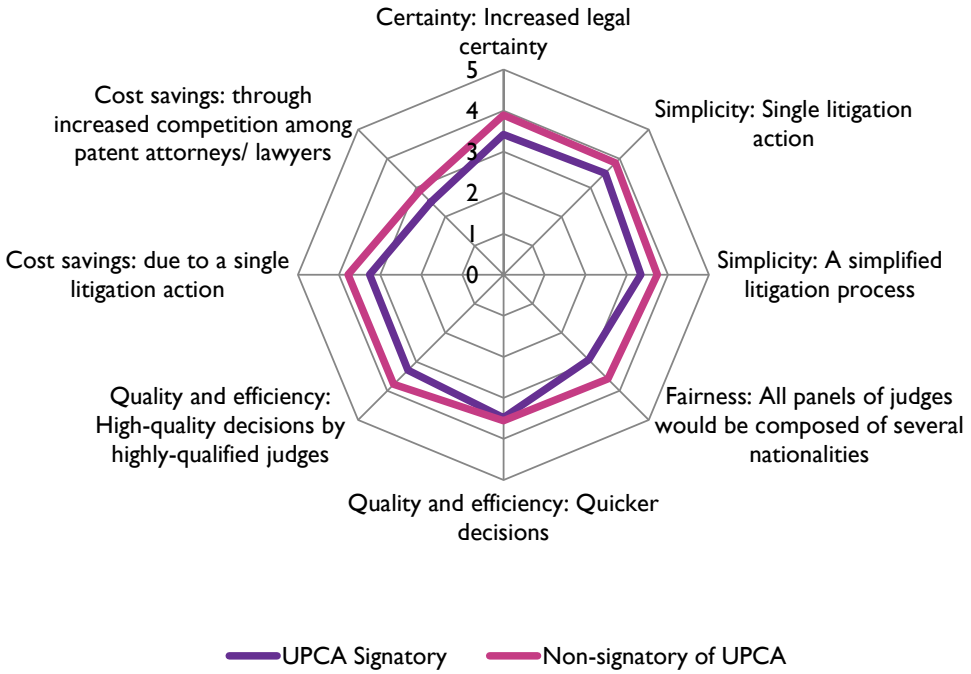
Figure 4.26: Aspects of UPC that would be beneficial for claimants in invalidity cases (by type of organisation)



Note: 1=no improvement; 5=very significant improvement.

The results in Figure 4.27 show that organisations headquartered in UPCA signatories perceive all potential benefits of the UPC for claimants in invalidity cases to be slightly less significant than those that have not signed the UPCA.

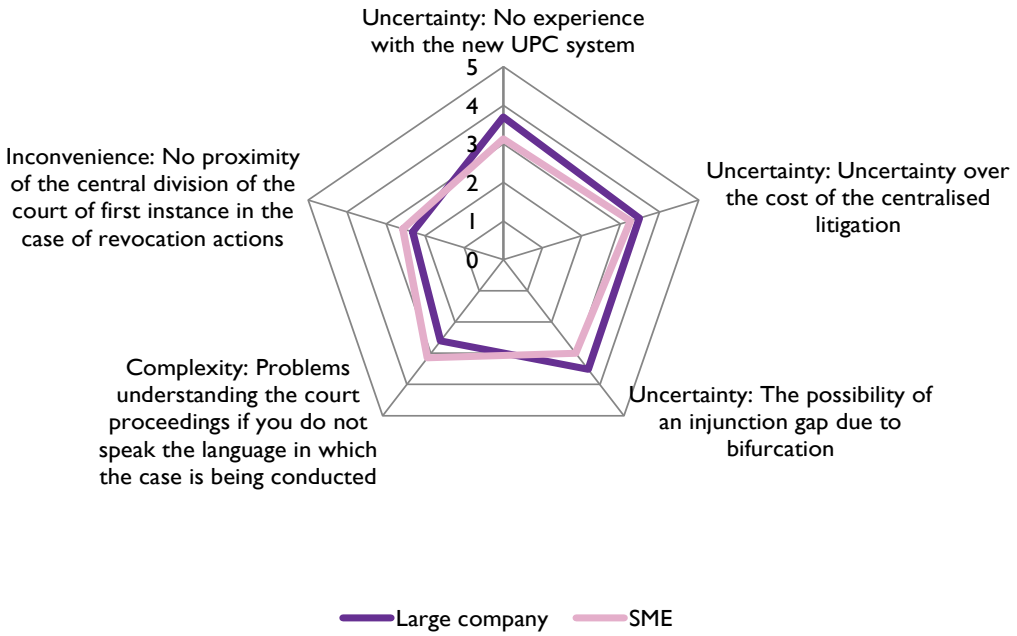
Figure 4.27 Aspects of UPC that would be beneficial for claimants in invalidity cases (by signatory status of the UPCA)



Note: 1=no improvement; 5=very significant improvement.

As shown in Figure 4.28 the potential detriment of the UPC perceived by large companies and SMEs is similar. SMEs are slightly more concerned about complexity than larger companies are, whereas uncertainty is considered to be a slightly more significant detriment by large companies. The level of inconvenience perceived by each group is similar.

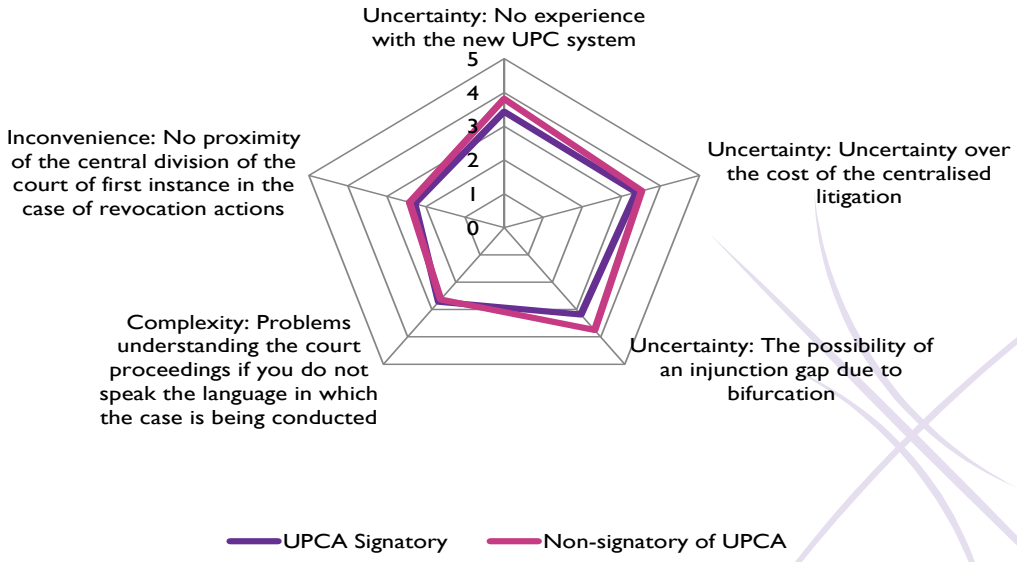
Figure 4.28: Aspects of UPC that would be detrimental for claimants in invalidity cases (by type of organisation)



Note: 1=no detriment; 5=very significant detriment.

In common with previous responses, the level of detriment due to the UPC perceived by UPCA signatories is lower compared to non-signatories (see Figure 4.29).

Figure 4.29: Aspects of UPC that would be detrimental for claimants in invalidity cases (by UPCA signatory status)



Note: 1=no detriment; 5=very significant detriment.

4.4.3 Summary

The results presented in this section show that, overall, SMEs are slightly more positive about the impact of the UPC than larger companies are, reporting greater benefits for invalidity and infringement defendants than large companies do, while the reports for both classes of claimant are similar. The results also suggest that, when acting as claimants in infringement cases, larger firms seem to have fewer concerns with the UPC than SMEs and these are mainly associated with the uncertainty that may arise from a lack of experience with the UPC system and the costs of centralised litigation.

There is little difference between respondents with headquarters in UPCA signatory countries and non-signatory countries with respect to the perceived benefit of the UPC for actors in patent litigation cases. This conclusion holds for both claimants and defendants in both invalidity and infringement cases.

5 Survey Results by Technological Classification

5.1 Introduction

As noted in the above literature review and reflected in our conceptual framework, the patents system is used in different ways by companies that are active in different technology fields. For example, we reported that the degree of licensing and willingness to licence vary significantly by technological field. Licensing is very common in the pharmaceuticals, medical technology and biotechnology whereas chemical and printing industries tend to have a low proportion of licensing. The difference between these extremes can be of a factor of two in the case of licensing and a factor of four for willingness to license.

In light of the fact that the patent system is not used uniformly by all fields, it is important to explore how perspectives on the costs and benefits of the Unitary Patent and Unified Patent Court differ between sectors. For the purpose of this analysis we define 'sectors' using the technological cluster definition provided below.

Table 5.1: Technological clusters and technological classifications

Technological Clusters	Technological Classification
Electrical Engineering	Electrical machinery, apparatus, energy
	Audio-visual technology
	Telecommunications
	Digital communication
	Basic communication processes
	Computer technology
	IT methods for management
	Semiconductors
Instruments	Optics
	Measurement
	Analysis of biological materials
	Control
	Medical technology
Chemistry	Organic fine chemistry
	Biotechnology
	Pharmaceuticals
	Macromolecular chemistry, polymers
	Food chemistry
	Basic materials chemistry

Technological Clusters	Technological Classification
	Materials, metallurgy
	Surface technology, coating
	Micro-structural and nano-technology
	Chemical engineering
	Environmental technology
Mechanical Engineering	Handling
	Machine tools
	Engines, pumps, turbines
	Textile and paper machines
	Other special machines
	Thermal processes and apparatus
	Mechanical elements
	Transport
Other fields	Furniture, games
	Other consumer goods
	Civil engineering

In contrast to the presentation of results in the previous chapter it is not possible to present a table reporting the number of responses by technological cluster, since it would be inappropriate to match each respondent exclusively to a unique cluster. The reason for this is that many respondents file patents in more than one technological cluster and hence do not fall neatly into one category.

However, it is possible to report the number of respondents that have filed at least one application in each technological cluster, as shown in Table 5.2. Given that many applicants file in more than one cluster it is to be expected that the sum of entries in this table exceeds the number of survey respondents.

Table 5.2: Number of respondents that have filed at least one application in each technological cluster

Electrical Engineering	180
Instruments	185
Chemistry	205
Mechanical Engineering	210
Other fields	68

Again, it should be noted that not all respondents provided information for some of the questions in the survey and so not all tables and charts presented in this section are based on the sample of respondents. Furthermore, respondents had the option to select 'unsure' or 'prefer not to answer' for each specific element of each question. Therefore, it is typically the case that the number of responses achieved differs between different parts of a single question. As a result, we do not provide information on the number of respondents to each element of each question in this report, though a summary of response rates by question is included in Appendix 5.

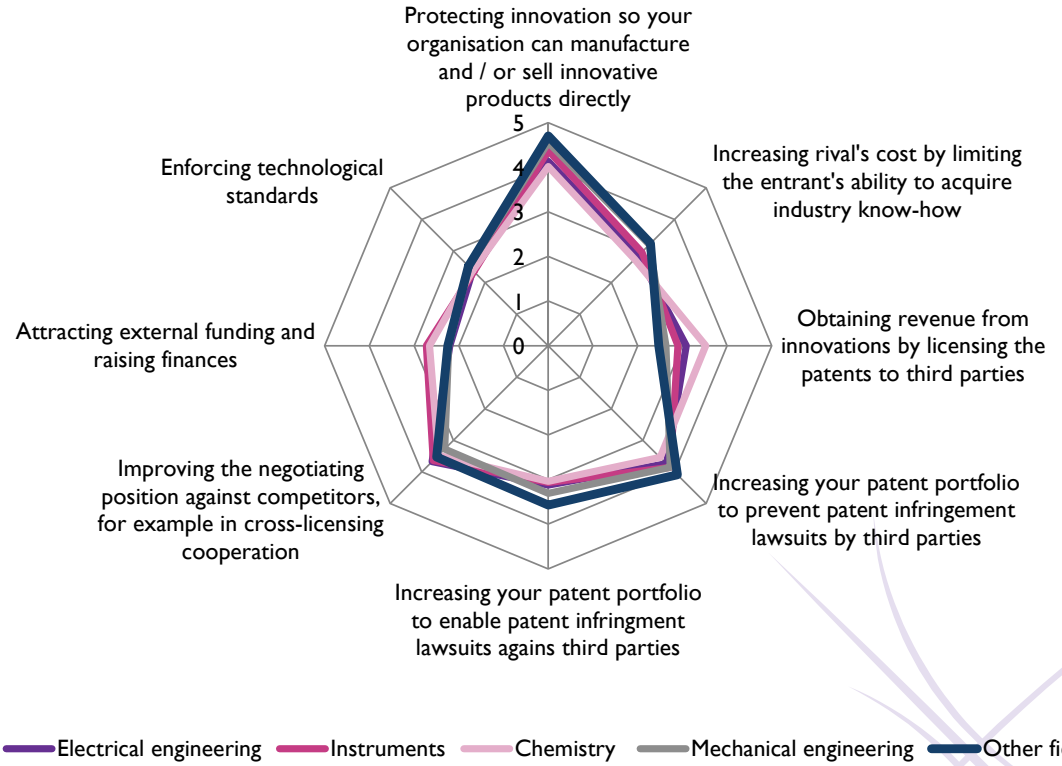
5.2 Overview of patent users' characteristics

The goal of this sub-section is to illustrate how users belonging to different technological clusters differ with respect to certain patenting behaviours. More specifically, we illustrate below how patent users differ across the following characteristics:

- Main rationale for patenting.
- Validation activity, e.g.:
  - number of countries in which EPO patents are typically validated;
  - means though which patent are validated; and
  - key factors driving the choice of the country in which patents are validated.
- Renewal decisions, e.g.:
  - typical lifetime of patents;
  - means though which patents are renewed; and
  - importance of different typologies of renewal costs.

5.2.1 Rationales for patenting

Figure 5.1: Rationale for patenting across different technological clusters



Note: 1=not important factor in deciding whether or not to apply for EPO patent; 5= important factor in deciding whether or not to apply for EPO patent.

Figure 5.1 depicts the importance (from a scale to 1 — "Not important" to 5 — "Very important") of different rationales for the decision of whether or not to apply for EPO patents. The traditional rationale for patenting (i.e. protecting innovation in order to manufacture and commercialise innovative products) appears to be the most important factor across all technological clusters and, overall, the profiles in Figure

5.1 are broadly homogenous. The most distinctive differences are as follows. Attracting external funding appears to be more important for users in the chemistry and instruments clusters and the possibility of generating revenues through licensing agreement is weighted more by users in the chemistry cluster. Finally, strategic practices such as obtaining patents to increase rivals' costs and to decrease the chances of lawsuits by third parties, on average, have been ranked as been marginally more important for users in the other fields cluster.

5.2.2 Validation activity

As illustrated in Table 5.3 users in the chemistry cluster, on average, tend to validate patents in the largest number of countries, whilst those in the electrical engineering and the instruments cluster in the least.

Table 5.3: Average number of countries where patents are validate by technological cluster

	Average number of countries in which a patent was validated
Whole group	8.07
Electrical Engineering	6.89
Instruments	7.72
Chemistry	12.38
Mechanical Engineering	8.03
Other fields	8.42

The table below indicates the use of patent attorneys is, on average, the most common means through which users validate their patents. Moreover, there are no widespread differences in validation methods across clusters with two notable exceptions: users in the electrical engineering cluster make the least use internal staff for validation activities, whilst users in the instruments cluster make the least use of specialised companies.

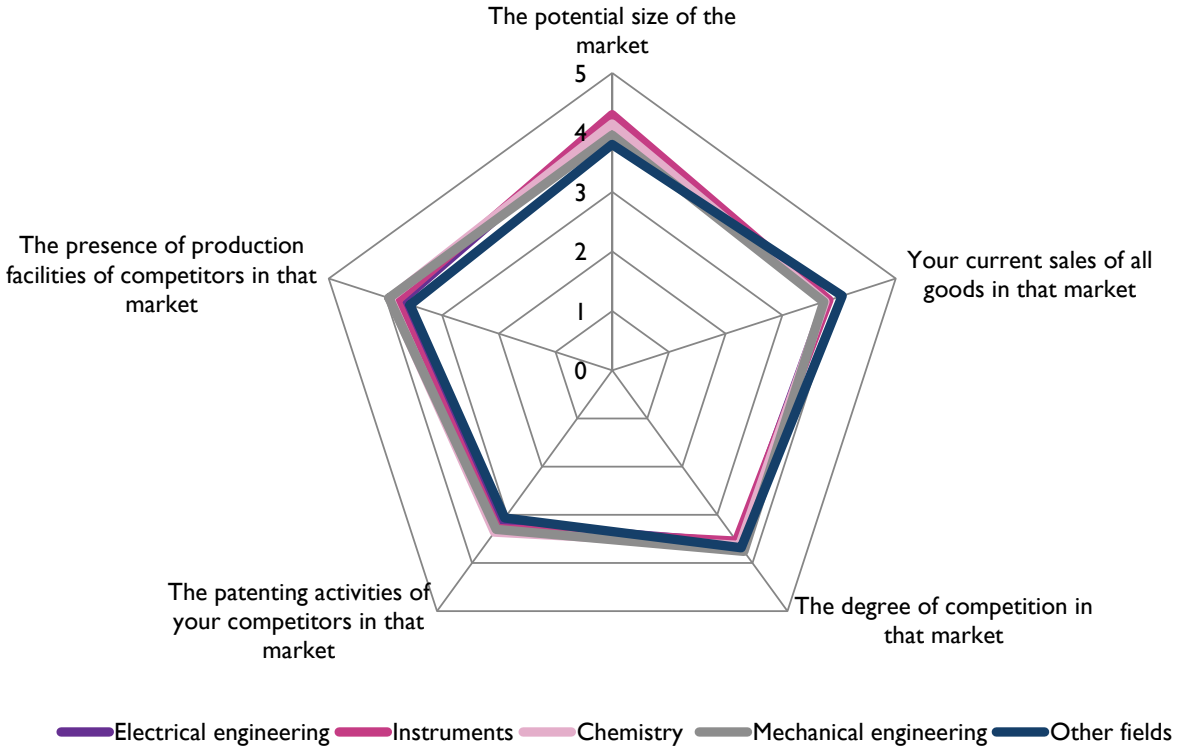
Table 5.4: Percentage of patents validated through different means (by technological cluster)

	Validated directly by your organisation only	Validated by an independent patent attorney in the countries where you achieved patent protection	Validated by a European patent attorney representing the European application	Validated using specialised company dealing with the validation process	Prefer not to answer	Unsure
Electrical Engineering	7%	19%	42%	15%	9%	7%
Instruments	9%	12%	57%	12%	8%	1%
Chemistry	11%	24%	42%	14%	7%	2%
Mechanical Engineering	12%	24%	40%	13%	8%	3%
Other fields	14%	23%	34%	18%	9%	1%

There is also broad similarity among respondents in relation to the importance attached to factors driving the choice of the countries where patents are validated (see Figure 5.2 below). Interestingly, the size of the potential market has been mentioned by users in both the electrical engineering cluster and the instruments

cluster as the most important factor for determining where to validate patents, while the presence of patenting activity by competitors in a market has been mentioned as the least important.

Figure 5.2: Importance of commercial factors in the decision of where to validate a patent (by technological cluster)



Note: 1=not important factor in deciding where to validate a patent; 5= important factor in deciding whether where to validate a patent.

5.2.3 Renewal decisions

The following table indicates the percentage of patents kept in force in at least one EPC Member State for different time periods. On average, patents held by users in other fields and chemistry are those more likely to reach the end of the term (users in these clusters have indicated that, on average, 38 and 31 per cent respectively, of the patent in their portfolios reach statutory life in at least one country). Users in the electrical engineering and instruments cluster report the highest percentage patents (19 per cent) kept in force for less than five years. Whilst aggregate information patent validation activity is retrievable from the EPO the added value of gathering this information through the survey is that it allows the drawing of a more accurate picture of the self-reported patenting characteristics of the respondents upon which our survey results are based.

Table 5.5: Percentage of patents in the portfolio kept in force for different periods in at least one EPC member state (by technological cluster)

	Less than 5 years in at least 1 MS	Between 5 and 9 years in at least 1 MS	Between 10 and 14 years in at least 1 MS	Between 15 and 19 years in at least 1 MS	Until the end of the term	Other
Electrical Engineering	19%	15%	22%	15%	25%	4%
Instruments	19%	15%	14%	25%	27%	0%

	Less than 5 years in at least 1 MS	Between 5 and 9 years in at least 1 MS	Between 10 and 14 years in at least 1 MS	Between 15 and 19 years in at least 1 MS	Until the end of the term	Other
Chemistry	17%	24%	18%	9%	31%	0%
Mechanical Engineering	15%	17%	22%	17%	28%	0%
Other fields	8%	10%	16%	28%	38%	0%

Whilst patent attorneys tend to be the most common means through which patent users conduct patent validation activities, specialised companies are the primary means through which users carry out renewal activities (see Table 5.6 below).

Table 5.6: Percentage of patents renewed through different means (by technological cluster)

	Renewed directly by your organisation by paying fees to the relevant NPO	Renewed by a patent attorney in the country where the patent was in force	Renewed by a European patent attorney representing a European patent application	Renewed by a specialised company	Other/ Unsure	Prefer not to answer
Electrical Engineering	4%	11%	23%	51%	0%	9%
Instruments	5%	9%	25%	48%	0%	10%
Chemistry	5%	11%	16%	52%	2%	11%
Mechanical Engineering	6%	7%	18%	54%	0%	12%
Other fields	4%	18%	26%	43%	0%	9%

5.3 Key findings: potential impacts of the Unitary Patent

As noted earlier, the existence of a unitary patent may affect the number of applications that an organisation would make to the EPO. The results presented in Table 5.7 suggest that the Unitary Patent is likely to lead to an increase in the number of filings from all clusters. In all cases, the proportion of respondents stating that filings would increase exceeds those stating the filings would fall by at least eight percentage points.

Table 5.7: Impact of the Unitary Patent on filings, relative to current filings (by technological cluster)

	Increase	No effect/ remain the same	Decrease	Unsure	Prefer not to answer
Electrical Engineering	19%	60%	7%	11%	2%
Instruments	14%	64%	6%	14%	2%
Chemistry	17%	64%	5%	13%	2%
Mechanical Engineering	22%	57%	7%	14%	0%
Other	22%	63%	1%	13%	1%

The remainder of this sub-section explores the degree to which perceptions of the advantages and disadvantages of the Unitary Patent differ by technological cluster.

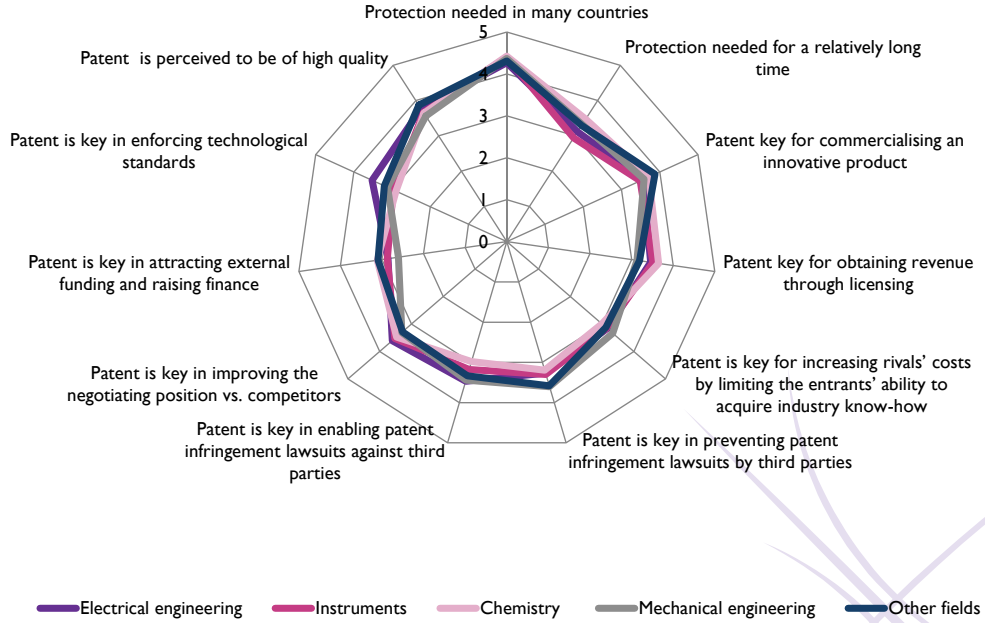
5.3.1 Innovation characteristics and protection requirements

As illustrated in Figure 5.1 there is much consistency across clusters with respect to the significance of certain factors on the choice of whether to use the Unitary Patent. The most important driver of choosing to use the Unitary Patent is the desire to secure protection in a large number of countries. Such a finding provides support for one of the objectives of the Unitary Patent: a desire to reduce the costs and complexity of securing protection across Europe.

Few of the specified influences are thought to reduce the likelihood of securing protection through the Unitary Patent route, although the impact of many factors on the decision between the Unitary and classical routes is considered to be limited.

The instruments cluster considers that a desire to guard against infringement lawsuits and a desire to increase rivals costs would provide motivation for choosing the Unitary Patent route whereas these influences are considered to be less significant by the other clusters. The chemistry cluster considers that the wish to enforce technological standards and improve the company's negotiating position relative to competitors would have a slightly stronger influence on the decision to choose a Unitary Patent than is the case for respondents from other clusters.

Figure 5.3: Influences of innovation characteristics and protection requirements on use of Unitary Patent (by technological cluster)



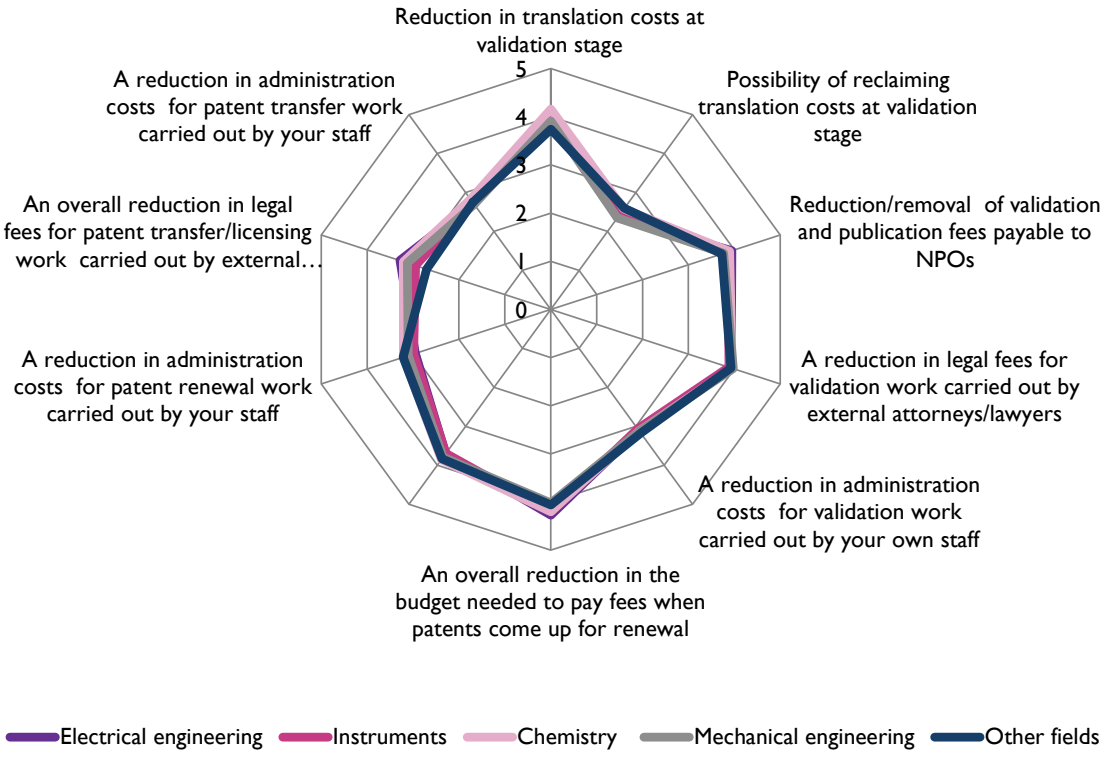
Note: 1=significantly less likely to use Unitary Patent; 5= significantly more likely to use Unitary Patent.

Costs of securing patent protection

Figure 5.4 shows that there is almost complete consistency between clusters with respect to the importance of certain cost factors on the choice of whether or not to choose a Unitary Patent. In particular, all clusters agree that the factors most likely to increase the likelihood that a Unitary Patent

reductions in various administrative fees (publication, legal and renewal) and translation costs. Potential administrative cost savings have a less strong influence on the likelihood of choosing a Unitary Patent while the possibility of reclaiming translation costs is found to have the least strong influence (most likely because of the fact that this possibility would only be available to a sub-set of respondents).

Figure 5.4: Influences of potential cost reductions on use of Unitary Patent (by technological cluster)



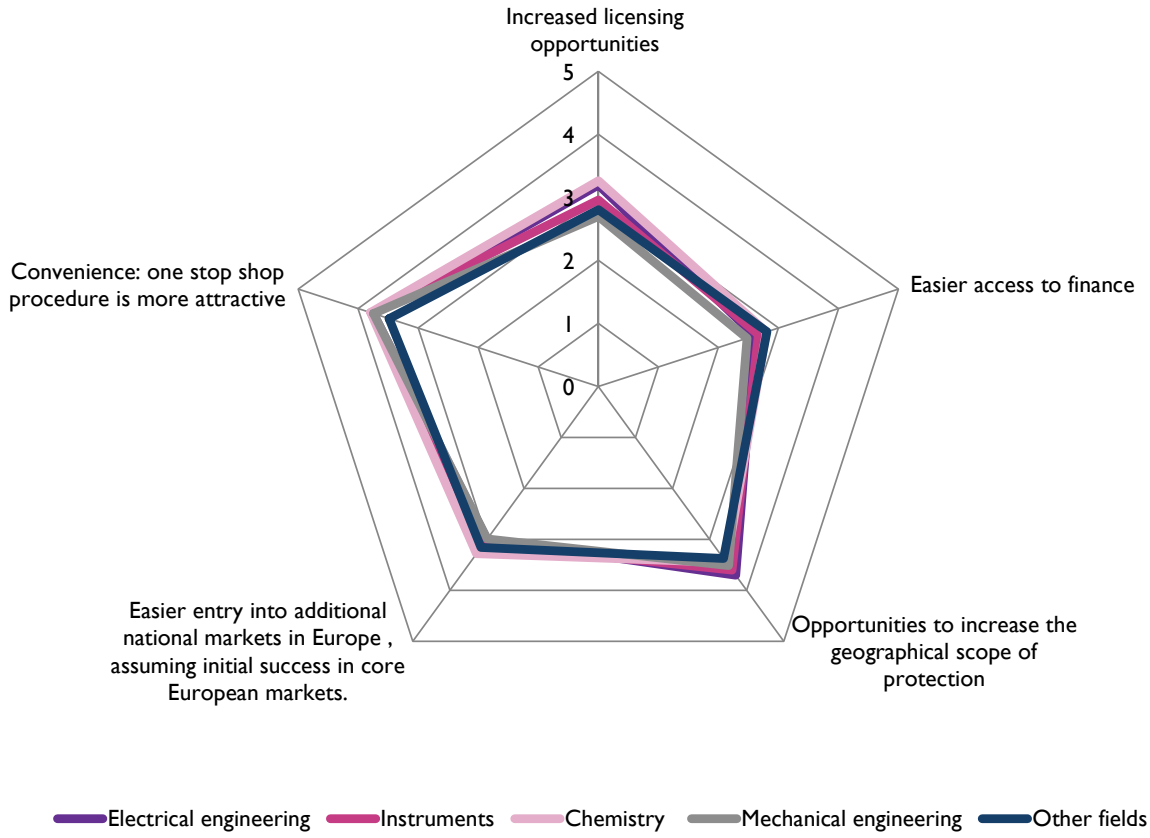
Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

5.3.2 Business opportunities

Figure 5.5 shows that there is almost total consistency across clusters with respect to the perceived business benefits of the Unitary Patent. All clusters see significant benefits of the Unitary Patent due to the one-stop-shop procedure and the wider geographical scope of protection. The clusters perceive moderate benefits with respect to the greater ease of entering new markets, the possibility of accessing finance more easily and increased licensing opportunities that might result from the Unitary Patent.

The perceived benefits associated with the possibility of having easier access to finance through the UP appear to be even less significant the larger the share of patents filed in the instruments and mechanical engineering clusters (see Section 10.2 in the appendices).

Figure 5.5: Influences of potential increased business opportunities on use of Unitary Patent (by technological cluster)



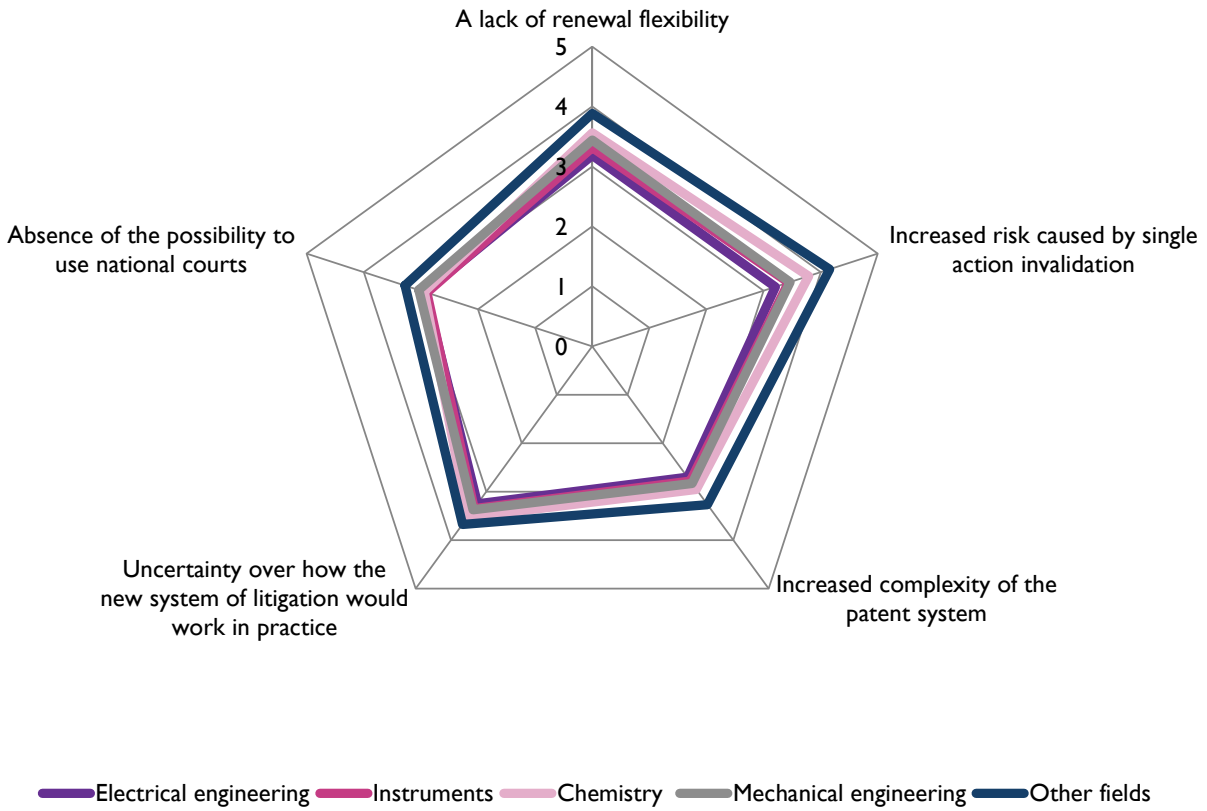
Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

There is some consistency between clusters with respect to the influence of some potential disadvantages of the Unitary Patent but there is a more mixed picture with respect to some other influences. There is a general consensus that the lack of opportunity to use national courts would have a relatively limited influence of the choice between the Unitary Patent and classical European patent. By contrast, the risk of single action invalidation is considered to be a relatively more important factor by clusters such as other fields and chemistry.

The statistical analysis (see Appendix 2) suggests that the increased risk of single action invalidation is perceived as being less significant for users primarily active in the instruments and electrical engineering clusters. We rationalise this result by noticing that respondents with a higher share of patent filings in belonging in these clusters tend to validate patents in the fewest number of countries, as illustrated in Table 5.3.

Moreover, the statistical analysis also suggests that the users who file a greater share of patents in the electrical engineering cluster tend to be less concerned about the uncertainty over the way in which the new litigation system would work in practice, whilst the absence of the possibility to use national courts is perceived as being less important by users filing primarily in the chemistry cluster.

Figure 5.6: Influences of potential disadvantages on use of Unitary Patent (by Technological cluster)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

5.3.3 Summary

Overall, the results presented in this section demonstrate that there is reasonable consistency across clusters with respect to views on the factors that would influence the decision of whether or not to choose a unitary patent. The typical rating given to a pull factor (i.e. those aspects of the Unitary Patent that may be beneficial for patent users) exceeds that given to the potential disadvantages of the Unitary Patent. While the analysis presented above cannot provide a robust cost benefit analysis of the Unitary Patent, the high-level findings are suggestive of the possibility that the Unitary Patent delivers an overall benefit to patent users from all clusters. More insights on the how the perception of the UP may vary across users operating in different clusters can be gained through the econometric analysis conducted in Appendix. The result of this analysis suggests that patent users that file more patents in the Chemistry technical cluster are possibly more likely to register future patents as UP.

5.4 Key Findings: potential impacts of the Unified Patent Court

We report below our findings in relation to the UPC. As already stated earlier, given the very limited litigation experience of universities, PROs and individuals, all the charts presented below are based only on answers provided by large companies and SMEs. The number of responses by technological cluster when only large companies and SMEs are considered are reported in the table below.

Table 5.8: Number of responses by users that filed at least one patent in the following technological clusters (only large companies and SMEs)

Electrical Engineering	142
Instruments	152
Chemistry	159
Mechanical Engineering	181
Other	60

5.4.1 Enforcing rights established by patent protection

Claimant in infringement case (i.e. the patent-holder)

Table 5.9 shows that the proportion of respondents that have experience of acting as a claimant in infringement cases differs significantly by cluster. A small proportion of respondents from the electrical engineering cluster have taken such action whereas approximately a quarter of respondents from the remaining clusters have done so.

Table 5.9: Percentage of organisations that have taken legal action in any European National Court to defend their European patents against infringement of a third party

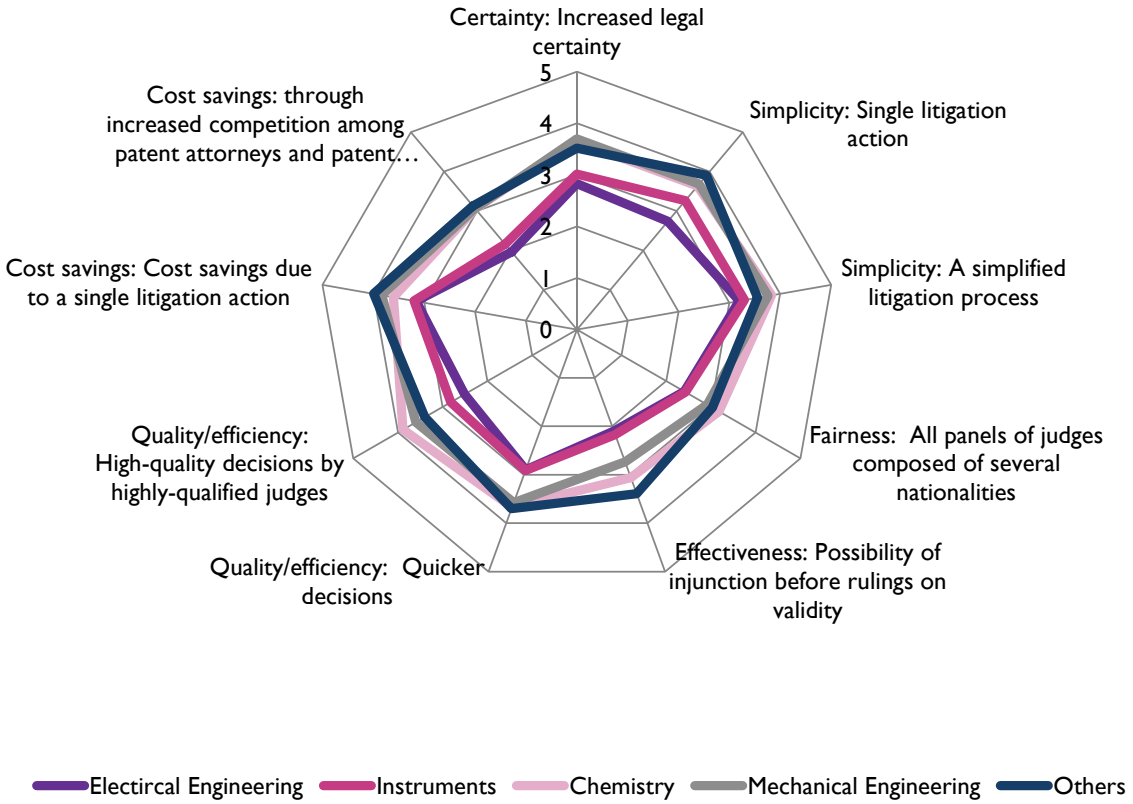
	Yes	No	Unsure	Prefer not to answer
Electrical Engineering	13%	71%	10%	5%
Instruments	26%	57%	8%	9%
Chemistry	26%	60%	10%	4%
Mechanical Engineering	23%	57%	13%	6%
Other	24%	55%	12%	9%

Figure 5.7 demonstrates that there is a significant difference of opinion across the clusters with respect to the importance of several possible benefits of the UPC to claimants in infringement cases. Simplicity, particularly with respect to the litigation process, appears to be valued by respondents from all clusters although respondents from the instruments and electrical engineering clusters appear to value simplicity relatively less than other clusters.

A mixed picture is evident for cost savings: respondents from most clusters consider that the cost savings due to a single litigation action are a significant benefit when acting as a claimant in an infringement case, although the electrical engineering and instruments clusters tend to disagree. The potential cost savings due to increased competition amongst lawyers are, on average, seen to be less significant by all respondents.

Similar patterns are observed for fairness, effectiveness, efficiency and quality: the electrical engineering and instruments clusters report the benefits to be lower than those from other clusters do.

Figure 5.7: Aspects of UPC that would be beneficial for claimants in infringement cases (by technological cluster)



Note: 1=no improvement; 5=very significant improvement.

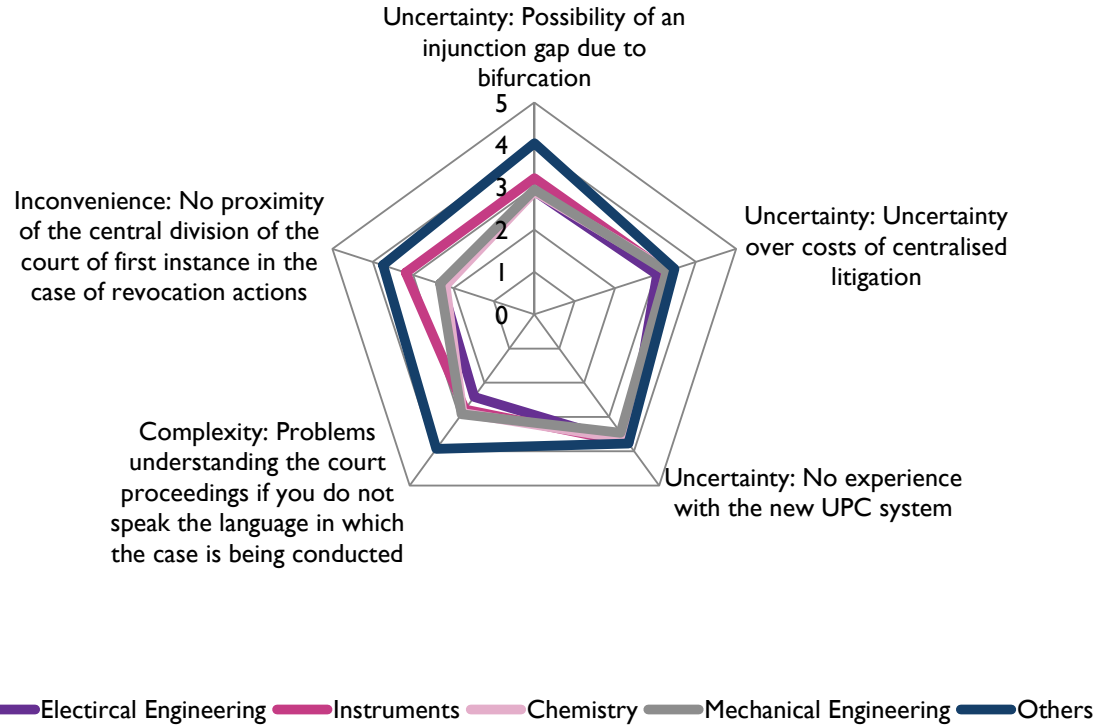
As shown in Figure 5.8 respondents from 'other' clusters perceive that the UPC would lead to a greater detriment for claimants in infringement cases than those in the four named clusters do. The mechanical engineering and chemistry clusters consider that the UPC will lead to limited detriment for claimants in infringement cases.

The greatest concern of respondents relates to the potential uncertainty that could arise from the introduction of the UPC for claimants in infringement cases. This finding is consistent for the electrical engineering and instruments clusters in the sense that they considered the potential benefit of increased legal certainty to be weak, but is more puzzling for the other clusters given their relatively positive opinions concerning increased legal certainty (as shown in Figure 5.7).

The lack of experience with the UPC is a key concern for respondents from all clusters. While this concern would decrease over time in light of experience with the UPC there remains the risk that the uncertainty associated with the lack of experience would discourage claimants from pursuing cases through the UPC, particularly during the transitional period.

Inconvenience and complexity are considered to be significant drawbacks by respondents from 'other' clusters but to be a much less significant issue by those from the chemistry, mechanical engineering and electrical engineering clusters.

Figure 5.8: Aspects of UPC that would be detrimental for claimants in infringement cases (by technological cluster)



Note: 1=no detriment; 5=very significant detriment.

Defendant against invalidity claim of third party

The degree of experience in defending against invalidity claims of third parties differs significantly by cluster. Table 5.10 shows that, as for experience with instigating infringement action, fewer respondents from the electrical engineering cluster have defended invalidity claims whereas a higher proportion of respondents from other clusters have done so. The proportion of respondents that have defended invalidity claims in each of the other clusters is reasonably similar.

Table 5.10: Percentage of organisations that have taken legal action in any European National Court to defend its European patents against the invalidity claim of a third party

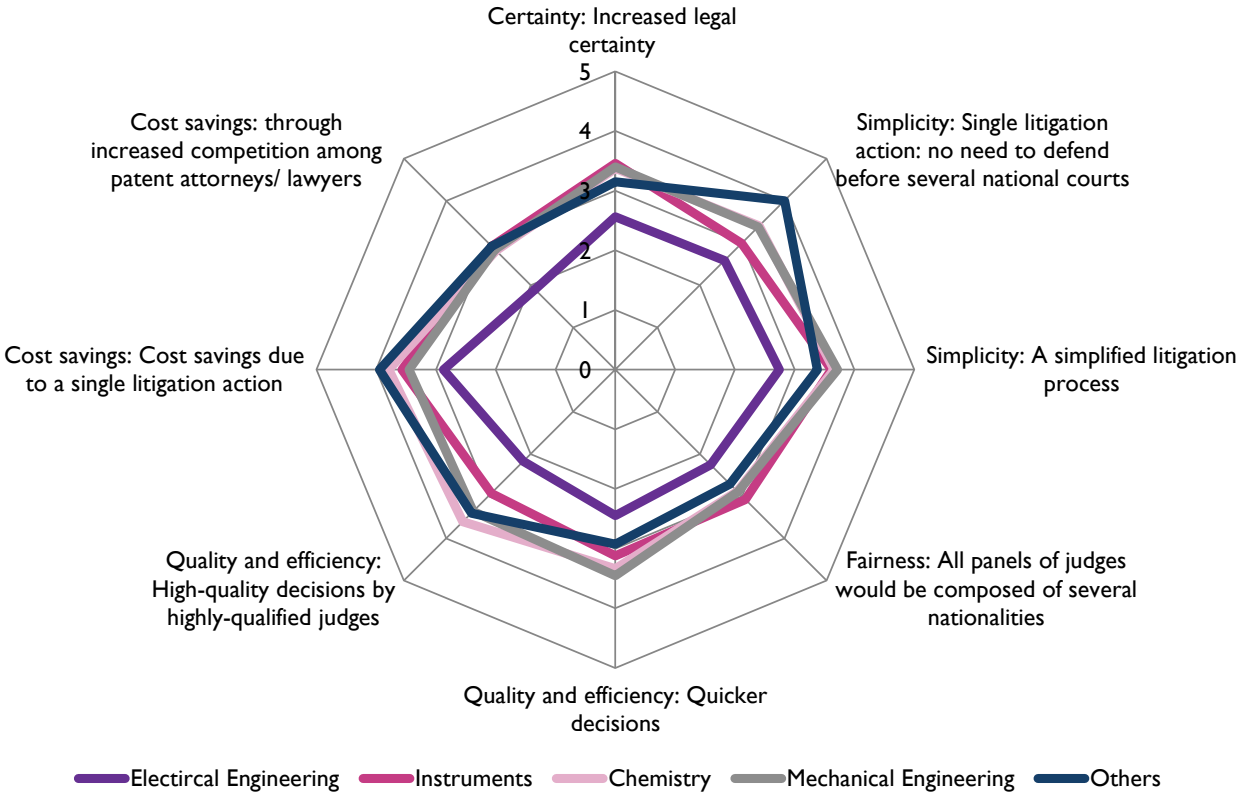
	Yes	No	Unsure	Prefer not to answer
Electrical Engineering	12%	73%	9%	6%
Instruments	22%	61%	8%	9%
Chemistry	22%	61%	13%	4%
Mechanical Engineering	22%	60%	12%	6%
Other	17%	61%	10%	12%

In comparison to views on the benefits to claimants in infringement cases, Figure 5.9 shows that opinions concerning the benefits of the UPC for the defendant in invalidity cases are somewhat less consistent across clusters. To some extent, this may be due to differences in the characteristics of infringement and invalidity actions and/or the level of experience with such actions in each firm.

The greater simplicity that may result from the implementation of the UPC is again seen to be beneficial to those seeking to defend their patent rights (though less significantly by the electrical engineering cluster), while the cost savings due to the single litigation action are again thought to be an important benefit by most clusters.

The instruments cluster – which was generally sceptical of the benefits of the UPC for claimants in infringement cases – considers that the UPC will be beneficial for defendants in invalidity cases. This is an interesting and perhaps somewhat surprising finding given that the proportion of respondents with experience of each action is similar.

Figure 5.9: Aspects of UPC that would be beneficial for defendants in invalidity cases (by Technological cluster)

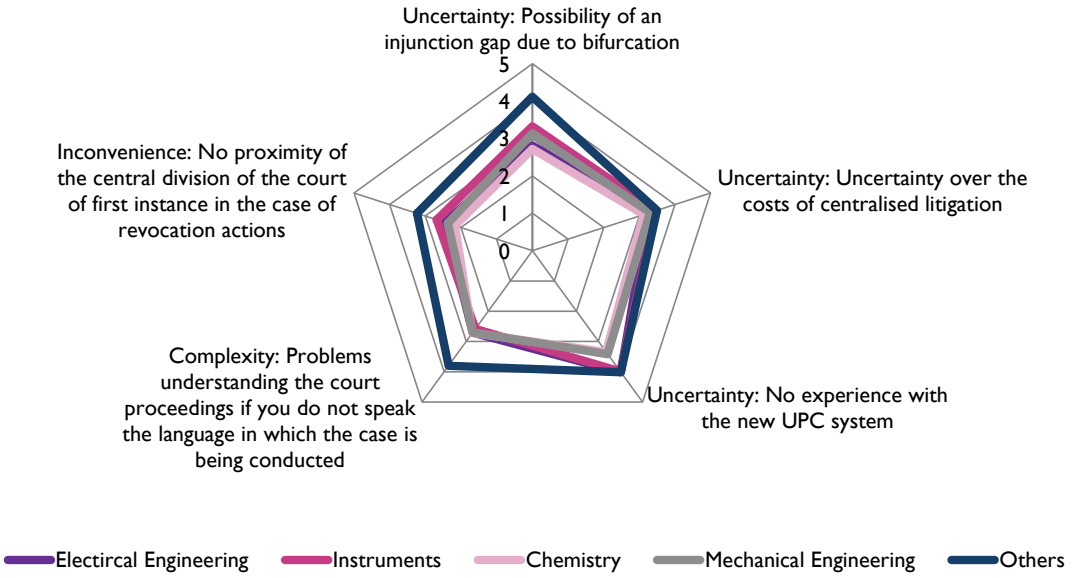


Note: 1=no improvement; 5=very significant improvement.

As for the case of claimants in infringement cases, the 'others' cluster considers that the UPC is likely to deliver a greater detriment to defendants in invalidity cases than respondents from other clusters do.

As in the case of infringement claimants, the greatest perceived detriment overall arises from the lack of experience with the UPC while cost uncertainty is perceived to be a significant issue by most clusters. Inconvenience and complexity are not thought to be of significant detriment to defendants in invalidity cases by most clusters of respondent but the issues are important to the 'others' cluster.

Figure 5.10: Aspects of UPC that would be detrimental for defendants in invalidity cases (by Technological cluster)



Note: 1=no detriment; 5=very significant detriment.

5.4.2 Countering the claims to patent protection of third parties

Defendant in infringement case (i.e. the alleged infringer)

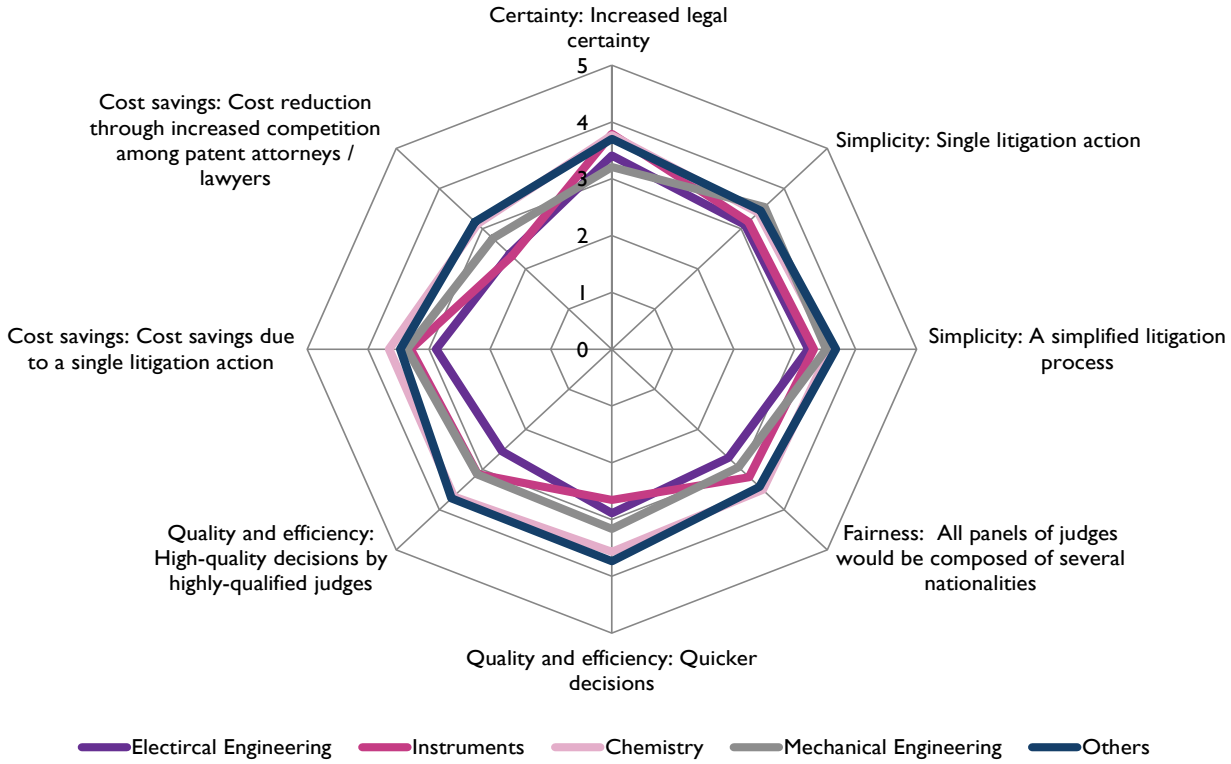
Table 5.11 shows that the proportion of respondents with experience of defending an alleged infringement is reasonably consistent across all clusters except the 'other' group. Significantly fewer respondents in the instruments cluster have experience as a defendant than as a claimant in an infringement case.

Table 5.11: Percentage of organisations that have faced legal action in any European National Court by a third party claiming that their patent has been infringed

	Yes	No	Unsure	Prefer not to answer
Electrical Engineering	18%	67%	8%	7%
Instruments	16%	60%	14%	10%
Chemistry	20%	65%	11%	4%
Mechanical Engineering	16%	67%	9%	8%
Other	33%	52%	7%	9%

Figure 5.11 shows that the strength of feeling concerning the various benefits of the UPC for defendants in infringement cases differs by cluster. The majority of clusters consider that the greater simplicity of the UPC would be a significant improvement while the chemistry and 'others' clusters consider that all other potential benefits of the UPC would be either a significant or very significant improvement for defendants in infringement cases. The instruments and electrical engineering clusters consider that the benefits for defendants in infringement cases are likely to be more muted as do, to some extent, respondents from the mechanical engineering cluster.

Figure 5.11: Aspects of UPC that would be beneficial for defendants in infringement cases (by Technological cluster)

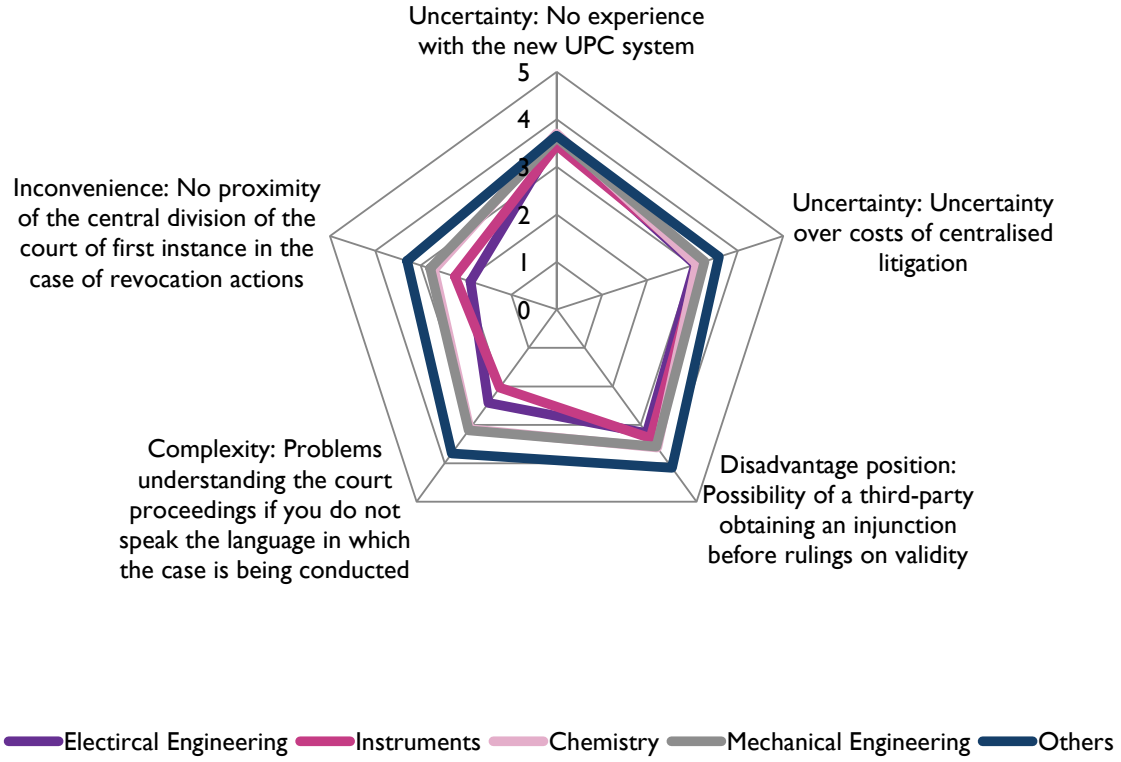


Note: 1=no improvement; 5=very significant improvement.

Respondents from the 'others' cluster consider that certain aspects of the UPC are likely to deliver significant detriment to defendants in infringement cases. Such respondents' concerns are greater than those of any other cluster for all potential impacts. Interestingly, respondents from this cluster were also concerned about the potential detriment that would arise from the UPC for claimants in infringement cases. Given that this cluster has more experience as both defendants and claimants in infringement cases than other clusters have, this finding suggests that strength of response may be correlated with experience.

The instruments and electrical engineering clusters generally consider that the UPC would be of limited detriment to defendants in infringement cases, although uncertainty and the disadvantage position are a somewhat significant concern for both.

Figure 5.12: Aspects of UPC that would be detrimental for defendants in infringement cases (by Technological cluster)



Note: 1=no detriment; 5=very significant detriment.

Claimant in invalidity case (i.e. alleger that patent is not valid)

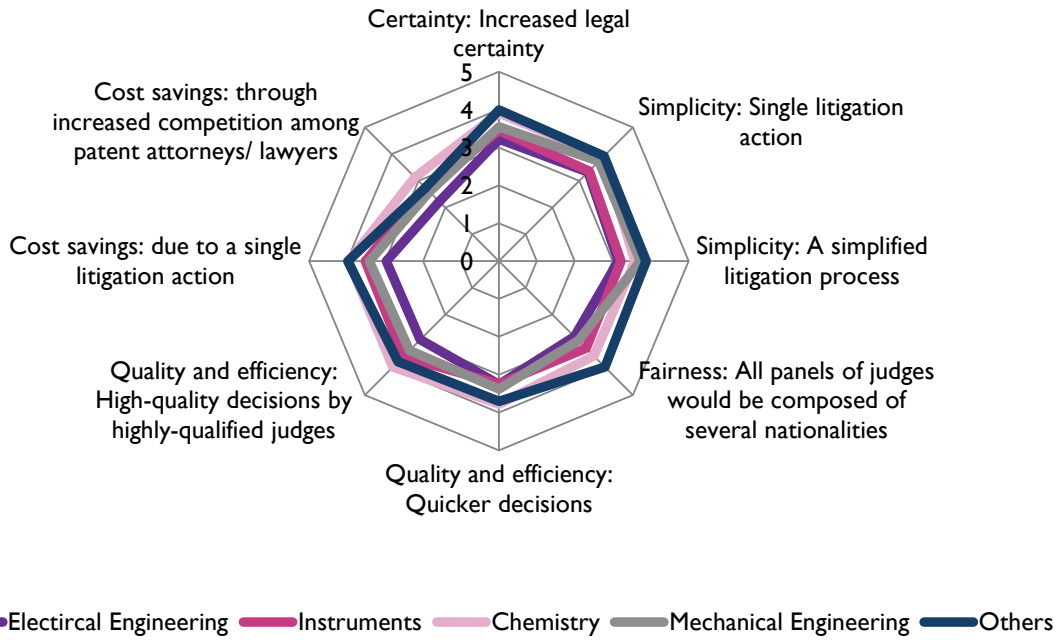
The results presented in Table 5.12 show that the proportions of respondents from each cluster with experience as a claimant in an invalidity case are similar to the proportions with experience as an invalidity defendant. Together with the tables presented above these results confirm that the electrical engineering cluster makes relatively little use of litigation procedures, whereas legal cases are a more prevalent in the remaining clusters.

Table 5.12: Percentage of organisations that have taken legal action in any European National Court to argue that a third party's European patent is not valid

	Yes	No	Unsure	Prefer not to answer
Electrical Engineering	16%	69%	9%	6%
Instruments	20%	63%	8%	9%
Chemistry	18%	67%	11%	4%
Mechanical Engineering	21%	63%	10%	6%
Other	20%	58%	13%	9%

Perceptions of the strength of benefits of the UPC for claimants in invalidity cases are reasonably consistent across clusters. As shown in Figure 5.13 most potential benefits are considered to be a significant improvement for claimants in invalidity cases, although the impact of the UPC on legal costs through increased competition amongst lawyers is considered to be less significant.

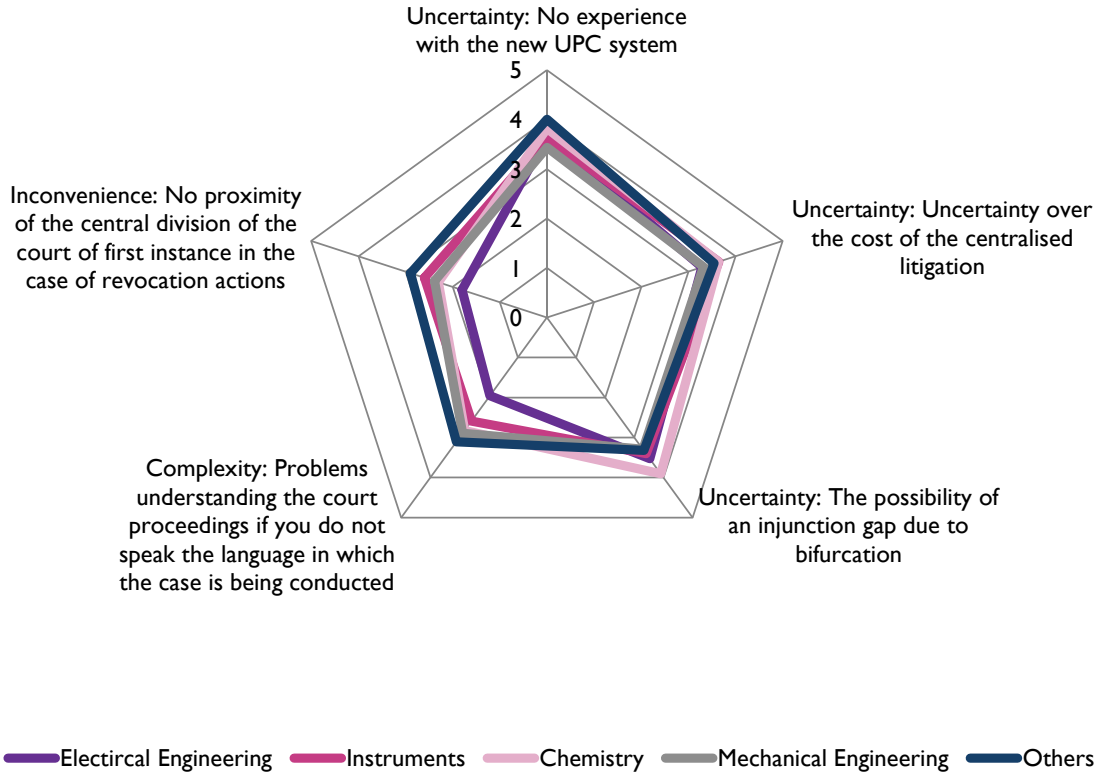
Figure 5.13: Aspects of UPC that would be beneficial for claimants in invalidity cases (by Technological cluster)



Note: 1=no improvement; 5=very significant improvement.

Figure 5.14 shows that the perceived detriment of the UPC for claimants in invalidity cases is generally consistent across clusters, although the electrical engineering cluster is a slight exception. Most clusters consider that all possible detrimental impacts would have a moderate or significant impact on claimants in invalidity cases. The electrical engineering cluster considers that the UPC could bring some detriment to claimants in invalidity cases but to a less significant extent. The element of the UPC that the electrical engineering cluster expects to deliver the most significant detriment to claimants in invalidity cases is uncertainty, while it is less concerned about complexity and inconvenience. This finding is consistent with the key sources of perceived detriment of the UPC to other actors in legal cases.

Figure 5.14: Aspects of UPC that would be detrimental for claimants in invalidity cases (by Technological cluster)



Note: 1=no detriment; 5=very significant detriment.

5.4.3 Summary

The results presented in this section show that, in general, respondents from the electrical engineering cluster perceive the benefits and costs of the UPC to be less significant than respondents from other clusters do. This may reflect the relative lack of litigation experience of such respondents, a thought which is supported by our finding of strong opinions from the 'other fields' cluster in respect of the litigation in which they have significant experience: infringement cases. It appears, therefore, that the strength of feeling with respect to the potential benefits and costs of the UPC is correlated with experience.

Overall, we find that the greatest perceived benefits of the UPC tend to be linked to the simplicity that it offers while the most significant perceived detriment relates to the uncertainty that is associated with an unfamiliar concept. We would expect this uncertainty to dissipate over time as experience is gained and the cost of centralised litigation becomes clearer.

6 How do the Survey Results Compare with our Prior Theories?

In section 2 a set of "prior theories" (i.e. working hypotheses) was provided. These prior theories were based on the lessons learned from the literature review and were constructed by mapping stylised profiles of patenting behaviour to companies' characteristics (e.g. size, type of organisation and technological field) and by inferring what the cost and benefits might be for each of the profiles.

We are now able to compare these prior theories to the results from the survey. Through this exercise we will be able to validate theoretical findings and expectations and draw conclusions regarding the quality of our survey data.

The focus groups for testing prior theories will be SMEs, universities and public research organisations and firms in the pharmaceutical, electronics and biotechnology fields.[16] The number of responses for SMEs and large companies is the same as the one provided in Table 4.1. With regards to the three technological fields considered it is not possible to present a table reporting the number of responses by each field. The reason is the same as why it was not possible to provide responses by technological cluster, i.e. respondents may file patents in more than one field and hence do not fall neatly into one category. Therefore, we report below the number of respondents that have filed at least one application in each technological field.

Number of respondents that have filed at least one application in the three technological fields considered

Biotechnology	180
Pharmaceutical	185
Electronics	205

Table 6.1presents some key statistics concerning the patenting behaviour of respondents from these fields, indicating that the pharmaceutical and biotechnology fields typically validate European patents in significantly more countries than SMEs, universities and electronics companies do.

With respect to patent life the results show that SMEs typically keep patents alive in at least one Member State for a relatively long period of time, whereas universities and public research organisations rarely maintain a patent alive for more than ten years. The short lifetime of patents granted to universities is not entirely surprising: such organisations are primarily involved in research rather than commerce. Therefore, universities may seek to transfer a patent to a commercial enterprise early in its life rather than exploiting the patent itself or managing licensing agreements. Such behaviour would be reflected in our data as a short patent life since the questions focus on the length of time that a patent is maintained alive by the respondent.

The picture for fields is more mixed: there is a bimodal distribution for the pharmaceutical and biotechnology fields with local maxima at the lower and upper bounds of the range (i.e. patents are typically

[16] Electronics it is not one of the technological reported in the technological classification of Table 5.1. For the purpose of this analysis we therefore define 'electronics' companies to be those that are active in at least one of the following fields: audio-visual technology, telecommunications, digital communications, computer technology and semi-conductors.

retained for only a short time or for their full term). This pattern suggests that companies in these fields may use the first five years to test the value of the patent to the firm but is also consistent with a strategy of filing a lot of patents to create thickets, a strategy which the academic literature has found to be present in both fields.[17] The electronics field exhibits a somewhat more uniform distribution than the other two fields which may suggest that strategic patenting behaviour is less common in such fields.

Table 6.1: Patenting behaviour in focus groups

	Average number of countries in which a patent was validated	% kept in force for less than 5 years in at least 1 MS	% kept in force between 5 and 9 years in at least 1 MS	% kept in force between 10 and 14 years in at least 1 MS	% kept in force between 15 and 19 years in at least 1 MS	% kept in force until the end of term in at least 1 MS
Aggregate	8.1	16	18	19	17	29
Biotechnology	16.8	25	20	9	6	39
Electronics	7.0	12	13	20	20	28
Pharmaceutical	16.6	29	11	8	1	50
SME	5.7	20	12	11	11	43
University and Public Research Organisation	7.5	58	33	8	1	0

6.1 Unitary Patent

Increased access to finance and licensing opportunities

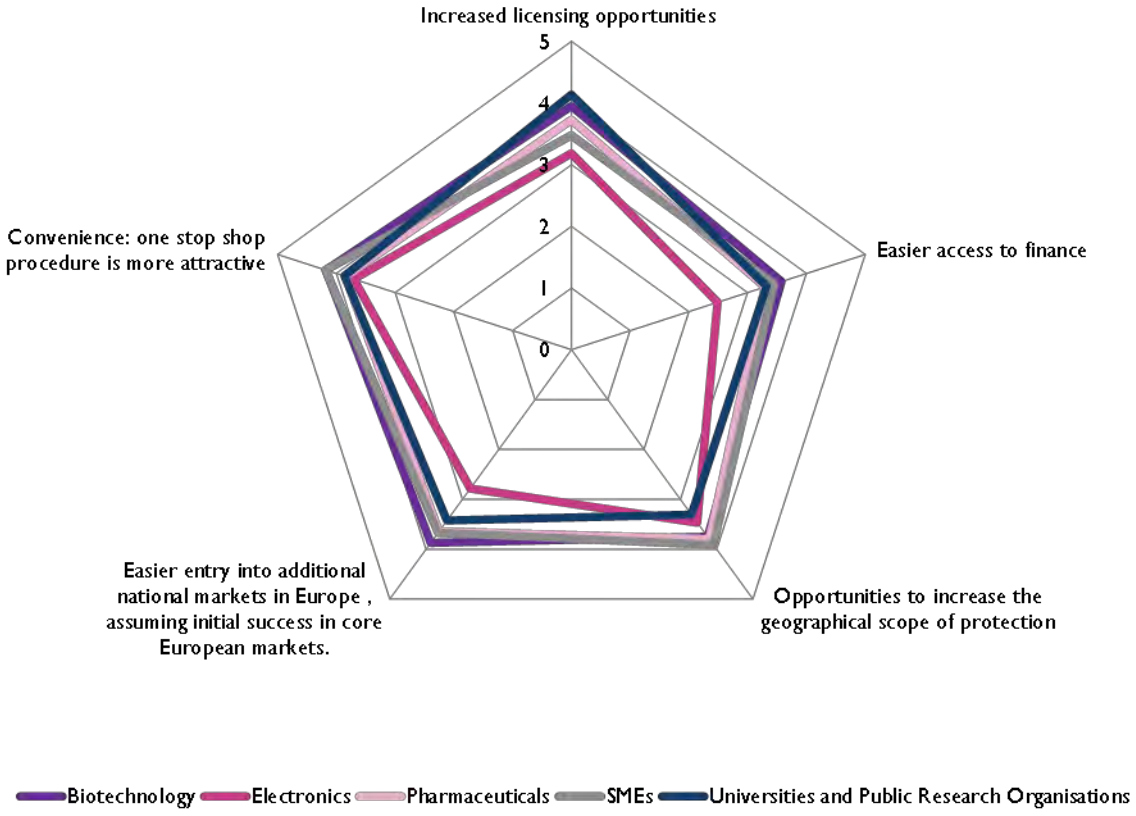
Our theoretical framework stipulates that universities and public research organisations, SMEs and biotechnology firms stand to gain the most from increased access to finance and licensing opportunities. Our survey data (Figure 6.1) indicates that these three groups of respondents find the scope for increased licensing opportunities particularly significant (especially universities and public research organisations).

Somewhat surprisingly, pharmaceutical companies also find increased licensing opportunities highly relevant. This is in contrast with our hypothesis that increased licensing opportunities are of limited relevance. This could be due to the fact that we consider companies that have filed a patent in the relevant industry as "pharmaceutical". It does not necessarily mean that they are pure-play pharmaceutical companies, thereby "polluting" the end result.

Regarding access to finance, SMEs and universities consider it to be an important influence on use of the Unitary Patent as do pharmaceutical and biotechnology companies. The electronics category, as hypothesised, reports a moderate influence.

[17] Schmidt, C. (2007), "Negotiating the RNAi patent thicket" Nature Biotechnology 25, 273 – 275 and DG Competition (2008), "Pharmaceutical Sector Inquiry Preliminary Report", Staff Working Paper.

Figure 6.1: Influences of potential increased business opportunities on use of Unitary Patent (by focus group)



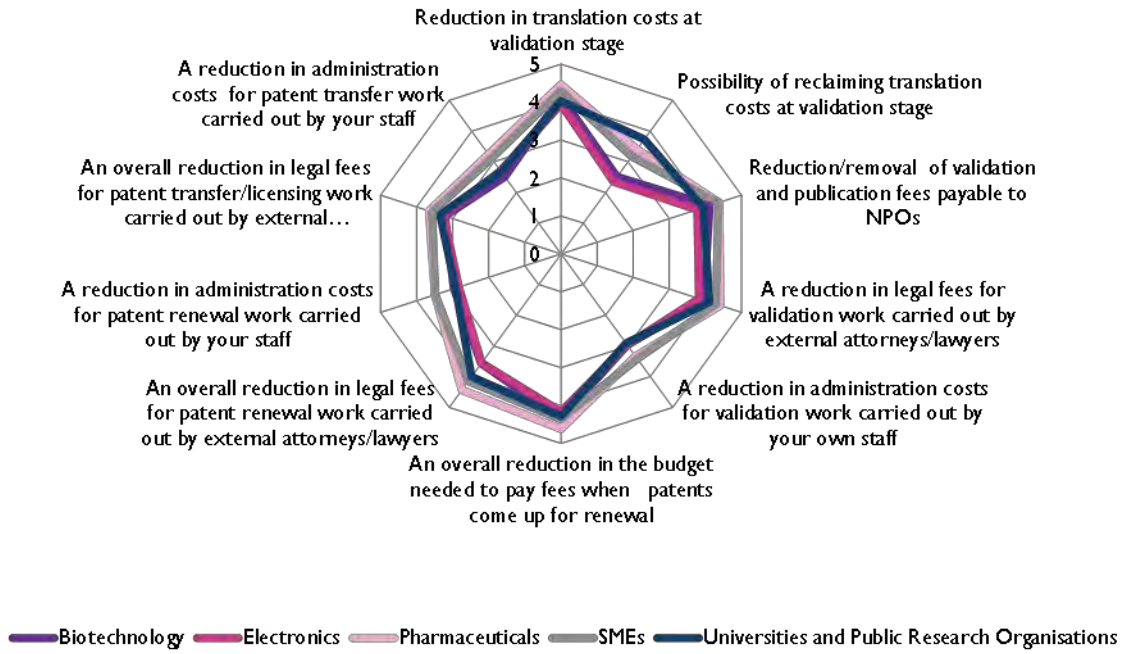
Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

Reduction in translation costs, validation/publication fees payable at NPOs, and legal fees for validation activity

We hypothesised that SMEs, universities and public research organisations, pharmaceuticals and biotechnology firms stand to gain the most from a reduction in translation, legal and other validation/publication fees payable at the NPO level. On the other hand, we suspected that electronics firms would consider the reduction of such costs to be of moderate benefit, in part because they typically validate patents in a relatively small number of countries.

Figure 6.2 supports our hypothesis, illustrating that in most cases, firms in the electronics category find these cost savings the least relevant. It also shows that the other four focus groups (particularly universities and SMEs) consider such cost savings to be a particularly important influence on the use of the Unitary Patent.

Figure 6.2: Influences of potential cost reductions on use of Unitary Patent (by focus group)



Note: 1=no influence on decision to use Unitary Patent; 5= very significant influence on decision to use Unitary Patent.

Decrease in administrative burdens for validation/renewal

Figure 6.2 also serves to test our hypotheses regarding the reduction of administrative burdens for patent validation or renewal. We would expect SMEs, universities and biotechnology firms to give greater importance to a reduction in administrative burdens when compared to pharmaceutical and electronics firms.

While the reduction of administrative costs for validation work is found to exert a somewhat significant influence on the use of the Unitary Patent for all expected groups of respondents (particularly SMEs), the scale of benefit is generally considered to be lower than that of the other factors shown in Figure 6.2

With respect to reduced administrative burdens for patent renewals we observe a rather similar pattern. The main difference is that electronics firms perceive the influence of reduced administration costs for patent renewal work carried out by their staff to be rather moderate compared to the other categories.

Introduction of a centralised renewal fee

Our hypotheses for the impact of the centralised renewal fee were that it would be perceived as clearly beneficial by biotechnology companies, less so by pharmaceuticals and moderately beneficial by SMEs and universities, while the electronics category should not experience any benefits.

Table 6.2 summarises the average responses from our survey sample. It can be seen that most categories are remarkably close to each other (with the exception of biotechnology and pharmaceuticals) indicating that the lack of renewal flexibility is considered as a moderate disadvantage by all groups of respondents. Biotechnology and pharmaceutical respondents exhibit slightly greater perceived disadvantage compared to the other types of respondents. This may reflect the fact that the centralised renewal fee would bring benefits as well as inflexibility, thereby suggesting that the centralised renewal fee schedule may be a moderate benefit for all fields.

Table 6.2: How would a lack of renewal flexibility influence your organisation in deciding whether or not to use the Unitary Patent?

Category	Level of influence on decision to use Unitary Patent
All sample	3.4
SME	3.3
University	3.1
Pharmaceuticals	3.6
Electronics	3.1
Biotechnology	3.7

Note: 1=significantly more likely to use Unitary Patent; 5= significantly less likely to use Unitary Patent.

The consistency between our hypotheses and reported findings for the Unitary Patent is summarised in Table 6.4.

6.2 Unified Patent Court

As indicated in the discussion of chapters 3 and 4, the survey questions on the impacts of the Unified Patent Court were broken down by type of litigation and role (claimant /defendant). Again, the results related to the UPC are drawn based only on SMEs and large companies (see table below).

Table 6.3: Number of respondents that have filed at least one patent in the three technological fields considered (only large companies and SMEs)

Biotechnology	37
Pharmaceuticals	35
Electronics	106

Including an analysis similar to that presented previously would result in a significant number of additional tables and charts. We consider that this would be an inefficient way in which to report the results of our testing of prior theories and so instead present the findings in Table 6.4, identifying the extent to which prior theories were or were not borne out in responses to the survey.

The results presented in the table show that there is strong supporting evidence for some prior theories and weak support for many others.[18]

The strongest supporting evidence for prior theories is in the biotechnology field where there is strong support for the prior theory impacts of the Unified Patent Court in more than 60 per cent of cases and weak support for the remainder (except for one case where our prior is weakly rejected). There is weakly positive support for the majority of prior theories for SMEs and strong supporting evidence for the remainder.

Across all classes of respondents for which prior theories were tested the strength of supporting evidence is particularly high for prior theories concerning: increased legal certainty; the speed, fairness and quality of decisions; and lower legal fees. By contrast, the evidence for the impact of the complexity of the language system does not support the prior theories. In particular, respondents in the pharmaceuticals and

[18] The degree of benefit/cost evident in survey responses was determined using objective criteria. An impact was considered to be 'clear' if the average rating (on a scale of one to five) across respondents within the relevant sector exceeded 3.33. It was considered moderate if the average lay between 1.67 and 3.33 while the impact was weak if it lay below 1.67. We compared these rankings with our hypotheses to determine the level of supporting evidence both in terms of the existence/direction of effect and the strength of effect.

electronics fields reported that such difficulties would be significantly more detrimental than we had anticipated.

Table 6.4: Summary of how prior theories matched our findings

	Potential Costs/ Benefits Of UP/UPC	Relevance For SMEs/Universities		Relevance For Pharmaceuticals		Relevance For Electronics		Relevance For Biotechnology	
		Prior theory	**Supporting evidence?**	**Prior theory**	**Supporting evidence?**	**Prior theory**	**Supporting evidence?**	**Prior theory**	**Supporting evidence?**
Validation and renewal phase of the UP	Increased access to finance and licensing opportunities	Clear benefit	✓✓	Limited relevance	xx	Moderate relevance	✓✓	Clear benefit	✓✓
	Reduction in translation costs, validation/publication fees payable at NPOs, and legal fees for validation activity	Clear benefit	✓✓	Clear benefit	✓✓	Moderate benefit	✓✓	Clear benefit	✓✓
	Decrease in administrative burdens for validation/renewal	Clear benefit	✓✓	Moderate benefit	✓✓	Moderate benefit	✓✓	Clear benefit	✓?
	Introduction of a centralised renewal fee	Moderate/ no benefit	✓✓	Clear/moderate benefit	✓✓	No benefit	x?	Clear benefit	✓✓
Litigation at the UPC	Overall increased legal certainty due to uniform decisions applied in Europe	Clear benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓✓ *Infringement Def.* ✓? *Infringement Cl.* ✓✓	Clear benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓✓ *Infringement Def.* ✓✓ *Infringement Cl.* ✓?	Clear benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓? *Infringement Def.* ✓? *Infringement Cl.* ✓?	Clear benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓✓ *Infringement Def.* ✓✓ *Infringement Cl.* ✓✓
	Decisions would be quicker, fairer, and of higher quality.	Clear benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓? *Infringement Def.* ✓? *Infringement Cl.* ✓✓	Clear benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓✓ *Infringement Def.* ✓✓ *Infringement Cl.* ✓✓	Clear benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓? *Infringement Def.* ✓? *Infringement Cl.* ✓?	Clear benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓✓ *Infringement Def.* ✓✓ *Infringement Cl.* ✓✓
	Lower legal fees due to the centralised nature of the litigation procedure (only one	Moderate benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓? *Infringement Def.*	Clear benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓✓ *Infringement Def.*	Moderate benefit	*Invalidity Def.* ✓✓ *Invalidity Cl.* ✓✓ *Infringement Def.*	Clear benefit	*Invalidity Def.* ✓? *Invalidity Cl.* ✓✓ *Infringement Def.*

Potential Costs/ Benefits Of UP/UPC	Relevance For SMEs/Universities		Relevance For Pharmaceuticals		Relevance For Electronics		Relevance For Biotechnology	
advocate is needed).		✓?		✓✓		✓?		✓?
		Infringement Cl. ✓?		*Infringement Cl.* ✗✗		*Infringement Cl.* ✓✓		*Infringement Cl.* ✓✓
Lower legal fees (due to introduced competition between European patent attorneys and patent lawyers)	Moderate benefit	*Invalidity Def.* ✓?	Clear benefit	*Invalidity Def.* ✓?	Moderate benefit	*Invalidity Def.* ✓✓	Clear benefit	*Invalidity Def.* ✗?
		Invalidity Cl. ✓✓		*Invalidity Cl.* ✓✓		*Invalidity Cl.* ✓✓		*Invalidity Cl.* ✓✓
		Infringement Def. ✓✓		*Infringement Def.* ✓✓		*Infringement Def.* ✓✓		*Infringement Def.* ✓?
		Infringement Cl. ✓✓		*Infringement Cl.* ✓?		*Infringement Cl.* ✓✓		*Infringement Cl.* ✓?
Higher legal fees associated of centralised litigation	Unclear	*Invalidity Def.* N/A	Clear cost	*Invalidity Def.* ✓?	Unclear	*Invalidity Def.* N/A	Unclear	*Invalidity Def.* N/A
		Invalidity Cl. N/A		*Invalidity Cl.* ✓?		*Invalidity Cl.* N/A		*Invalidity Cl.* N/A
		Infringement Def. N/A		*Infringement Def.* ✓?		*Infringement Def.* N/A		*Infringement Def.* N/A
		Infringement Cl. N/A		*Infringement Cl.* ✓✓		*Infringement Cl.* N/A		*Infringement Cl.* N/A
Complexity of the language system and limitations in the use of certain languages.	Clear cost	*Invalidity Def.* ✓?	No cost	*Invalidity Def.* ✗?	No cost	*Invalidity Def.* ✗?	Unclear	*Invalidity Def.* N/A
		Invalidity Cl. ✓?		*Invalidity Cl.* ✗?		*Invalidity Cl.* ✗?		*Invalidity Cl.* N/A
		Infringement Def. ✓?		*Infringement Def.* ✗?		*Infringement Def.* ✗?		*Infringement Def.* N/A
		Infringement Cl. ✓✓		*Infringement Cl.* ✗?		*Infringement Cl.* ✗?		*Infringement Cl.* N/A
Injunction gap due to bifurcation	Unclear	*Invalidity Def.* N/A	Unclear	*Invalidity Def.* N/A	Moderate cost	*Invalidity Def.* ✓✓	Moderate cost	*Invalidity Def.* ✓✓
		Invalidity Cl. N/A		*Invalidity Cl.* N/A		*Invalidity Cl.* ✓?		*Invalidity Cl.* ✓?
		Infringement Def. N/A		*Infringement Def.* N/A		*Infringement Def.* N/A		*Infringement Def.* N/A
		Infringement Cl. N/A		*Infringement Cl.* N/A		*Infringement Cl.* ✓✓		*Infringement Cl.* ✓✓
Single action invalidation	Moderate cost	✓?	Clear cost	✓✓	Moderate cost	✓✓	Moderate cost	✓?

Notes: Where the prior theory was *Unclear* the supporting evidence section is characterised as Not Applicable (N/A). ✓✓ stands for supporting evidence that strongly supports the prior theory; ✓? Weakly supports the prior theory; ✗? indicates that the prior theory was rejected but not very strongly and ✗✗ indicates strong rejection of the prior theory.

7 Conclusions

This report has produced an economic analysis of the impact of the switch from the current system to the Unitary Patent and Unified Patent Court, based upon economic reasoning, a review of past literature and a survey of patent users.

7.1 Unitary Patent

- The perceived benefit of the Unitary Patent is similar for those with headquarters in UPP participating Member States and for those with headquarters in the rest of the world. The differences in responses observed between these groups of respondents are not significant.
- The influences of potential increased business opportunities on decisions to use the Unitary Patent differ significantly by type of organisation, reflecting differences in business models (e.g. the increased licensing opportunities that may be associated with the Unitary Patent are an important driver of patenting for individuals and universities but not for large companies).
- Our results show that there is reasonable consistency across technological clusters with respect to views on the factors that would influence the decision of whether or not to choose a unitary patent.
- The typical rating given to a pull factor (i.e. those aspects of the Unitary Patent that may be beneficial for patent users) exceeds that given to the potential disadvantages of the Unitary Patent.
- While the analysis presented above cannot provide a robust cost benefit analysis of the Unitary Patent, the high-level findings are suggestive of the possibility that the Unitary Patent may deliver an overall benefit to patent users from all clusters.

7.2 Unified Patent Court

- There is little difference between respondents with headquarters in a UPCA signatory Member State and those with headquarters in the rest of the world with respect to the perceived benefit of the UPC for actors in patent litigation cases. This conclusion holds for both claimants and defendants in both invalidity and infringement cases.
- Overall, SMEs are slightly more positive about the impact of the UPC than larger companies are, reporting greater benefits for invalidity and infringement defendants than large companies do, while the reports for both classes of claimant are similar.
- When acting as claimants in infringement cases larger firms seem to have fewer concerns with the UPC than SMEs and these are mainly associated with the uncertainty that may arise from a lack of experience with the UPC system and the costs of centralised litigation. SMEs are slightly less concerned about potential detriment for infringement defendants than larger firms are. The perceived detriment of the UPC for invalidity claimants and defendants differ little between SMEs and larger companies.
- Our results show that, in general, respondents from the electrical engineering cluster perceive the benefits and costs of the UPC to be less significant than respondents from other clusters do. This may reflect the relative lack of litigation experience of such respondents, a thought which is supported by our finding of strong opinions from the 'other fields' cluster in respect of the litigation in which they have significant experience: infringement cases. It appears, therefore, that the strength of feeling with respect the potential benefits and costs of the UPC is correlated with experience.

- We also find that the greatest perceived benefits of the UPC tend to be linked to the simplicity that it offers while the most significant perceived detriment relates to the uncertainty that is associated with an unfamiliar concept. We would expect this uncertainty to dissipate over time as experience is gained and the cost of centralised litigation becomes clearer.

Appendices

Europe Economics

8 Appendix 1: Value of Patenting

The economic literature on patent value is abundant and can be distinguished into two broad streams of research. The first stream is concerned with the social value of patents, whilst the second deals with the private value of patents and is therefore concerned with an assessment of the financial rewards to patent owners from holding a formal intellectual property right.

The literature on the social value of patents has its origin in the seminal work of Nordhaus (1967, 1969) which laid the foundations for many of the aspects on which patent systems are currently designed. In particular, Nordhaus found that the statutory life of patents should be finite as this ensures a socially optimal balance between dynamic efficiency (i.e. the provision of sufficient incentives for firms to undertake innovative activity) and the static welfare loss (i.e. the welfare losses associated to the monopolistic behaviour deriving from conferring an exclusive right of commercial exploitation to patent holders). Following Nordhaus' work other researchers have added further insights into how patent systems should be designed in order to maximise social welfare. Whilst acknowledging the importance of this strand of the research, the remainder of this sub-section is devoted entirely to the literature on the private value of patenting as this appears to be more relevant in the context of the current study.

Economic studies on the private value of patents can be categorised according to the specific methodology used for estimating the economic rewards associated with patent protection. Following this categorisation we distinguish between[19]:

- Studies that assess patent value based on renewal decisions.
- Studies that assess patent value based on econometric analyses.
- Studies that assess patent value based on patent indicators.
- Studies that assess patent value based on survey data.
- Studies that assess patent value based on transaction data.

These strands of the literature are discussed in turn below. Since the literature in these areas is vast, the review we provide below here is not intended to be comprehensive.[20]

8.1 Renewal decisions as a proxy for patent value

The idea of estimating patent value through renewal decisions is based on the observation that renewal fees act as a sorting device. Pakes (1986) interprets patent holders' renewal decisions as a rational bet on future uncertain revenues: a patent holder will renew his patent for another year only if he perceives that the cost of doing so is less than the value of holding the patent for that additional year. From this observation it follows that long-lived patents must be of higher value than short-lived ones. This intuition is further supported by the closely related literature on the optimal renewal fee structure. Scotchmer (1999) and Cornelli and Schankerman (1999) find that the socially optimal renewal fee structure is one with renewal fees increasing over time (in fact renewal fees charged by most patent offices are progressively increasing). This result can be intuitively explained by the fact that the economic value of patents cannot be directly observed by patenting authorities but it is private information to patent holders. Within this information setting increasing renewal fees act as an incentive-compatible mechanism which ensures that

[19] A similar categorisation of has been suggested by Munari (2013).

[20] For a review on patent valuation see e.g. Dixon and Grrenhalgh (2002), "The economics if intellectual Property: a Review of identify themes for future research" MIMEO.

only those patent holders with the most valuable patents will indeed pay higher fees in order to extend the life of the patent.

Empirical analyses on patent renewal decisions have been carried out on both European patents (see, for example, Lanjouw (1998), Pakes, (1986), Pakes and Schankerman (1986), and Schankerman (1998)) and US patents (Bessen (2009), Putnam (2006)). All studies in this area share a common finding: the distribution of patent value is highly skewed: the majority of patents are of low-value and elapse after few years, whilst a small proportion of highly valuable patents reach their statutory expiration period.

The key advantage of renewal-based patent estimation approaches lies in the robustness of its theoretical foundations and on the availability of a large amount of data for estimation. However, a key limitation is due to the fact that this approach is intrinsically ordinal in nature (i.e. it distinguishes high-value patents from low values-patents), rather than cardinal (i.e. it does not attach specific monetary value patents).

8.2 Empirical relationship between patenting activity and firms' performance

An alternative patent valuation approach relies on regression analysis to explain companies' performance by a set of control variables including measures of patenting activity.

The simplest way to measure a firm's patenting activity is to consider its patent stock calculated as a count of patents owed. This approach is used by Griliches (1981) who explains the market value of listed companies by a set of firms' characteristics including the size of their patent portfolios. It has been argued that simple patent counts provide an imprecise measure of patenting activity because they do not account for the high degree of variation in patent quality. For example, Trajtenberg (1990) finds that patents with greater economic value tend to be cited more frequently.[21] Consequently, a large amount of subsequent studies use citation-weighted patent stock as explanatory variable. For example, Bloom and van Reenen (2002) examine the impact that simple patent counts and citation-weighted patent stocks have on the sales and the market value of a UK firms. A similar approach, in the context of the US market, has been adopted by Hall et al. (2002). Harhoff et al. (2009) find evidence that patents that are renewed to full term expiration in Germany (where the renewal fees structure is highly progressive) tend to have higher citation rates. The authors also find that, among the subsample of patents reaching statutory life, those cited more frequently tend to have a higher economic value. The importance of this result is twofold: on the one hand it confirms the importance of forward citation as a patent quality measure (hence confirming Trajtenberg's original findings); on the other hand it endorses the patent valuation methodologies based on renewal decisions and confirms that the patent value is highly skewed. Other studies have extended the scope of the analysis by considering a wider range of IPRs. For example, Greenhalgh and Longland (2002) investigate the empirical relationship between firms' value added and a set of IPR indicators which include both patents and trademarks. Another distinctive feature of the authors' approach is the use of the number of new patents registered (as opposed to existing patent stocks) as a proxy for patenting activity. The authors conclude that the conjoint use of patents and trademarks is associated with higher productivity levels.

Renewal decisions represent a good proxy for patent quality because, by deciding to pay renewal fees for several years, a patent holder signals the economic value he attaches to the patent. Similarly, since seeking protection in multiple jurisdictions requires significant investments, the number of countries in which a patent is valid is also expected to be a strong proxy for patent quality. The first study to exploit international patent application data in studying the private value of patents was Putnam (1996). Since then other studies have exploited the geographical scope of patent protection in their analyses (see, for example, Eaton et al. (2003), Deng (2007)). The number of countries where patent protection is sought has generally emerged as being a strong predictor of patent value. Moreover, it has also been empirically

[21] In this context a citation is a forward-citation, i.e. the quote by a subsequent patent.

demonstrated that the value of holding a patent across countries depends on a number of country-specific characteristics, the most obvious one being the size of the domestic market.[22] For example, Deng (2007) finds that the value of patent protection in a country increases with the GDP of the country. However, the relation is not linear and Deng (2007) reports apparent 'decreasing returns' to the GDP effect. Similarly, Gambardella et al. (2008) conclude that patent value estimates are significantly correlated to the specific countries in which the patent is validated.

Another important variable in explaining patent value is the sectors in which firms operate and/or the technological fields in which patents are filed. The value of patent protection is generally the highest in patent-intensive industries such as pharmaceutical and chemicals, followed by the computer and machinery sectors (see e.g. Cockburn and Griliches, (1988), Hall et al. (2005), and Bessen (2009)). Deng (2011) suggests that patent value may depreciate at different rates depending on technological field in which the patent is filed. This study analyses EPO patent data and finds that patents in the pharmaceutical filed tend to be validated in the largest number of countries and to live the shortest lives. In contrast, electronics have the longest average patent life but tend to be validated in the fewest number of countries. The author's interpretation of this result is that pharmaceutical patents have higher initial returns and therefore their owners tend to seek patent protection in more countries than electronics patent holders. However, the value of pharmaceutical patents depreciates faster than that of electronics patents and consequently they have lower renewal rates than electronics patents.

Finally, other papers have investigated the explanatory power of alternative patent-quality measures such as, for example, the breadth of a patent (measure by the number of claims). However, findings in this area tend to be somewhat contradictive. Van Zeebroeck and Van Pottesberghe (2008) found that the number of claims is strongly related to patent value. Patents with a large number of claims tend to be associated with more citations, tend to be validated in more jurisdictions within and beyond the EPC and tend to live longer. In contrast, Hall et al. (2007) analyse USPTO and EPO data but find that, whilst forward citations are strongly correlated with patent value, the explanatory power of family size (i.e. number of countries where patent are validated) and the number of technical fields is rather limited.

8.3 Patent indicators as a proxy for patent value

A growing body of the literature attempts to explain patent value through the use of indicators that can be constructed from the wealth of information recorded by publicly available patent databases. We refer to Omland (2011), Van Zeebroeck and Van Pottelsberghe de la Potterie (2011a) and Van Zeebroeck and Van Pottelsberghe de la Potterie (2011b) for comprehensive reviews of this growing field of the literature. A synthetic table describing the indicators most commonly used, the rationale for their use and their empirical predictive power is provided below (this is based on Muntari (2013) and is adapted from Omland (2011)).

Table 8.1: Review of patent indicators

Topic	Common indicators	Rationale	Empirical support
Legal status	Grant Y/N; Pending Y/N	Valid patents and pending applications discourage competitors to use the invention.	Strong
International scope	Number of countries in which patents on the invention have been applied for; Triadic patent Y/N	Each patent is valid for a certain territory only. Covering all markets by patents thus requires significant investment.	Strong

[22] Other important country-idiosyncratic factors are represented by different judicial and technological backgrounds (see Deng 2007).

Topic	Common indicators	Rationale	Empirical support
		This investment indicates expected value.	
Forward citations	Number of citations received from later patents, corrected for time-dependency	Further investment into related developments made; invention contained useful aspects; Relevance of invention in later technology space.	Strong
Opposition and Litigation	Survived opposition Y/N; Survived annulment Y/N; Infringement lawsuit Y/N	If competitors invest money in order to challenge the patent (or if they illegally use the technology), then this means the patent is valuable if it is upheld.	Strong
Technological Scope	Number of 4-digit IPC classes assigned to the patent	A broader technological scope could mean the protected market for the invention is larger.	Limited (contradictory findings)
Claims	Number of claims	The breadth of the claims defines the scope and effectiveness of protection.	Limited (few tests, contradictory findings)
Patent Filling Strategy	Choice of PCT system Y/N (+ Misc.)	Choices in the application process may reveal patent value as perceived by the applicant.	Limited (few tests)
Inventors	No. of inventors (+ Key inventor Y/N)	Number of inventors related to size of R&D investment. Patents of key inventors are more likely to be valuable.	Limited (few tests)

Source: Munari (2013), adapted from Omland (2011).

The main message of Table 8.1 is that only a restricted set of indicators has been found to have a consistent predictive power in the empirical literature. Moreover, those indicators that have received consistent empirical support (e.g., number of granted patents, forward citations and number of countries where protection is sought) tend to relate to patent characteristics whose predictive power has already been confirmed by other strands of the literature.

8.4 Estimates of patent value based on survey data

This branch of the literature relies on self-reported patent valuations in order to produce estimates of the private reward associated with patent protection.

Harhoff et al. (2003a) analyse survey responses from German and US patent holders and find that the distribution of patent value is highly skewed and can be approximated by a log-normal distribution. Harhoff et al. (2003b) investigate the extent to which citations, opposition procedure and the size of patent families are predictors of patents' value. All three patent characteristics considered are positively associated with patent value. However, whilst citations outside the patent literature are informative for the value of patents in the pharmaceutical and chemical sectors they are not for patents in other technical fields.

Gambardella et al. (2008) report that the estimated mean of the European patent value distribution is more than €3m whilst the median is about €300,000. Their results are based on the PatVal-EU survey of inventors from Denmark, France, Germany, Hungary, Italy, Netherlands, Spain and the UK. Their value estimates are significantly correlated with a number of variables, including the specific countries in which the patent is validated. Further evidence on the relationship between patent value and geographical area of protection is found in Gambardella et al (2006). The authors report that the total value of patents in Europe is, on average, around one per cent of the GDP in 1994-1996 and has increased during the 1990s, both in absolute terms and as a percentage of GDP. In 2000-2002 the value of patents was 1.16 per cent of GDP.

Other studies have relied on survey techniques to investigate which form of intellectual property protection is perceived as being most effective. For example, Hall and Zeidonis (2001) use survey data from US firms operating in the semiconductor industry and conclude that, due to the short product life-cycles in this sector, patents constitute a less effective method of protection compared to informal methods such as speed-to-market or trade secrecy. The result is somewhat surprising given the intensive patenting activity observed within the sector. The authors justify this seemingly contradictive result by noting that firms in the semi-conductor sector may engage in strategic patent portfolio races whose primary goal is to build large portfolio that can then use as a bargaining chip to avoid delays in investment. This intuition is confirmed by Hsu and Ziedonis (2008) who find that, among semiconductor start-ups, there is a positive correlation between patenting activity and access to venture capital funding. A similar result has been found by Lerner (1994) in relation to start-ups operating in the biotechnology sector. Other surveys (e.g. Arundel (2001), Arundel and Kabala (1998) and Cohen et al. (2000)) have clearly shown that firms tend to rely more on patent protection in in the presence of product innovation (for which IP infringements can be more easily observed in the marketplace), whilst trade secrecy is generally preferred in the presence of product innovation.

Finally, surveys have also provided useful insights into firms' motivations for using patents (see e.g. Arundel, (2001), Blind and Thumm (2004), Blind et al. (2006), Cohen et al. (2000), Duguet and Kable (1998) and Graham et al. (2010)). One of the most fundamental findings among surveys of patent users is the realisation that firms do not use patents with the exclusive goal of protecting their innovations, but also for strategic purposes. Some of the strategic patenting practices most commonly cited in the literature include:

- Patent thickets — the practice of obtaining several patents with very similar scope. This strategy is particularly common in the biotechnology sector and there is a belief that it is carried out with the primary goal of increasing rivals' costs by limiting the entrants' ability to acquire industry know-how.
- Defensive patenting — the practice of building large patent portfolios to prevent patent infringement lawsuits by third parties.
- Increasing bargaining power — using patents as a way of improving the negotiating position against competitors, for example in cross-licensing cooperation.
- Monetisation — patenting inventions with the primary goal of securing licensing agreements. This practice may be particularly attractive for SMEs, universities or individual inventors who do not have the means to exploit their innovations through market commercialisation.
- Raising finance — using patents to assist in the acquisition of venture capital or to attract external funding.
- Enforcing standards.

A very important message of such studies concerns the observation of dramatic differences across sectors in the use and value attributed to the different appropriability mechanisms. So-called "discrete-product industries" (i.e., whose products are typically comprised of a relatively small number of patentable elements), such as pharmaceuticals and chemicals, place a significantly higher importance on patents in terms of protection effectiveness than other manufacturing industries (Cohen et al., 2000). This is due to the comparatively clearer standards that can be applied in such a context to define a patent's validity and to defend it against infringements. On the other hand, companies operating in so-called "complex-product industries", such as the electro-technical industry or the automotive industry, make considerably higher strategic use of patents than the rest of the manufacturing sector, due to the necessity to use patents of others in such complex contexts.

8.5 The impact of patent values on patenting behaviour

Whilst acknowledging that there is some degree of variation in the results, most economic analyses of patent value tend to confirm the following findings:

- Patent stocks are positively and statistically associated with firms' performance and the strength of this statistical relationship tend to be stronger when some measure of patent portfolio quality (e.g. citation counts) is also used. Also, this is a positive relationship between patent value (estimated through regressions analysis of firms' performance) and patent–lifetime: patents that add greater value to a firm tend to be renewed for more years.
- In addition to patent-lifetime the geographical scope of protection is also linked to patent value. Moreover, country-specific characteristics, and in particular market size as measure by GDP, also play an important role in explaining patent value: patents validated in larger markets are, all else being equal, more valuable than patents validated in smaller markets. This explains the observation that the majority of European patents are validated in the largest EU markets.
- The value of patent protection tends to vary across technological sectors: it is generally highest in patent-intensive industries such as pharmaceutical and chemicals, followed by computer and machinery sectors. Moreover, clear patterns have been observed between technological fields, geographical scope of validation and patent lifetime. For example, European patents in the pharmaceutical field tend to be validated in the largest number of countries and to live the shortest lives. In contrast, electronics have the longest average patent life but tend to be validated in the fewest number of countries.
- Even among sectors where informal protection mechanisms may be perceived to be more effective than patents, patenting activity can still play a key strategic role by providing firms with easier access to finance. Moreover, there is abundant evidence that firms build patent portfolios not only with the primary purposes of protecting and commercialising innovation but for a variety of different strategic reasons.

8.6 Studies that assess patent value based on transaction data

Patent transactions and patent licencing agreements represent, in principle, the most reliable source of information for assessing patent values. However this type of information is rarely observable due to the confidential nature of transaction and licensing agreements involving patents. As a consequence, studies that attempt to estimate patent value based on transaction data are scant at best (examples of studies in this area include Serrano (2006), Sneed and Johnson (2009) and Sakakibara (2010)). Therefore we focus here on studies that have assessed patent licensing and patent transfers more generally.

A common theme among these studies is the observation that the market for IPR transfers has not yet reached its full potential.

An impact assessment conducted by the European Commission (2011) notes that registering transfers and licences can be complex and expensive for patent holders in many Member States. Licensing or transferring a patent might require professional representatives, attorney and translator fees that might go up to EUR 500. In addition, the complexity is increased due to the diversity in the administrative requirements at each national patent office. These obstacles might dissuade patent holders, especially small firms, from securing economic rewards from their invention which, in turn, reduces incentives for undertaking innovative activities.

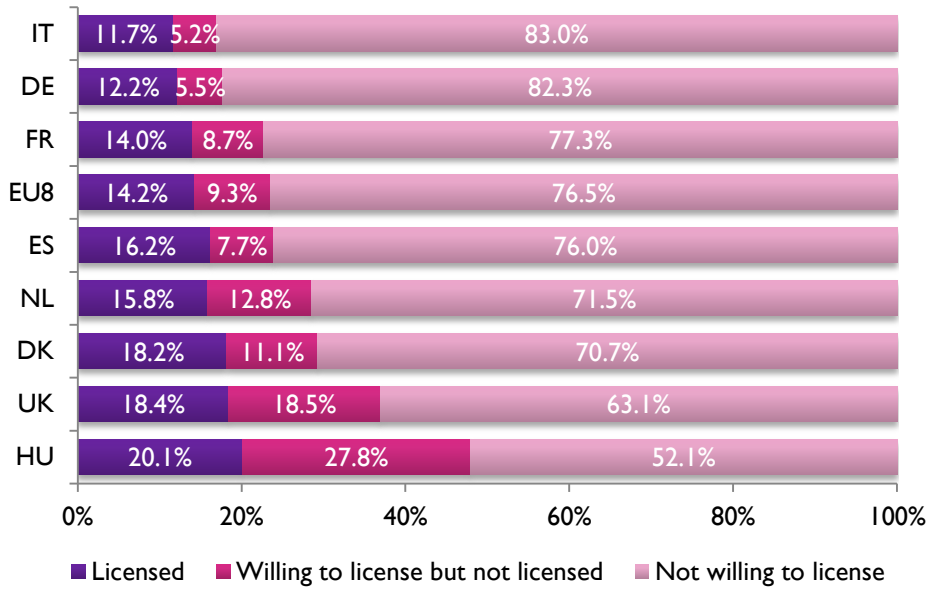
Gambardella et al (2007) find there are transaction costs in the European market for technologies that prevent a licensing agreement being concluded. The evidence suggests that the development and the efficient functioning of the market for patents require supporting institutions. The author's view is that policy should remove any obstacle that prevents the supporting institutions coming into being, or should support their formation when difficulties emerge. Similarly, Gambardella et al (2006) find that standard

technology contracts, and guidelines on how they should be written would reduce transaction costs in markets for technologies and/or patents.

Gambardella et al (2006) estimated that the market for European patents could be 50 per cent larger, in terms of value, than it was at the time of the study. This estimate was based on the PatVal survey, which revealed that several patent owners were willing to sell their technologies but were unable to do so. The survey also found that larger firms have a lower utilisation rate of patents. This could be explained partially because large firms have a greater propensity to patent for strategic reasons. However, in spite of their high share of blocking patents, large firms still exhibit a sizable share of sleeping patents.[23] This suggests that the reservoirs of inventions and by-product inventions that they produce are potentially usable. Therefore, large firms could be substantial key source of potential patent licenses.

The following charts, reported by Gambardella et al (2006), break down the propensity of licenses by (selected) Member States, firm size and industrial sectors, respectively.

Figure 8.1: Share of unused patents by country (PatVal-EU Survey 2003-2005, Patent application years 1993-1997)

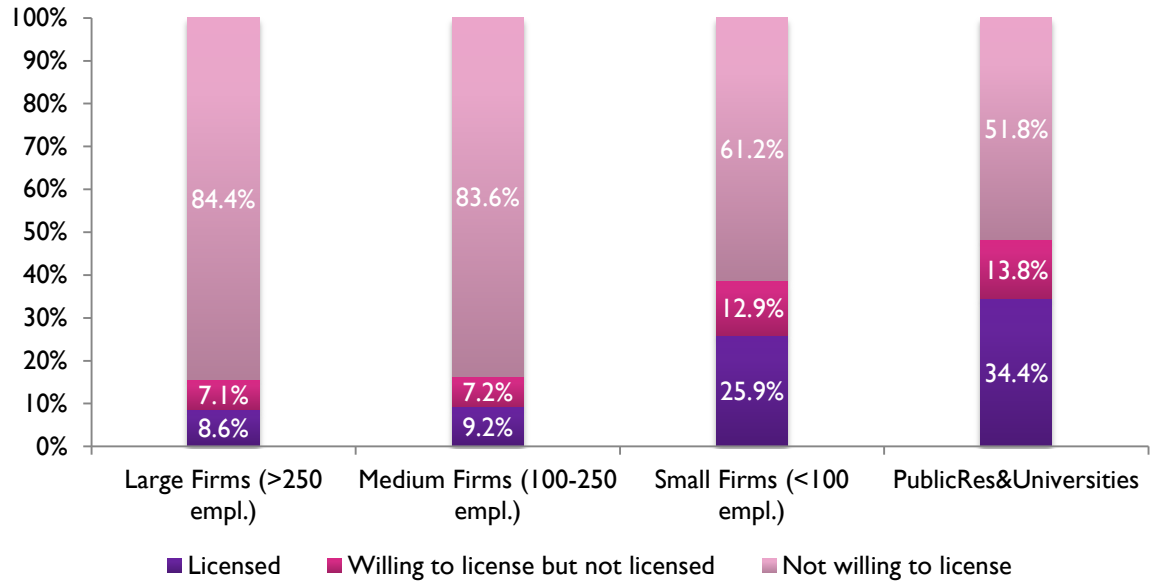


Source: Europe Economics, adapted from Gambardella et al (2006).

Figure 8.1 shows that there is a substantial unmet supply of patents, evidenced by the number of patent holders who would be willing to license but are unable to do so. This 'market failure' could be explained via high transaction costs to licensing. It is worth noticing that the UK is among the countries with the highest proportion of unmet supply. This is somewhat surprising, given that validation behaviour seems to indicate that the UK is one of the Member States where patents have the highest value.

[23] According to Gambardella et al (2006), "blocking" patents have the purpose of blocking rivals from using a given technology even if the technology is not used by the patent holder. "Sleeping" patents are simply patents that are left unexploited by the patent holder. The sleeping patents are natural targets for enhancing the rate of utilization of patents.

Figure 8.2: Share of licensed patents by type of organisation

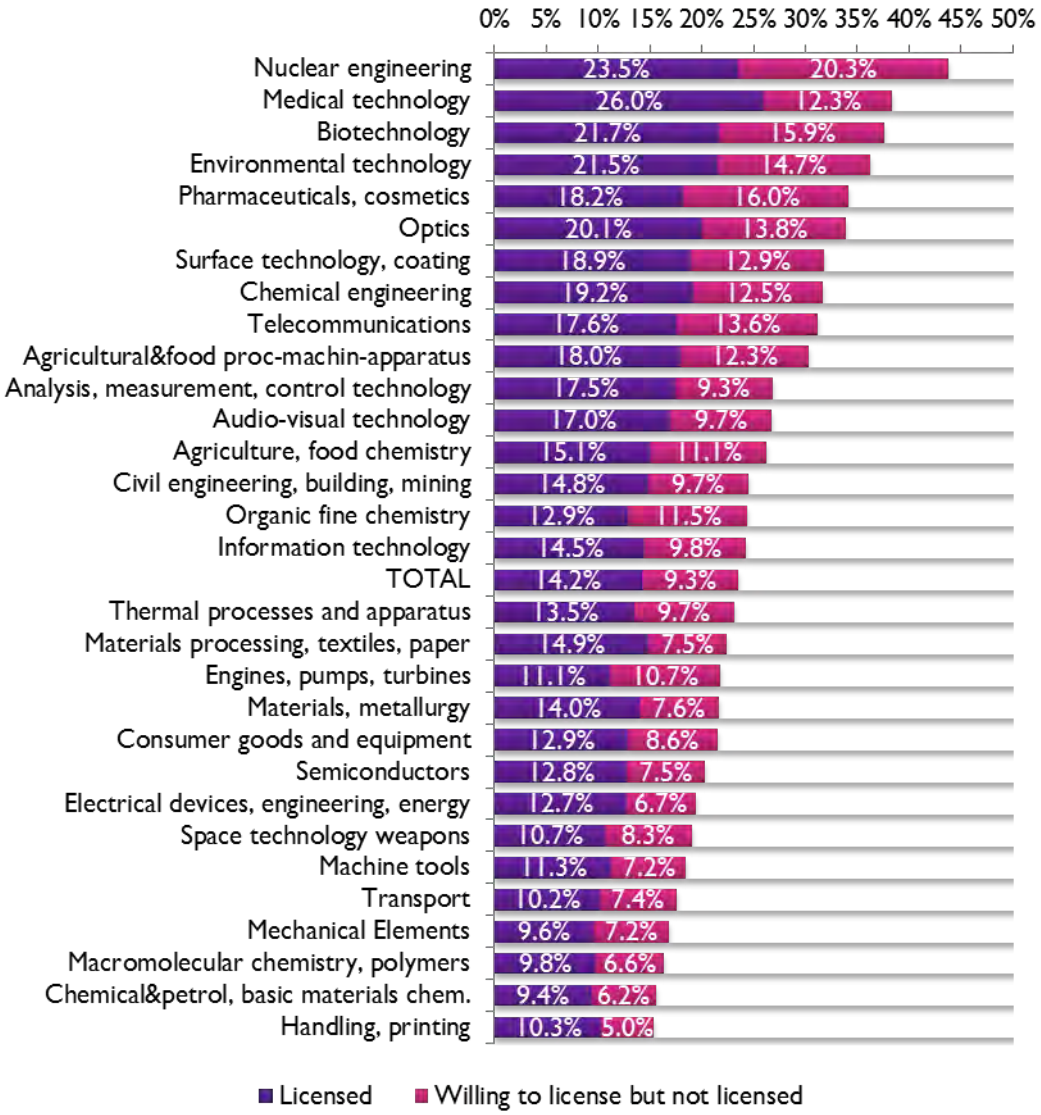


Source: Europe Economics, adapted from Gambardella et al (2006).

Figure 8.2 shows evidence that licensing is of particular interest to small firms. This might be for two reasons. First, small firms typically do not have an international presence, therefore they might have a higher willingness to license their patents in jurisdictions where they do not operate. It is worth noting that if licensing costs were lower, there would be a greater incentive to validate patents in further member states. Consequently, there is reason to believe that the data shown on Figure 8.2 provide only a conservative estimate of the existing latent supply. Second, large firms might have an incentive to use patents strategically and not license them, even when they are not being used.

Figure 8.3 provides a breakdown of licensing by industrial sector. It can be seen that there are substantial differences between them. At one end, pharmaceuticals, medical technology and biotechnology are among the sectors that licence the most. At the other end, chemical and printing industries tend to have a low proportion of licensing. The difference between these extremes can be of a factor of two in the case of licensing and a factor of four for willingness to license.

Figure 8.3: Share of Licensed Patents by Sector



Source: Europe Economics, adapted from Gambardella et al (2006).

9 Appendix 2: Statistical Analysis of the Potential Uptake of the UP

9.1 Introduction

This section provides a statistical analysis of the potential uptake of the unitary patent by patent users. The question addressed here is how sensitive will the take-up of the UP be to the level of centralised renewal fees. The analysis is primarily based upon a survey obtaining patent user self-reported statements on their use of the UP under different hypothetical scenarios for the levels of centralised renewal fees.[24] Two separate questions in that survey asked patent users first how many grants they received from the EPO in the last five years, and then — assuming the UP had been available in the last five years — how many of these granted patents they would have registered as UP under the following hypothetical scenarios:

- Scenario 1 — the centralised renewal fee for the UP is equal to the sum of the current renewal fees for Germany, France and the UK.
- Scenario 2 — the centralised renewal fee for the UP is equal to the sum of the current renewal fees for Germany, France, the UK, the Netherlands, Sweden and Belgium.
- Scenario 3 — the centralised renewal fee for the UP is equal to the sum of the current renewal fees for Germany, France, the UK, the Netherlands, Sweden, Belgium, Austria, Ireland, and Denmark.
- Scenario 4 — the centralised renewal fee for the UP is equal to the sum of the current renewal fees for Germany, France, the UK, the Netherlands, Sweden, Belgium, Austria, Ireland, and Denmark, Poland Finland and Czech Republic.

The 10 years renewal costs implied by each of the scenarios considered above are reported in the table below.

Table 9.1: Renewal fees of the hypothetical scenarios

Scenarios	Renewal costs of maintaining patent "alive" for 10 years
Scenario 1	€ 3,116
Scenario 2	€7,023
Scenario 3	€11,354
Scenario 4	€14,797

We have estimated the sensitivity of the take-up of the UP to the level of renewal fees through a regression analysis (details on estimation methods are provided below) that aimed to control for the following factors:

- Type and size of the organisation, i.e. whether the patent user is a large company, an SME, a public research organisation, an individual inventor or some other type of organisation. This information was gathered through the survey and is included in the analysis through a set of dummy variables.
- The total number of EPC countries were patent users have validated patents granted by the EPO in the last five years. This information was gathered through the survey. In the analysis we used this information to construct an auxiliary dummy variable (named *wide geographical scope*) which takes value

[24] Details of the survey are provided in our Main Report.

one when the number of countries where patents are validated is larger than the median (which is seven in our sample) and zero otherwise.

- Technological areas. For each survey respondent the EPO provided us with information on the distribution (at the technological field level) of patent filings made in 2012. We have used this information to construct five technological cluster variables (electrical engineering, instruments, chemistry, mechanical engineering and other fields) that indicate, for each patent user, the share of patent filings made in that specific technological clusters.

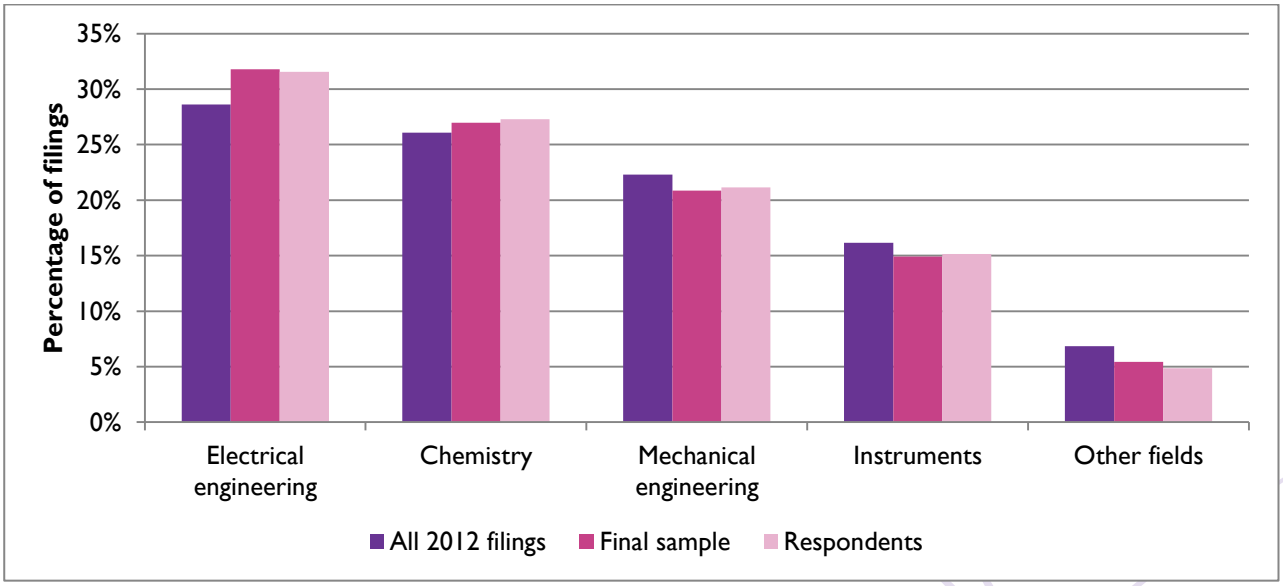
9.2 Dataset description and dataset validation

We first provide a description of the survey data in order to explore the extent to which the characteristics of respondents are representative of the population of EPO patent users. To check the representativeness of respondents to the survey we have compared the three following samples;

- The total number of filings to the EPO during 2012 (direct filings excluding divisional applications and Euro-PCT regional phase applications) broken down by WIPO technological clusters.
- A random sample of 5,020 unique patent applicants drawn from the set of applications made to the EPO in 2012 (Euro-direct excluding divisional and Euro-PCT regional phase), also broken down by WIPO technological clusters. This random sample was provided by the EPO and constitutes the reference sampling population for the survey.
- The final sample of respondents (broken down by WIPO technological clusters) containing the 439 patent users that completed the survey.

Figure 9.1 exhibits the percentage of filings in each technological cluster for the three samples.

Figure 9.1: Representativeness of the survey responses



The figure above shows that the 'final sample of respondents' and 'random sample' figures are extremely similar, suggesting that those that responded to the survey are representative of those that were approached. The degree of similarity between the 'respondents' and 'all 2012 filings' figures is slightly lower: relative to all 2012 filings, there is a slight over-representation of respondents from the electrical engineering and chemistry sectors.

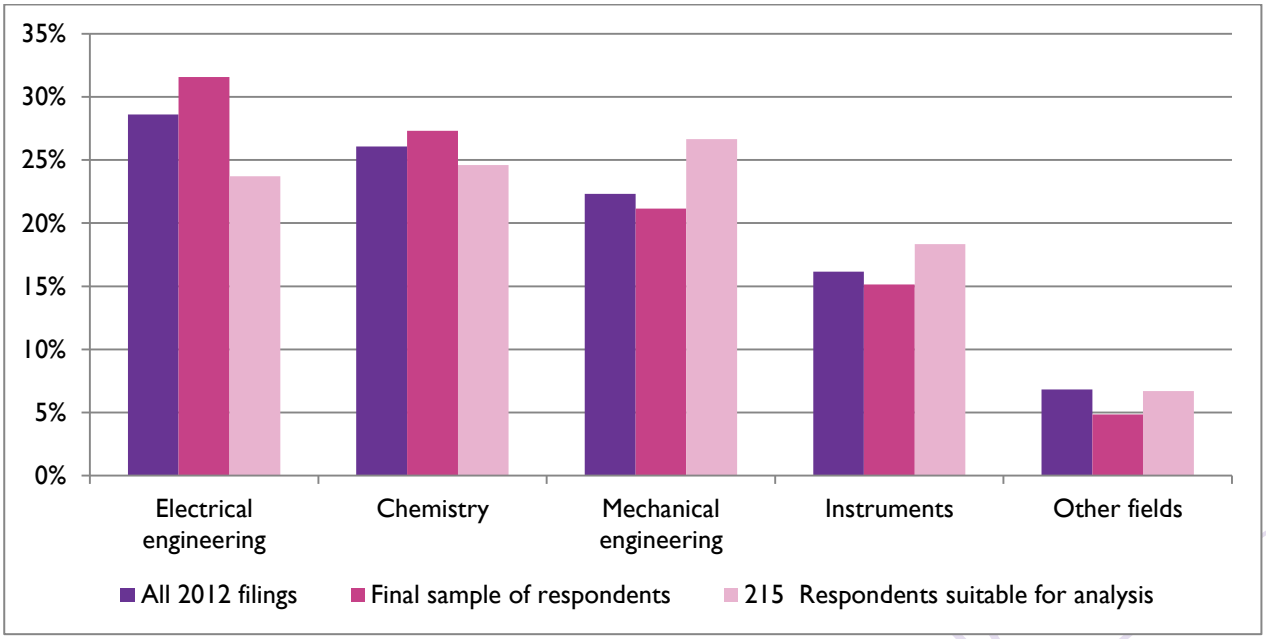
Not all of the 439 patent users that completed the survey provided answers that are feasible for the purpose for the analysis on the sensitivity of the take-up of the UP to the level of centralised renewal fees.

More specifically, we have excluded responses from users that follow in at least one of the following categories:

- Valid missing: 181 patent users who either stated that they did not receive a patent grant from the EPO in the last five years (hence were not eligible for the question on the potential uptake of the UP), or were unable — or preferred not — to provide an answer to the question on the potential uptake of the UP.
- Answers without economic meaning: 19 patent users stated that they would have consistently registered more patents as UP for higher centralised renewal fees values.
- Inconsistent answers concerning the number of patents that would have been registered as UP: seven patent users stated that the number of patents they would have validated as UP in the last five years is larger than the number of patents they had actually been granted by the EPO during the same period.
- Inconsistent answers concerning the countries where patents are validated: 50 patent users stated that they had validated at least one of the patents granted by the EPO in the last five years, but then did not provide information on the EPC countries were validations were made activity.

After excluding responses from users in the categories illustrated above we are left with 215 observations that are suitable for the analysis. As shown in Figure 9.2, the representativeness of these 215 respondents is somewhat limited (in particular, mechanical engineering and instruments clusters are overrepresented, whilst the electrical engineering cluster is underrepresented). The regression analysis attempts to overcome this problem by controlling for the technological areas in which respondents are active. Furthermore, it is of interest to note that the 215 analysis-suitable responses are a better match for all 2012 filings than they are of the final sample of respondents.

Figure 9.2: Representativeness of the responses suitable for the analysis



Unfortunately, it is not possible to complete this analysis for type of organisation (large firm, SME, university etc.) as such information is not recorded in the EPO's database. Therefore, we cannot identify the degree to which respondents to our survey are representative of the all applicants to the EPO during 2012 in respect of organisational type.

Nonetheless, for completeness we report the break-down of the sample type of organisation as follows:

Table 9.2: Usable responses by type of organisation

Type of organisation	Count	Percentage
Large companies	152	70.7
SME	33	15.4
Universities and PROs	13	6.1
Individuals or other organisations	14	6.5
Prefer not to answer	3	1.4
Total	**215**	**100**

9.3 Statistical analysis

In order to estimate the potential impact that different levels of centralised renewal fees might have on the uptake of the UP we have taken two separate approaches:

- In the first approach we treat self-reported answers under different renewal fees scenarios as separate cross-sectional observations (i.e. the answer of a respondent in scenario one is treated as a separate cross-sectional observation from the answer provided by the same respondent in scenarios two, three, and four). This results in a single *cross sectional* model based on a sample of 860 (i.e. 215 x 4) observations. A limitation to this approach is that it fails to account for the fact that some of the observations (though they refer to different assumptions concerning fee levels) are generated by the same patent users.
- In the second approach we conduct a *panel* estimation with 215 cross sections (one for each respondent) and four different answers (each one corresponding to a different renewal fee scenario) concerning the potential uptake of the UP. Compared to the previous approach this method has the advantage of treating each response from the same patent users as a unique cross-sectional observation. Furthermore, it allows use of random effects models designed to compensate for unobserved heterogeneity (i.e. idiosyncratic features of patent users that are not directly observable from the data).

In this Appendix we report below results for a model specification in which the dependent variable is the logarithm of the share EPO granted patents in the last five years that would be registered as UP and where the dependent variables are dummies related to different centralised fee level scenarios.[25] Therefore, under this specification, the model aims at explaining the percentage change in the share of patents that would be registered as UP under different fee scenarios. We have also estimated the model under a different specification where the dependent variable is the logarithm of EPO patents registered as UP, and where the dependent variable is the logarithm of the fee levels. We do not report the results of these alternative specifications, but note that they produce qualitatively similar results.

In order to take into account for the truncated (at zero) nature of the dependent variable we have estimated a Tobit model as opposed to a standard OLS. The estimates have been conducted with robust standard errors.

We provide a cross tabulation indicating different measures of potential UP take-up below.

[25] Since self-reported number of patents that would have been registered as UP is often zero (especially when renewal fees are assumed to be relatively high) the log transformation used for the dependent variable is Log(Share+1)= Log((UP Patents/EPO Grant)+1)=Log(UP Patents + EPO Grants)- Log(EPO Grants).

Table 9.3: Descriptive statistics for the explanatory variables

	Granted in the last 5 years	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total EPO patents	20,903	13,581	3,629	2,262	1,691
% of past five years EPO grants, by total patents granted	100%	65%	17%	11%	8%
Average % of past five years EPO grants per respondent	100%	79%	34%	20%	14%
Average EPO patents per respondent	97.2	63.2	16.9	10.5	7.9

The percentages in this table come in two forms. In the second row we quote the total numbers of patents granted in each scenario as a percentage of the total granted in the past five years. So, for example, in Scenario 1 13,581 / 20,903 = 65%. In the third row, by contrast, we quote the average across respondents for what proportion of each respondent's past five years of grants that the respondent says would have been registered as a UP under each scenario.

We reiterate that Table 9.1 is the raw survey responses. The task of the models presented below is to consider how these raw results are affected once one controls for type of organisation, geographic scope of patent-filing and the technological area of the patent.

9.3.1 Cross-sectional model

We provide below the estimation result of the *cross-sectional* model. Coefficients that are statistically significant at the 90 per cent confidence level are highlighted in bold throughout — the precise degree of statistical significance can be seen explicitly in the final column of each table ("Prob."), where it will be observed that in almost all cases variables that are significant at the 90 per cent confidence level are significant at the 95 per cent confidence level, also.

Table 9.4: Cross-sectional model

Dependent Variable: Log(UP Patents + EPO Grants)-Log(EPO Grants)
Method: Tobit regression with clustered standard errors
Sample (adjusted): 1 860
Included observations: 816 after adjustments
Left censoring (value) at zero

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Large firm	0.1686365	0.0785783	2.15	0.0320
SME	0.0370877	0.1036746	0.36	0.7210
University & PRO	-0.0018952	0.1186513	-0.02	0.9870
Electrical Engineering	-0.0134254	0.1021542	-0.13	0.8950
Chemistry	0.1269568	0.1020955	1.24	0.2140
Instruments	0.0498358	0.1044042	0.48	0.6330
Mechanical engineering	0.0329147	0.1010905	0.33	0.7450
Wide geographical scope	0.092464	0.0413736	2.23	0.0260
Log (grants in last 5 years)	-0.0541475	0.0148471	-3.65	0.0000
Fee scenario 2	-0.3846487	0.0267775	-14.36	0.0000
Fee scenario 3	-0.5501751	0.0292036	-18.84	0.0000
Fee scenario 4	-0.674615	0.0321269	-21	0.0000
Constant	0.5065507	0.1146169	4.42	0.0000

Left censored obs	339	Right censored obs	0

Uncensored obs	477	Total obs	816

From Table 9.4 we notice that, in addition to the level of renewal fees, the dummy variable indicating that the patent user is a large company, the wide geographical scope of validation and the total number of patents granted in the last five years are statistically significant (all at the 95 per cent confidence level) and positively associated to the number of patents hypothetically registered as UP.

9.3.2 Panel model

The table below provides the estimation result for the panel model with random effects[26].

Table 9.5: Panel model with random effects

Dependent Variable: Log(UP Patents + EPO Grants)-Log(EPO Grants)
Method: Panel regression with bootstrapped standard errors
Periods included: 4
Cross-sections included: 204
Total panel (balanced) observations: 816

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Large firm	0.1508474	0.0962989	1.57	0.117
SME	0.0273089	0.1158981	0.24	0.814
University & PRO	-0.0074753	0.1312947	-0.06	0.955
Electrical Engineering	0.0215874	0.1180048	0.18	0.855
Chemistry	0.1208126	0.1194205	1.01	0.312
Instruments	0.0652354	0.1181564	0.55	0.581
Mechanical engineering	0.0393337	0.1111092	0.35	0.723
Wide geographical scope	0.0859136	0.0500626	1.72	0.086
Log (grants in last 5 years)	-0.0529459	0.0141105	-3.75	0.000
Fee scenario 2	-0.3767805	0.0221852	-16.98	0.000
Fee scenario 3	-0.5432754	0.0246908	-22	0.000
Fee scenario 4	-0.662155	0.0278864	-23.74	0.000
C	0.5112393	0.1340386	3.81	0.000
Left censored obs	339	Right censored obs		0
Uncensored obs	477	Total obs		816

Comparing the results of Table 9.4 and Table 9.5, we notice that the results are broadly similar, more specifically:

- As in the cross-sectional model, renewal fees and wide geographical scope are associated with a lower and higher (respectively) potential uptake of the UP. Again, similarly, the sign of the coefficient of the logarithm of number of patents granted in the last five years (which control for the patent intensiveness of respondents) is negative.
- With regard to the typologies of patent users, whilst Table 9.4 indicates that large firms tend to report a larger number of patents as potentially registered as UP, this is no longer the case in Table 9.5 (even though we notice that the coefficient is still positive and close to being significant at the 90 per cent confidence level).
- None of the technological clusters' variables is statistically significant in the model specifications presented above. However, we do not interpret this as implying that the technological clusters do not

[26] The estimates in Table 9.5 are based on bootstrapped standard errors. We have replicated the estimation also with alternative error corrections methods — i.e. Jackknife and Observed Information Matrix (OIM) — and obtained virtually identical results.

have any impact on the potential uptake, In fact, we have found that in a simple OLS panel model without random effect and in which the dependent variable (share of EPO patents registered as UP) is not log-transformed, the chemistry cluster variable has a positive correlation to the uptake of the UP, whilst the electrical engineering cluster variable appears to be negatively associated with the potential use of the UP. We do not provide these results here as we believe they are less robust than those reported above, but we cannot rule out the possibility that, with a larger dataset, technological cluster variables may be significant even under the specifications of Table 9.4 and Table 9.5.

9.4 Simulation of the potential impact of renewal fees on the take-up of the UP

We provide below a simulation on the potential impact of renewal fess on the take-up of the UP by we simulating the impact upon average UP registrations within the EPO, by patent-holder, as a proportion of that patent-holder's recent portfolio of EPO patent grants.

The measure of take-up used for the simulation is the share (per-applicant) of EPO patents registered as UP, based on the estimated coefficients for different fee scenarios as provided in the cross-sectional model (Table 9.4) and the panel model with random effects (Table 9.5). The coefficients in these two models are as reported below:

	Model 1 (cross-sectional model)	Model 2 (panel model with random effects)
Coefficient of fee scenario 2	-0.38	-0.38
Coefficient of fee scenario 3	-0.55	-0.54
Coefficient of fee scenario 4	-0.67	-0.66

Since estimates are not available for Scenario 1 (which, in the two models, is assumed to be the baseline scenario) we assume that the percentage of the patents that an average firm would register as UP under scenario one is the one provided in Table 9.3 (i.e. 79 per cent). We also assume that in a counterfactual scenario in which renewal fees for the UP were zero, all patents would be registered as UP.[27] The percentage take-up for Model 1 and Model 2 are obtained by subtracting the proportionate decline in applications under each scenario from the value in the row above. So, for example, in Model 1 under Scenario 2, the modelled reduction as a proportion of the 79 per cent Scenario 1 value is 38 per cent and therefore the take-up in Scenario 2 is (1-0.38)*0.79=0.49.

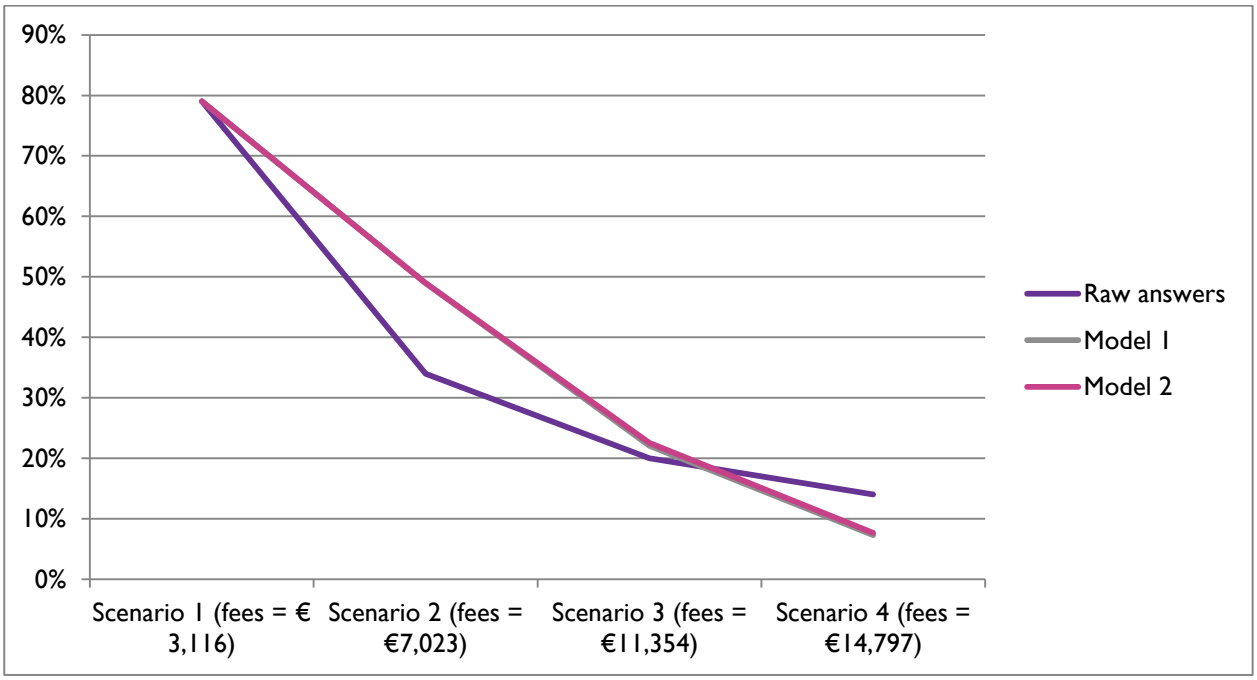
Implications of the simulation exercise illustrated above are summarised in the following table and chart, comparing them to the raw answers exhibited originally in Table 9.3.

[27] We note that this assumption is non-trivial because there might be other aspects associated to the Unitary Patent Protection system (e.g. the way in which in central litigation at the UPC may work) that could decentivise some patent users to use the UP even if its renewal costs were zero.

Table 9.6: Simulation of the share per applicant of EPO patents registered as UP under different fee scenarios

Renewal fees for 10-years	Average share of EPO patents registered as UP per respondent		
	Raw answers	*Model 1*	*Model 2*
Counterfactual (fees = € 0)		100%	100%
Scenario 1 (fees = € 3,116)	79%	79%	79%
Scenario 2 (fees = €7,023)	34%	49%	49%
Scenario 3 (fees = €11,354)	20%	22%	23%
Scenario 4 (fees = €14,797)	14%	7%	8%

Figure 9.3: Simulation of the share of EPO patents registered as UP per applicant under different fee scenarios



We note that the modelled results imply that the average respondent would register a higher proportion of total patents with the EPO under the higher fees scenarios than was the case in the raw data for Scenario 2 and Scenario 3, but a lower proportion for Scenario 4.

9.5 Summary

In this document we have exhibited two econometric models of the impact of renewal fees upon Unitary Patent take-up and the factors influencing such take-up.

We found that take-up of the patent would be affected by:

- Firm size: in one of our models large firms take up more.
- Geographic scope: in our models firms with wide geographic scope (i.e. that validate patents in more than seven EPC member states) take up more.

- The number of grants: those that have been granted more patents are likely to register more patents via the UP but are likely to register a lower proportion of their patents via the UP than other patent users are.

Fees are robustly significant in both our models. We used our results to simulate the impact of fees upon take-up of the UP under various fee scenarios, to test to what extent the raw answers in our survey were dependent upon the characteristics of respondents. We find that the average proportions of hypothetical UP registrations are a little less price sensitive than in our raw results for lower fee levels, but are slightly more sensitive for higher fee levels.

10 Appendix 3 – Statistical Analysis of the Benefits and Costs of the UP

We provide here a series of regressions aimed at testing statistically to what extent the perception of potential benefits and costs of the UP changes across different users. The regressions are based on Probit models in which the dependent variable takes value one if the respondent stated that a given benefit/cost of the UP is perceived as being either significant (i.e. value of four in the self-reported significance scale) or very significant (i.e. value of five in the self-reported significance scale), and a value of zero the if the self-reported significance scale is between one and three, or if the respondent is unsure about its significance. Respondents who preferred not to provide an answer to the relevant questions were dropped from the regressions (for each regression the total number of included observation is also reported).

The regression controls for the size and typology of organisations (whether it is a large company, an SME a university or a public research organisation), the share of patents filed in different technological clusters and the geographical scope of validation (i.e. whether or not the respondent has filed patents in more than six EPC member state — this is the median number of countries in which the 439 respondents in our sample have validated patents in the last five years).

The regressions are provided in relation to the questions concerning:

- Potential cost reductions associated with the UP.
- Potential business opportunities associated with the UP.
- Potential perceived costs of the UNP.

Statistically significant coefficients (at the 90 per cent confidence level) are reported in bold.

10.1 Potential cost reduction of the UP

1. Dependent Variable: Reduction in translation cost is perceived as a significant/very significant benefit (included observations: 366)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.160840	0.351144	0.458045	0.6469
Large firm	0.127802	0.251983	0.507186	0.6120
SME	0.394402	0.292058	1.350424	0.1769
UniPro	0.106013	0.357551	0.296497	0.7669
Electrical Engineering	0.390991	0.341710	1.144219	0.2525
Instruments	-0.064803	0.351982	-0.184109	0.8539
Chemistry	0.222859	0.324436	0.686911	0.4921
Mechanical Engineering	0.018798	0.325126	0.057819	0.9539
Wide geographical scope	0.148813	0.151076	0.985022	0.3246

2. Dependent Variable: Possibility of reclaiming translation costs (for SMEs, Universities and Individual investors) is perceived as a significant/very significant benefit (included observations: 366)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.610312	0.376510	-1.620971	0.1050
Large firm	-0.030919	0.293426	-0.105373	0.9161

SME	**0.761489**	**0.316270**	**2.407718**	**0.0161**
UniPro	**1.104876**	**0.374422**	**2.950887**	**0.0032**
Electrical Engineering	-0.526043	0.353607	-1.487647	0.1368
Instruments	-0.337687	0.358203	-0.942726	0.3458
Chemistry	-0.423756	0.327551	-1.293711	0.1958
Mechanical Engineering	-0.542863	0.336287	-1.614284	0.1065
Wide geographical scope	0.124714	0.163240	0.763994	0.4449

3. Dependent Variable: Reduction or removal of validation and publication fees payable at NPOs is perceived as a significant/very significant benefit (included observations: 365)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.276069	0.353190	0.781644	0.4344
Large firm	0.200850	0.250226	0.802673	0.4222
SME	**0.588149**	**0.291188**	**2.019825**	**0.0434**
UniPro	0.292983	0.353691	0.828358	0.4075
Electrical Engineering	0.191435	0.343747	0.556907	0.5776
Instruments	-0.217757	0.353881	-0.615339	0.5383
Chemistry	-0.018617	0.323232	-0.057596	0.9541
Mechanical Engineering	-0.324399	0.325604	-0.996297	0.3191
Wide geographical scope	-0.155619	0.147013	-1.058538	0.2898

4. Dependent Variable: Reduction in legal fees for validation work carried out by external patent attorneys/lawyers is perceived as a significant/very significant benefit (included observations: 366).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.933907	0.381886	2.445511	0.0145
Large firm	-0.261089	0.255446	-1.022093	0.3067
SME	0.237237	0.297460	0.797544	0.4251
UniPro	0.463585	0.376647	1.230820	0.2184
Electrical Engineering	-0.395504	0.365019	-1.083516	0.2786
Instruments	-0.601056	0.381535	-1.575363	0.1152
Chemistry	-0.677502	0.349891	-1.936325	0.0528
Mechanical Engineering	-0.408760	0.357436	-1.143587	0.2528
Wide geographical scope	0.156196	0.149638	1.043825	0.2966

5. Dependent Variable: Reduction in administration cost for validation work carried out by own staff is perceived as a significant/very significant benefit (included observations: 366)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.278825	0.342037	0.815189	0.4150
Large firm	-0.191077	0.245299	-0.778952	0.4360
SME	-0.010416	0.277839	-0.037491	0.9701
UniPro	-0.188941	0.348057	-0.542846	0.5872
Electrical Engineering	-0.470070	0.326360	-1.440341	0.1498
Instruments	-0.363074	0.340422	-1.066539	0.2862
Chemistry	-0.499055	0.312586	-1.596535	0.1104
Mechanical Engineering	-0.317154	0.314727	-1.007712	0.3136
Wide geographical scope	-0.108464	0.145228	-0.746854	0.4552

6. Dependent Variable: Overall reduction of budget needed to pay fees when patents come up for renewal is perceived as a significant/very significant benefit (included observations: 365)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.636367	0.370023	1.719802	0.0855
Large firm	-0.003732	0.260123	-0.014346	0.9886

SME	0.288305	0.303721	0.949244	0.3425
UniPro	-0.066109	0.371174	-0.178108	0.8586
Electrical Engineering	0.106860	0.357013	0.299317	0.7647
Instruments	-0.085150	0.371170	-0.229409	0.8186
Chemistry	0.039630	0.341670	0.115988	0.9077
Mechanical Engineering	-0.446884	0.337827	-1.322818	0.1859
Wide geographical scope	0.071148	0.153812	0.462563	0.6437

7. Dependent Variable: Overall reduction in legal fees for patent renewal work carried out by patent attorneys/lawyers is perceived as a significant/very significant benefit (included observations: 366)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.006277	0.371653	2.707569	0.0068
Large firm	**-0.606350**	**0.267949**	**-2.262932**	**0.0236**
SME	-0.140798	0.304817	-0.461911	0.6441
UniPro	-0.449050	0.363920	-1.233927	0.2172
Electrical Engineering	-0.237714	0.342211	-0.694641	0.4873
Instruments	-0.549945	0.355186	-1.548330	0.1215
Chemistry	-0.087110	0.328520	-0.265159	0.7909
Mechanical Engineering	-0.390453	0.331057	-1.179414	0.2382
Wide geographical scope	-0.008132	0.146233	-0.055609	0.9557

8. Dependent Variable: Reduction in administrative costs for patent renewal work carried out by own staff is perceived as a significant/ very significant benefit (included observations: 366)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.000577	0.343457	-0.001681	0.9987
Large firm	-0.208050	0.248770	-0.836313	0.4030
SME	0.123061	0.280264	0.439089	0.6606
UniPro	-0.103455	0.347653	-0.297580	0.7660
Electrical Engineering	-0.430069	0.330003	-1.303227	0.1925
Instruments	-0.307240	0.342212	-0.897807	0.3693
Chemistry	-0.031310	0.311684	-0.100454	0.9200
Mechanical Engineering	-0.026291	0.314499	-0.083595	0.9334
Wide geographical scope	-0.127489	0.146852	-0.868145	0.3853

9. Dependent Variable: Overall reduction in legal fees for patent transfer/licensing work carried out by external patent attorneys/lawyers is perceived as a significant/ very significant benefit (included observations: 364).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.188390	0.352061	-0.535106	0.5926
Large firm	-0.485004	0.250885	-1.933174	0.0532
SME	0.076140	0.283970	0.268127	0.7886
UniPro	-0.051967	0.347104	-0.149717	0.8810
Electrical Engineering	**0.658329**	**0.336401**	**1.956976**	**0.0504**
Instruments	0.142036	0.350179	0.405609	0.6850
Chemistry	0.410022	0.320714	1.278465	0.2011
Mechanical Engineering	0.095378	0.325912	0.292649	0.7698
Wide geographical scope	-0.157742	0.147935	-1.066294	0.2863

10. Dependent Variable: Reduction in administration costs for legal fees for patent transfer/licensing work carried out by own staff is perceived as a significant/ very significant benefit (included observations: 364)

Variable	Coefficient	Std. Error	z-Statistic	Prob.

C	-0.219218	0.356236	-0.615374	0.5383
Large firm	-0.249044	0.265118	-0.939368	0.3475
SME	0.115253	0.293426	0.392785	0.6945
UniPro	-0.168899	0.369286	-0.457365	0.6474
Electrical Engineering	-0.360027	0.342397	-1.051488	0.2930
Instruments	-0.141213	0.352134	-0.401020	0.6884
Chemistry	-0.104461	0.323392	-0.323016	0.7467
Mechanical Engineering	-0.455967	0.331699	-1.374641	0.1692
Wide geographical scope	-0.152881	0.157963	-0.967825	0.3331

10.2 Potential business opportunities of the UP

1. Dependent Variable: Increased licensing opportunities perceived as a significant/very significant benefit (included observations: 358).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.304257	0.123918	2.455302	0.0146
Large firm	-0.061266	0.091251	-0.671399	0.5024
SME	**0.194610**	**0.102781**	**1.893447**	**0.0591**
UniPro	**0.362263**	**0.126432**	**2.865291**	**0.0044**
Electrical Engineering	0.106160	0.116420	0.911873	0.3625
Instruments	0.018003	0.121909	0.147678	0.8827
Chemistry	0.118395	0.111108	1.065584	0.2873
Mechanical Engineering	-0.093242	0.112270	-0.830513	0.4068
Wide geographical scope	-0.040323	0.051613	-0.781265	0.4352

2. Dependent Variable: Easier access to finance is perceived as a significant/very significant benefit (included observations: 358).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.423916	0.107958	3.926673	0.0001
Large firm	**-0.145378**	**0.079496**	**-1.828738**	**0.0683**
SME	**0.311200**	**0.089447**	**3.479133**	**0.0006**
UniPro	0.152505	0.111240	1.370959	0.1713
Electrical Engineering	-0.138702	0.101431	-1.367447	0.1724
Instruments	**-0.205050**	**0.106072**	**-1.933124**	**0.0540**
Chemistry	-0.092941	0.096825	-0.959887	0.3378
Mechanical Engineering	**-0.201726**	**0.097802**	**-2.062592**	**0.0399**
Wide geographical scope	-0.015954	0.045010	-0.354445	0.7232

3. Dependent Variable: Opportunities to increase the geographical scope of protection is perceived as a significant/very significant benefit (included observations: 361).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.550090	0.137729	3.993991	0.0001
Large firm	-0.049628	0.101424	-0.489315	0.6249
SME	0.073179	0.114145	0.641111	0.5219
UniPro	-0.107985	0.140519	-0.768476	0.4427
Electrical Engineering	0.112664	0.129331	0.871125	0.3843
Instruments	0.046550	0.135301	0.344046	0.7310
Chemistry	-0.074681	0.123334	-0.605522	0.5452
Mechanical Engineering	0.007514	0.124778	0.060220	0.9520
Wide geographical scope	-0.005171	0.008618	-0.600029	0.5485

4. Dependent Variable: Easier entry into additional national markets in Europe later on, assuming initial success in ore European markets is perceived as a significant/very significant benefit (included observations: 358).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.498656	0.133999	3.721355	0.0002
Large firm	-0.047826	0.098668	-0.484716	0.6282
SME	0.140114	0.111148	1.260604	0.2083
UniPro	0.113242	0.138057	0.820254	0.4126
Electrical Engineering	-0.159162	0.125907	-1.264121	0.2070
Instruments	-0.144248	0.131859	-1.093958	0.2747
Chemistry	-0.033917	0.120056	-0.282513	0.7777
Mechanical Engineering	-0.124090	0.121401	-1.022156	0.3074
Wide geographical scope	-0.018697	0.055909	-0.334424	0.7383

5. Dependent Variable: Convenience of one-stop shop is perceived as a significant/very significant benefit (included observations: 360).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.517227	0.135701	3.811524	0.0002
Large firm	-0.035521	0.101390	-0.350340	0.7263
SME	0.120419	0.113344	1.062417	0.2888
UniPro	0.053509	0.137693	0.388609	0.6978
Electrical Engineering	0.113473	0.126858	0.894487	0.3717
Instruments	0.145180	0.132730	1.093797	0.2748
Chemistry	0.119130	0.121072	0.983965	0.3258
Mechanical Engineering	0.060228	0.122769	0.490581	0.6240
Wide geographical scope	-0.040247	0.056277	-0.715164	0.4750

10.3 Potential costs of the UP

1. Dependent Variable: Lack of renewal flexibility is perceived a significant /very significant cost (included observations: 361).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.451443	0.369247	-1.222605	0.2215
Large firm	**0.907034**	**0.291317**	**3.113559**	**0.0018**
SME	**0.808009**	**0.320073**	**2.524451**	**0.0116**
UniPro	0.409845	0.380971	1.075793	0.2820
Electrical Engineering	-0.739548	0.335584	-2.203766	0.0275
Instruments	-0.379907	0.349030	-1.088466	0.2764
Chemistry	-0.221724	0.321154	-0.690397	0.4899
Mechanical Engineering	-0.186896	0.323411	-0.577891	0.5633
Wide geographical scope	0.083341	0.146650	0.568303	0.5698

2. Dependent Variable: Risk of successful invalidation in all 25 participating MS is perceived as significant /very significant cost (included observations: 361).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.104232	0.374222	0.278529	0.7806
Large firm	**0.809612**	**0.281938**	**2.871599**	**0.0041**
SME	**0.747519**	**0.311504**	**2.399706**	**0.0164**
UniPro	0.155226	0.374357	0.414647	0.6784
Electrical Engineering	**-1.012285**	**0.348985**	**-2.900656**	**0.0037**
Instruments	**-0.963749**	**0.364497**	**-2.644051**	**0.0082**
Chemistry	-0.412684	0.340151	-1.213238	0.2250
Mechanical Engineering	-0.780624	0.340111	-2.295199	0.0217

Wide geographical scope	0.075144	0.147687	0.508807	0.6109

3. Dependent Variable: Increased complexity of the patent system due to additional strategic choices between national route, classic route and UP route is perceived as significant /very significant cost (included observations: 362).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.553923	0.376600	-1.470853	0.1413
Large firm	0.181940	0.282142	0.644855	0.5190
SME	-0.121533	0.317536	-0.382739	0.7019
UniPro	-0.462925	0.409955	-1.129208	0.2588
Electrical Engineering	-0.256151	0.352713	-0.726230	0.4677
Instruments	-0.023478	0.365522	-0.064230	0.9488
Chemistry	0.242819	0.332250	0.730832	0.4649
Mechanical Engineering	-0.165861	0.340326	-0.487360	0.6260
Wide geographical scope	-0.236516	0.156220	-1.513990	0.1300

4. Dependent Variable: Uncertainty over the way the new system of litigation would work in practice is perceived as a significant/ very significant cost (included observations: 361).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.252794	0.367712	-0.687477	0.4918
Large firm	**0.892034**	**0.283945**	**3.141578**	**0.0017**
SME	0.381166	0.313416	1.216164	0.2239
UniPro	-0.219779	0.393924	-0.557924	0.5769
Electrical Engineering	**-0.637907**	**0.335397**	**-1.901946**	**0.0572**
Instruments	-0.406286	0.349763	-1.161602	0.2454
Chemistry	-0.021210	0.321052	-0.066064	0.9473
Mechanical Engineering	-0.461507	0.324398	-1.422657	0.1548
Wide geographical scope	-0.165291	0.148439	-1.113530	0.2655

5. Dependent Variable: Absence of the possibility to use national courts is perceived as a significant/very significant cost (included observations: 361).

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.164041	0.354435	-0.462823	0.6435
Large firm	0.211267	0.270663	0.780552	0.4351
SME	0.236312	0.303712	0.778077	0.4365
UniPro	-0.618322	0.420941	-1.468904	0.1419
Electrical Engineering	-0.522504	0.328911	-1.588589	0.1122
Instruments	-0.531853	0.345493	-1.539403	0.1237
Chemistry	**-0.559578**	**0.315461**	**-1.773845**	**0.0761**
Mechanical Engineering	-0.514905	0.316815	-1.625254	0.1041
Wide geographical scope	0.172824	0.151540	1.140453	0.2541

The general conclusions that can be drawn from the above regressions are as follows:

- Potential cost reduction associated to the UP such as the possibility or reclaiming translation costs and the removal of validation and publication fees are perceived to be more important for SMEs compared to other users. However, large companies appear to benefit more than other typologies of users from reductions in legal fees for patent renewal work carried out by patent attorneys/lawyers.
- Cost reductions in transfer/licensing work carried out by external patent attorneys/lawyers is perceived to be more significant among users that file a large share of applications in the electrical engineering cluster.

- Increased licensing opportunities are perceived to be a more significant for SMEs, universities and public research organisations. Also, the role that the UP may play in improving access to finance is perceived as being more significant for SMEs and less so for large companies and among users primarily active in the instruments and Mechanical Engineering cluster.
- With regard to potential costs, these are generally perceived to be more significant among commercial entities (i.e. large companies and SMEs) compared to other users. In particular, concerns associated with the risk of single action invalidation are relatively higher for SMEs and large companies but lower among users filing a greater share of patent application in the instruments and electrical engineering clusters (compared to those filing in other clusters). We can rationalise this last result by noticing that respondents primarily active in these clusters are also those that tend to validate patents in the lower number of EPC countries.
- Compared to other users, large firms tend to be more concerned about the uncertainty over the way the new system of litigation would work in practice, whilst such concerns are relatively less marked among users active in the Electrical Engineering cluster. Finally, users primarily active in the Chemistry clusters perceive the disadvantages associated with the impossibility to use national courts to be less significant compared to users filing primarily in other clusters.

11 Appendix 4: References

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12 Appendix 5: Questionnaire Responses

12.1 Characteristics of respondents

Type of organisation

	Percentage of respondents
Large company	60%
University	6%
Individual	3%
SME (i.e. less than 250 employees)	22%
Public research organisation	3%
Other (please specify)	5%
Unsure (exclusive)	0%
Prefer not to answer (exclusive)	1%

12.2 Current patenting strategy

Importance of factors in deciding whether or not to apply to the EPO for European patents

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
Protecting innovation so your organisation can manufacture and/or sell innovative products directly	260	37	94	32	7
Increasing rivals' costs by limiting the entrants' ability to acquire industry know-how	245	36	91	30	6
Obtaining revenue from innovations by licensing the patents to third parties	255	38	94	32	6
Increasing your patent portfolio to prevent patent infringement lawsuits by third parties	256	38	96	32	5
Increasing your patent portfolio to enable patent infringement lawsuits by third parties	256	38	94	31	5

	Number of respondents				
Improving the negotiating position against competitors, for example in cross-licensing cooperation	254	36	92	31	7
Attracting external funding and raising finances	253	38	94	32	6
Enforcing technological standards	249	35	90	31	6

Patent validation strategy

	Number of valid responses per organisation type
Large company	246
University and Public Research Organisation	37
SME	70
Individuals and other types of respondents	23
Unsure or prefer not to answer	6

Factors influencing the decision of where to validate

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
The potential size of the market (eg based on population size and GDP per capita)	258	36	93	31	6
Your current sales of all goods in that market	257	31	90	30	6
The degree of competition in that market	259	34	95	31	6
The patenting activities of your competitors in that market	256	34	93	31	6
The presence of production facilities of competitors in that market	257	33	94	31	6

Cost factors influencing the decision of where to validate

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
Language translation costs for each market	260	39	93	31	7
Internal administrative costs caused by validating an EPO granted patent for each market	257	39	90	29	7
Cost of patent attorneys in each market	256	39	91	31	7
The fees for validating a patent in each market	260	39	92	31	7
Whether a country has ratified the London Agreement	249	35	82	27	6
The cost of keeping a patent in force in each market (including renewal fees)	259	39	93	31	6

Sources of validation costs

	Valid responses per organisation type
Large company	248
University and Public Research Organisation	36
SME	70
Individuals and other types	23
Unsure or prefer not to answer	7

Time period for which patents are kept in force

	Valid responses per organisation type
Large company	166
University and Public Research Organisation	14
SME	51
Individuals and other types	18
Unsure or prefer not to answer	2

Patent renewal strategy

	Valid responses per organisation type
Large company	211
University and Public Research Organisation	27
SME	53
Individuals and other types	16
Unsure or prefer not to answer	9

Sources of renewal costs

	Valid responses per organisation type
Large company	211
University and Public Research Organisation	27
SME	53
Individuals and other types	15
Unsure or prefer not to answer	4

12.3 Unitary Patent considerations

Factors influencing decisions of whether or not to use the Unitary Patent: Cost factors

	Number of respondents				
	Large Company	University or Public Research Organisation	SME	Individuals and other types	Unsure or Prefer not to answer
Validation phase					
A reduction in translation costs at the patent validation stage	252	37	89	30	7
The possibility of reclaiming translation costs for SMEs, universities and individual investors at the validation stage	236	37	87	29	6
A reduction or removal of validation and publication fees payable to National Patent Offices	250	36	88	31	6
A reduction in legal fees for validation work carried out by external attorneys/lawyers	250	37	90	31	7
A reduction in administration costs for validation work carried out by your own staff	247	36	91	30	7
Renewal phase					

	Number of respondents				
An overall reduction in the budget needed to pay fees when patents come up for renewal	250	35	88	30	7
An overall reduction in legal fees for patent renewal work carried out by external attorneys/lawyers	252	36	88	31	7
A reduction in administration costs for patent renewal work carried out by your staff	249	36	89	31	7
Patent transfer/ licensing phase					
An overall reduction in legal fees for patent transfer/licensing work carried out by external attorneys/lawyers	238	34	85	31	6
A reduction in administration costs for patent transfer work carried out by your staff	239	34	86	30	6

Factors influencing decisions of whether or not to use the Unitary Patent: Business opportunities

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
Increased licensing opportunities due to a more efficient market for technological transfer. This is because patented products could be licensed in more countries for any given cost	242	37	88	27	3
Easier access to finance, as holding a unitary patent would constitute a strong signal for investors	242	34	88	27	3
Opportunities to increase the geographical scope of protection in countries where protection is currently not sought	248	36	90	28	3
Easier entry into additional national markets in Europe later on, assuming initial success in core European markets.	246	33	88	27	3
Convenience: one stop shop procedure is more attractive	244	37	87	28	3

Note: 1 = no influence; 5 = very significant influence.

Factors influencing decisions of whether or not to use the Unitary Patent: Potential adverse Influences

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
A lack of renewal flexibility (i.e. you could not keep patents in force in some countries and allow them to lapse in others)	250	37	90	27	2
Increased risk caused by successful invalidations as they would apply to all 25 participating EPO Member States (i.e. single action invalidation)	244	35	87	25	3
Increased complexity of the patent system due to the additional strategic choice between national routes, the classic European Patent route and the Unitary Patent route	248	35	89	27	3
Uncertainty over the way the new system of litigation would work in practice	243	37	88	27	3
Absence of the possibility to use national courts	233	35	87	26	2

Use of Unitary Patent under different renewal fee scenarios

	Valid responses per organisation type
Large company	164
University and Public Research Organisation	21
SME	46
Individuals and other types	15
Unsure or prefer not to answer	3

Factors influencing decisions of whether or not to use the Unitary Patent: Patenting Scenario

	Number of respondents				
	Large Company	**University or Public Research Organisation**	**SME**	**Individuals and other types**	**Unsure or Prefer not to answer**
When protection is needed in a large number of countries	237	36	90	30	4
When protection is needed for a relatively long period of time	230	28	87	30	4

	Number of respondents				
When a patent is key for commercialising an innovative product	230	34	88	30	4
When a patent is key for obtaining revenue through licensing agreements	226	35	86	30	4
When a patent is key for increasing rivals' costs by limiting the entrants' ability to acquire industry know-how	221	31	86	28	4
When a patent is key in preventing patent infringement lawsuits by third parties	222	29	83	29	4
When a patent is key in enabling patent infringement lawsuits against third parties	223	29	86	28	4
When a patent is key in Improving the negotiating position against competitors, for example in cross-licensing cooperation	231	30	84	28	4
When a patent is key in attracting external funding and rising finances	223	34	88	29	4
When a patent is key in enforcing technological standards	216	32	82	30	4
When a patent is perceived to be of high quality	229	33	87	30	4

12.4 Unified Patent Court considerations

Litigation preferences

	Number of large companies	Number of SMEs	Total
Prefer litigating through the Unified Patent Court	117	49	166
Prefer litigating through a National Court	29	12	41
Unsure	95	32	127
Prefer not to answer	21	3	24

	Number of large companies	Number of SMEs	Total
Prefer litigating through the Unified Patent Court	51	32	83
Prefer to file an opposition procedure	107	15	122
Unsure	91	46	137
Prefer not to answer	13	3	16

Benefits of the UPC for claimants in infringement cases (i.e. the patent-holder)

	Number of respondents	
	Large Company	**SME**
Certainty: Increased legal certainty because decisions would apply in 25 European countries and harmonised interpretation of law	67	10
Simplicity: Single litigation action: no need to defend before several national courts	67	10
Simplicity: A simplified litigation process	67	10
Fairness: All panels of judges would be composed of several nationalities	64	9
Effectiveness: The possibility of obtaining an injunction before rulings on validity	59	9
Quality and efficiency: Quicker decisions	62	10
Quality and efficiency: High-quality decisions by highly-qualified judges	61	9
Cost savings: Cost savings due to a single litigation action	64	10
Cost savings: Cost reduction through increased competition among patent attorneys and patent lawyers due to the centralised procedure	62	10

Detrimental aspects of the UPC for claimants in infringement cases (i.e. the patent-holder)

	Number of respondents	
	Large company	**SME**
Uncertainty: Possibility of an injunction gap due to bifurcation	52	4
Uncertainty: Uncertainty over costs of centralised litigation	60	6
Uncertainty: No experience with the new UPC system	62	7
Complexity: Problems understanding the court proceedings if you do not speak the language in which the case is being conducted	60	7
Inconvenience: No proximity of the central division of the court of first instance in the case of revocation actions	60	5

Benefits of the UPC for defendants in invalidity cases

	Number of respondents	
	Large company	**SME**
Certainty: Increased legal certainty because uniform decisions would apply in 25 European countries and harmonised interpretation of substantive European patent law	54	9
Simplicity: Single litigation action: no need to defend before several national courts	54	9
Simplicity: A simplified litigation process (i.e. only one advocate is needed if the language of the proceedings is one of the EPO's official languages, and if parties have full freedom to use English in place of the language of proceedings)	54	8
Fairness: All panels of judges would be composed of several nationalities (to reduce the risk of national bias in the administration of justice)	54	8
Quality and efficiency: Quicker decisions	50	9
Quality and efficiency: High-quality decisions by highly-qualified judges (assuming a successful training programme for judges and harmonised decision criteria)	50	8
Cost savings: Cost savings due to a single litigation action	52	9
Cost savings: Cost reduction through increased competition among patent attorneys and patent lawyers due to the centralised procedure	51	9

Detrimental aspects of the UPC for defendants in invalidity cases

	Number of respondents	
	Large company	**SME**
Uncertainty: The possibility of an injunction gap due to bifurcation	44	4
Uncertainty: Uncertainty over the costs of centralised litigation	51	6
Uncertainty: No experience with the new Unified Patent Court system	50	6
Complexity: Problems understanding the court proceedings if you do not speak the language in which the case is being conducted?	54	6
Inconvenience: No proximity of the central division of the court of first	51	6

	Number of respondents
instance in the case of revocation actions (i.e. Paris, Munich or London)	

Benefits of the UPC for defendants in infringement cases (i.e. the alleged infringer)

	Number of respondents	
	Large company	**SME**
Certainty: Increased legal certainty because decisions would apply in 25 European countries and harmonised interpretation of law	54	5
Simplicity: Single litigation action: no need to defend before several national courts	57	5
Simplicity: A simplified litigation process	57	5
Fairness: All panels of judges would be composed of several nationalities	53	4
Quality and efficiency: Quicker decisions	50	5
Quality and efficiency: High-quality decisions by highly-qualified judges	50	5
Cost savings: Cost savings due to a single litigation action	55	5
Cost savings: Cost reduction through increased competition among patent attorneys and patent lawyers due to the centralised procedure	55	4

Detrimental aspects of the UPC for defendants in infringement cases (i.e. the alleged infringer)

	Number of respondents	
	Large company	**SME**
Uncertainty: No experience with the new UPC system	55	5
Uncertainty: Uncertainty over costs of centralised litigation	54	5
Disadvantage position: The possibility of a third –party obtaining an injunction before rulings on validity	55	3
Complexity: Problems understanding the court proceedings if you do not speak the language in which the case is being conducted	57	5
Inconvenience: No proximity of the central division of the court of first instance in the case of revocation actions	56	4

Benefits of the UPC for claimants in invalidity cases

	Percentage of all respondents	
	Large company	**SME**
Certainty: Increased legal certainty because uniform decisions would apply in 25 European countries and harmonised interpretation of substantive European patent law	50	8
Simplicity: Single litigation action: no need to initiate cases before several national courts	51	8
Simplicity: A simplified litigation process (i.e. only one advocate is needed if the language of the proceedings is one of EPO official languages, and if parties have full freedom to use English in place of the language of proceedings)	51	8
Fairness: All panels of judges would be composed of several nationalities (to reduce the risk of national bias in the administration of justice)	48	8
Quality and efficiency: Quicker decisions	46	8
Quality and efficiency: High-quality decisions by highly-qualified judges (assuming a successful training programme for judges and harmonised decision criteria)	47	8
Cost savings: Cost savings due to a single litigation action	50	8
Cost savings: Cost reduction through increased competition among patent attorneys and patent lawyers due to the centralised procedure	50	7

Detrimental aspects of the UPC for claimants in invalidity cases

	Percentage of all respondents	
	Large company	**SME**
Uncertainty: No experience with the new Unified Patent Court system	49	8
Uncertainty: Uncertainty over the cost of the centralised litigation	48	8
Uncertainty: The possibility of an injunction gap due to bifurcation	45	6
Complexity: Problems understanding the court proceedings if you do not speak the language in which the case is being conducted?	51	7
Inconvenience: No proximity of the central division of the court of first	50	7

	Percentage of all respondents
instance in the case of revocation actions (i.e. Paris, Munich or London)	