

RESEARCH PAPER

The impact of the European patent system on SMEs and national states¹

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ABSTRACT

A centralized and federal patent system in the EU changes economic and constitutional law structures by creating a ‘nationalized’ international patent. As the underlying economic policy has concentrated on the development needs of small and medium-sized enterprises (SMEs), accounting for 99% of all businesses in Europe, statistical analysis and data of their patenting activity and patent ownership are used to assess whether the new regime can help or hinder SMEs and the states in which they are based. Due consideration is given to the monopoly effect of patents and the adversarial nature of the judicial, federal system that is introduced in the absence of a federation of states. Although there are always costs and benefits in such a system, new legal/institutional developments amplify existing imbalances in technological and economic capacities between and within member states, and between them and non-EU states.

Background

We almost never hear any discussion of the costs of patent . . . monopolies, although these costs are almost definitional. (Baker, 2016, p.18)

In the period between mid-2011 and January 2013, EU organizations and most of the EU member states negotiated and completed the European legislation and agreements for a federal patent system in Europe. This effort, often attempted and often rejected for more than a generation, finally found fertile ground in the political paralysis that followed the economic crisis which reached its peak in this period. This economic crisis is relevant to the EU’s federal patent system in many aspects. It exposed the EU’s economic currency system, the euro, for not having an effective control mechanism to deal with market failures, especially those caused by the EU’s internal market. And it exposed member states for having surrendered vital powers of national sovereignty which have deprived the national state from effective resistance mechanisms and democratic control in such crises. In addition, the crisis provided a reality test showing in the clearest way that, even after so many decades of continuous expansion of EU powers, there has not been much European integration. National interests always prevail and European partners have simply become strict creditors of other member states (see e.g. Farrell and Quiggin, 2011; Erne, 2012; Mahnkopf, 2012; Leška, 2013; Varoufakis, 2015; Oltermann, 2015; Guzman, Ocampo and Stiglitz, 2016). This moment of truth has demonstrated that the continuous abolition of national state powers, in the absence of a real federation, is a political oxymoron and paradox.

Thus, on the one hand, national sovereignty is surrendered in the most important aspects of national independence and, on the other, economic losses that are caused by very unbalanced trade

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deficits and market failures within and beyond the EU's internal market are not subsequently offset by a federal system where the continuous transfer of wealth from less developed to more developed states could have been redistributed to fund essential common systems, such as defence, fiscal sustainability, education, health and social welfare, R&D, etc. In the case of federalization of the patent system, the situation is particularly serious because of its immense economic and technological importance, and its adversarial nature. It involves exclusivity in the use of technological inventions in almost all aspects of technology, when the latter is absolutely essential for the survival and sustainability of a wide range of state systems on which the people depend. More than that, unlike the euro, the EU's institutional design for its new patent system is mainly founded around two international institutions – and hence beyond the direct control of the EU and the national states.

The current study aims to assess the economic impact of the new pseudo-federal/international patent system on national states. The national focus is appropriate because the only state that exists, and the space where legal rights and obligations become a living experience, is the national state. The national focus also has a pan-European dimension as far as European integration is concerned. 'Integration', however, has become a buzzword that it is often used without much explanation, frequently in conjunction with the term 'internal market', elevated to a sacrosanct objective with little elaboration (e.g. Ullrich, 2012; Jaeger, 2012). However, integration is also political and can be undermined by the failures of the internal market. European integration cannot possibly be achieved by a system that increases substantially serious imbalances between member states, and between them and the more developed, non-EU states.

In contrast, growing European disintegration has been observed in the sequels to the euro crisis, which have created their own parallel universe of political dramas. Indeed, the most dramatic change in national politics since the end of World War 2 has occurred in many member states. For instance, elected prime ministers have been replaced by technocrats (Skelton, 2011; Hopkin, 2012; Muscatelli, 2018; Zielonka, 2018), ruling parties that long dominated national and European politics have shrunk to the point of irrelevance,² and the extreme right has acquired mainstream political status in coalition governments³ or in opposition following democratic elections.⁴ As this becomes the new normal, political resistance weakens. Widespread euroscepticism associated with the growing expansion of the EU's federal powers at the expense of national democratic control reached a nadir in 2016, when the British people voted to leave the EU. The UK's exit from the EU is serious: the English language is indispensable for communication among Europeans, access to information, and the education system.

The creation of the new European patent system has taken place in a political landscape of growing realization about the consequences of the erosion of national sovereignty. The EU's new patent system, added to the denationalization of essential state powers, increases EU dominance substantially, both politically and economically. The negative consequences of the patent system exist by definition since patents are monopolies of inventions. Indeed, the loss of sovereignty in the two areas of monetary currency and intellectual property taken together (and without considering other areas where national sovereignty has been lost or substantially limited, such as state aid, competition policy and human rights), signals the emergence of zombie states.

EU organizations have designed the 'federalization' of the European patent system by upgrading and expanding the existing system of European patents. The European Patent Office (EPO) grants patents, which are automatically nationalized as national property rights in EPO member states

² Consider the socialist party in Greece (PASOK) in 2012–13, and subsequently, that of France (PS – *Parti Socialiste*) in 2017. Both parties were once pioneers in the re-emergence of socialist parties as ruling governments in Western Europe in the difficult years of the Cold War, a status they maintained in centre-left European politics until their recent and rapid demise.

³ Consider the current coalition governments in Austria and Italy and the rise of the far right in the Netherlands, France, Italy and Greece.

⁴ The current parliamentary opposition in the Netherlands, and the major opponent in the French presidential elections (see Louwerse and Otjes, 2019).

chosen by applicants. This arrangement has long been seen as problematic as it allows property rights to enter national markets in massive numbers with little of the control and concern for legal principles and economic policies that ought to underlie the determination of property rights (Borrás, 2006; Drahos, 2010).

The founding fathers of the EU's new patent system – the European Commission and a few developed EU member states – have done nothing to rectify the democratic deficit surrounding the EPO system. Ironically, they have reinforced it by placing it at the centre of their pseudo-federal project. In particular, they have promoted EU unitary patent regulations in the jurisdictions of member states.⁵ Replacing the current bundled system of a few EPO states, the influx of intellectual property rights in national markets rapidly increases from a few thousand to hundreds of thousands. The institutional design of the EU's new system is accompanied by a new international court, the unified patent court (UPC). This has exclusive responsibility for enforcing the EPO patent, creating a pseudo-federal system that is run mainly by international institutions, termed the 'unitary patent package' (UPP).

The current study focuses on the cost of this new system. This focus is appropriate because of the inherent adversarial nature of both the patent system and the new, judicial institution, and because of the total absence in official EU studies and EU parliamentary debates of an evaluation of the consequences of the new system. Particular interest is in the position of small and medium-sized enterprises (SMEs). SMEs are central to the current study not because they were used as policy targets in the EU official legislative texts and in their communicative narratives and parliamentary debates, but because they are inextricably linked to the evaluation of the UPP's impact on national states.

The first part of the current study is devoted to identification of relevant statistical information and data particularly in the years close to the UPP's conclusion at EU level. An economic analysis will follow to explain the various imbalances already observed among various economic actors and between member states and the more technologically developed non-EU states. How the current unbalanced situation will be affected by the UPP will then be addressed.

The wider economic implications of the UPP's unconstitutional design, rather than just its legal and constitutional characteristics, will be considered. In view of the fundamental constitutional problems in the UPP's design, what is also tested is the lack of democratic safeguards. Although the political paralysis that followed the severe economic crisis gave EU organs the opportunity to promote the UPP, recent events have shown that expert opinion and institutional reflexes are waking up at national level. The reaction of some states can be observed in the very slow ratification of the UPC agreement at national level, the constitutional rejection of the UPC agreement in Hungary, and the objections of law societies. The main problem is not the UPP as such, but expert opinion, both national and European, which increasingly comes from private consultancies and foreign research centres (such as the Max Plank institute) whose *modus operandi* excludes, consistently and deliberately, the vital interests of national states (see Xenos, 2013, pp. 259–264, 270–271). How has it been possible for national sovereignty to be surrendered without prior impact assessment at national level?

Mancur Olson (1982, p.26) has pointed out that democracy suffers because of the 'imperfect knowledge' of citizens unaware of important measures and policies. Either citizens participate in studies of major EU decisions involving loss of national sovereignty, or studies will be provided by foreign experts who may be unwilling to examine the impact on national states and who may advise the surrender of national sovereignty. The same *caveat* applies to the current study. The main focus of the current study is on economic and legal problems surrounding the UPP. However, its institutional design and the way it was imposed, as well as its recent, more critical treatment by some national states, reveals the use and abuse of expert opinion in democratic decision-making (Xenos, 2014b).

⁵ Regulation (EU) No 1257/2012, pp.1–8, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R1257>. Regulation (EU) No 1260/2012, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R1260>.

Ex post-only statistical evidence: focus on SME patenting activity

The political-economic focus on SMEs is evident in official UPP documents, parliamentary debates and voting sessions (Xenos, 2013, p.269), and has characterized all relevant EU communications and reports.⁶ However, it is manifestly absent from the EU's official pre-legislative assessment studies of UPP (Harhoff, 2009; European Commission, 2011). In the adversarial context of monopolies and especially of patents, the essential evaluation of economic impact cannot be secured without prior access to patent data. How has such a major institutional project passed all the main investigative and legislative stages despite the exclusion of such evidence?

The first part of the current study presents statistical results of EU studies which appeared only *post facto*; that is, after UPP had already been established at EU level. Here, we undertake statistical research of SME patenting activity (i.e. of granted patents), including corresponding national shares. National impact is rarely taken into account in EU studies, which are increasingly based on aggregate numbers – as if the EU was a federation of states (Xenos, 2013, notes 40–1). As a result, what is usually missing from EU studies is any evaluation of the national impact and risk exposure relating to the UPP. The EU's official, *ex post* statistical patent studies devote not a single reference to the UPP – a typical EU practice that has long made clear to all interested parties, lobbyists and powerful players how policy and decision-making actually operates in the EU. In contrast, the evaluation of patent statistics in relation to the existing patent system and the new changes the UPP introduces is the main aim of this study.

The general position of SMEs can be identified by key statistical information in the 2015 study of the EU's Intellectual Property Office (EUIPO),⁷ which found that the percentage of all EU-based SMEs owning a least one patent is 0.8% (EUIPO, 2015, table 8, p.40). It is clear that the monopoly effect of patents does not help the vast majority of SMEs (Hughes and Mina, 2010). This is also shown by their extremely low presence (0.5%) in their national base.⁸ Where the competing environment is stronger, as in the EPO system, patenting SMEs account for just 0.1%. In the post-UPP period, it is the EPO system which becomes dominant because of the unitary effect of the EPO patent. Bearing in mind this general picture, more specific aspects of patent data and statistics should be looked at with focus on the EPO system.

SME share of European patent applications

Some months after the UPP had officially been concluded at EU level, the EU, through its statistical office, Eurostat, published a study of the SME share of European patent applications. The study was carried out by external contractors, the research centre of only one university in collaboration with a consultancy firm (Eurostat, 2014, p. 4). The Eurostat contractors' study does not mention standard methodological information, such as the exact size of samples or whether the financial databases used contained data about the SME definitional criterion of employee headcount. The Eurostat timeframe is the period 1999–2011, which includes the period 1999–2003, before the EU's major enlargement with ten new states, and excludes the years 2012 and 2013 of

⁶ '... the EU patent should dramatically reduce the cost of patenting in Europe, *particularly for SMEs*' European Commission (2010, p.18) (emphasis added). Convenient statements about SMEs have been appearing in all relevant public communications of the European Commission (see UPC-related tweets of the current, European Commissioner of the Department of Internal Market, Industry, Entrepreneurship and SMEs, Elżbieta Bienkowska – a Polish national whose national state rejected the UPC on the ground that it would hurt SMEs, on which Poland's economy depends (Deloitte Polska, 2012).

⁷ Known until recently as the Office for Harmonization in the Internal Market, its responsibilities do not cover patents but only trademarks and designs.

⁸ The monopoly effect of patents is general, but is more directly felt when the patent is valid at national level too. In the current pre-UPP period, European patents are validated less often in small or poor national markets – the great majority of member states (Deloitte Polska, 2012).

the post-2008 economic crisis. The study did not take into account the consequences of the economic crisis: ‘SMEs’ innovations also suffered, as did *patent applications*’ (European Commission, 2015, p.68, emphasis added). The focus of the study is on patent applications, which has both advantages and disadvantages. On the one hand, patent applications indicate innovative industrial activity in patent-dependent sectors and, more importantly, the data remain unaffected by the EPO’s ever-changing administrative and management policies and practices (recent staff recruitment resulted in a sudden increase in granted patents).⁹ On the other hand, applications do not show industrial property ownership and actual innovative contribution with any accuracy as around half of patent applications are rejected.

The study of Eurostat’s contractors estimates, within a margin of 5% statistical error, that 17.6% of all European patent applications are made by EU-based SMEs and 78.9% by large companies (Eurostat, 2014, table 11, p.36). These findings point to very low patenting activity by SMEs compared with that of large companies and corporations, which clearly dominate patent activity in Europe. It should be noted that the EPO’s occasional announcements of SME shares are not accompanied by details of methodology (see Arrowsmith, 2014; Moody, 2016). For patent applications in year 2013 (the UPP setting-up period), the EPO’s website states that the share of large firms was 65.5%, compared with 29% for SMEs and 5.5% for universities and public research. The EPO’s does not distinguish between EU and non-EU-based SMEs in statistical announcements.

Eurostat also provides estimation by country of the proportion of SMEs in European patenting activity of all nationally based companies. These are only indicative. SME shares in European patent activity of all nationally based companies include: Germany (10.3%), Finland (13.2%), Denmark (27.6%), UK (35.3%), Italy (37.1%), Bulgaria (53.8%), and Poland (34.0%) (Eurostat, 2014, p.36). These percentages would seem to justify the examination of the UPP’s impact on the national state through the prism of SME patenting.

The Eurostat study does not attempt to make any evaluation of the UPP, which is mentioned nowhere in the entire text. Notable is the affirmation of ‘SMEs’ contribution in developing technology and high R&D productivity’ (Eurostat, 2014, p.3), which assumes the very point being assessed. Under this benefits-only approach typical of EU institutions, any patenting percentage of SMEs is always presented as good, as it always reflects a contribution to technological development and the economy.

SME share in European patents

The scope of Eurostat’s study of patent applications is legitimate, but does not reflect accurately the SME share in actual patents granted at the European regional level. The decision to conduct our own study is justified on two further grounds. First, it is in the interests of transparency and accountability to check the findings of official EU studies. Second, the methodology that Eurostat’s contractors adopted is particularly complex and obscure, partly because of its main focus on the third criterion of the SME definition, namely a company’s autonomy/independence, which is inherently complex and difficult to establish (see Centre for Strategy and Evaluation Services, 2012; European Commission, 2017).¹⁰ Heavy reliance on very expensive private databases exacerbates the complexity of the

⁹ In 2018, 924 EPO patent examiners wrote to the EPO’s administrative council raising serious concerns about the continuous decline in the quality of patent examination at EPO (available at <https://regmedia.co.uk/2018/03/15/epo-examiners-letters.pdf>). Reference was made to a position letter (Bausch, 2018). See also the comments of EPO observers and critics: ‘EPO staff has just warned the national delegates that EPO’s decline (in terms of patent quality and staff welfare) would be beneficial to patent trolls’ (Schestowitz, 2018).

¹⁰ Similar problems have been encountered in recent decisions of the EU general court, *Crosfield Italia Srl v European Chemicals Agency* (available at <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-587/14>) and EU general court, *K Chimica Srl v European Chemicals Agency* (available at <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-675/13> (both accessed November 2019)).

subject. If important statistical studies are carried out exclusively by contractors of EU institutions, the policy and decision-making process will be fed (and controlled) by the very organizations whose work must be reviewed and held to account. Thus, a key aim of this section is to simplify the methodology used in SME statistical studies to encourage participation in the scrutiny of EU policies and studies.

From the three definitional criteria the EU uses – (a) employee headcount, (b) limits to annual turnover and balance sheet total, and (c) autonomy – emphasis should be placed on the first. The Commission repeatedly affirms that this ‘must be observed as the main criterion’ (e.g. European Commission, 2003, recital 4). The second criterion is often satisfied where the first one is met as they reflect interconnected business dynamics. This is also reinforced by the fact that only a small percentage of SMEs reach the upper category, that of medium-sized companies. The third criterion (company autonomy) requires detailed investigation and privileged access to expensive private databases. The degree of remoteness of intermediate links between interconnected companies has been very difficult to assess (Centre for Strategy and Evaluation Services, 2012; European Commission, 2017). The relevance of all SME criteria is encountered mainly at individual level; for example, in assessing the eligibility of a company for EU systems favouring SMEs (e.g. funding programmes, state aid exceptions, reduced administrative fees). In general studies, however, examination of every single criterion is not a categorical requirement since the three SME criteria have a primary focus, the employee headcount, and the rest can operate as additional filters. As the application of the employee headcount criterion, i.e. $SME \leq 249$ employees, suffices to determine a general representative percentage (e.g. $A\%$), then, partial or non-examination of remaining filters simply means that the final accurate number is always less than the general representative result that the first criterion established (it will always be $Final\% < A\%$). Thus, if the general representative percentage ($A\%$) points to a small share of SMEs, the even smaller ($Final\%$) does not change the evaluation and conclusions of the study.

Our study focuses on the actual number of patents the EPO granted in 2014, which is the publication year of the EU studies discussed above and is close to the completion period of the UPP’s legislative texts. A year is a satisfactory period, considering the large number of patent applications submitted in any given year. The main change consistently observed, year after year, is the continuous reduction in the global patent share of EU-based companies. It should be pointed out that, following the exit of the UK from the EU in 2020, all patent statistics of EU-based companies will automatically remove UK data, leaving a much weaker picture.

The *European Patent Bulletin* contains all European patents granted by the EPO on a weekly basis. Data were extracted to build a dataset of all patents granted by the EPO between 1 January 2014 and 31 December 2014, a total of 64,585 patent records.¹¹ From the dataset, four hundred B1 documents (i.e. a European patent first granted in 2014) were selected using a random number generator in a python script. The size set was determined by the need to achieve a precision level of 5 % (confidence level of 95%) on the proportion of SMEs in the target patent population.¹²

The SME/non-SME status of each of the 400 entities of the selected sample was individually searched. The main criterion applied was employee headcount (fewer than 250 employees). For this purpose, internet searches were made based on the enterprise’s name and address, starting with the company website and publicly accessible financial databases. Additional websites, such as LinkedIn, were searched to check the information. Where there was insufficient information on the internet, the information was found through direct contact, such as emails and phone calls. In addition to the main criterion of the number of employees, the dependence of SMEs on larger companies (the third criterion of the EU’s SME definition) was also searched using similar sources. Entities found to be controlled by large companies were classified as large companies. For relevant

¹¹ The number of patents displayed on the EPO’s website is 64,613 for year 2014. The negligible difference from our own dataset of 28 patents does not affect the statistical examination.

¹² Both the dataset and the sample derived from it have been verified by subjecting them to an additional analysis of geographic origin (i.e. applicant company’s address in the *Patent Bulletin*). The national shares found in the sample match the actual national shares of European patents.

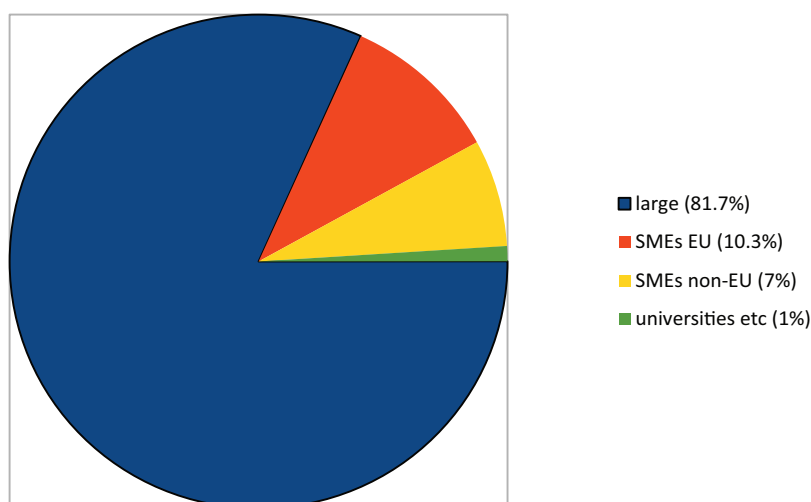


Figure 1. Applicant firm size, 2014

information on foreign-language websites, Google translate was used. The additional definitional criteria regarding annual turnover and balance sheet were not investigated. Five enterprises for which no information was found on the internet or through direct contact were classified as SMEs on the logical assumption that small companies tend to invest less in their digital presence than large entities.¹³

Figure 1 shows that 81.7% of all European patents are granted to large companies, whereas 17.3% are granted to SMEs. 1% of patents are assigned to universities and public research centres. Subdividing the SME share by geographic origins reveals that 10.3% of all European patents are granted to EU-based SMEs, and 7% to non-EU-based SMEs. The share of patenting SMEs based in Germany is 14.5%, whereas the other developed states of France, UK, Italy and the Netherlands have a combined share of 26.1%. For the other 23 member states, the corresponding share is 18.8%. The largest share, 40.1% is assigned to non-EU-based SMEs. So, the share of EU-based SMEs in patents granted by the EPO is very small, only 10.3% of patent volume in the 2014, compared with 81.7% for large companies and corporations.

National origins of European patenting

The national origin of the patent applicant/patentee is the main feature of the EPO's public data system and annual reports. Its statistical information presents the combined national share of European patent activity of all companies based in a national state, European or non-European. The national shares and those of company size can provide, in combination, a fairly comprehensive picture of how the costs and benefits of the patent systems are distributed. In the interests of consistency, the patent year examined is 2014. The results are similar to those presented in Xenos (2013). National shares are calculated from the actual total number of patents the EPO grants and the patent data for each individual state. Adding together all 28 member states, the shares of EU-based patentees can be categorized (see Figure 2).

Figure 2 shows that most European patents (54%) are granted to applicants that are not based in the EU. So, 34,892 patents entered the European market as monopolies of technological solutions which did not originate from, or are not owned by, EU-based companies. Because the unitary patent regime increases the scope of monopoly of the European patent, the dominance of non-EU based companies is expected to increase substantially. For the great majority of 23 EU member states, the combined share of EPO patents is just 9%. Some of these states have a negligible

¹³ The same assumption is made by Eurostat (Eurostat, 2014, p.30).

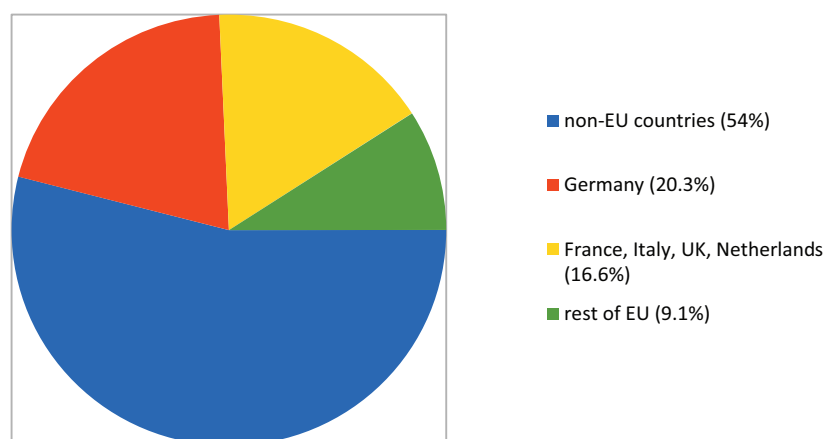


Figure 2. Applicant country of residence for EPO patents granted, 2014

number of patents, such as Poland (108 patents) and Bulgaria (7 patents), while others do rather better, such as Finland (633 patents). In contrast, companies based in Germany had 13,086 patents, 20.3% of all European patents that the EPO granted in the relevant year, a share close to the combined share of the other 27 member states. As a general observation, the difference in patent shares between EU-based and non-EU-based companies is much greater than their general share of 54% (Eurostat, 2016). In particular, in certain key technological sectors, such as information and communication technologies (which account for almost one third of all patent applications), the share of EU-based companies is only 32.0%. A similar picture is observed in the biotechnology and nanotechnology sectors. In sum, the extra benefits the unitary patent system gives are designed to help most those already in a dominant position.

Benefits of secondary consideration as the European Commission's trump cards

The contribution of patents to technological innovation is a textbook justification for patents. Though there are major costs inherent in the anticompetitive effect of patents, the EU adheres to a benefits-only approach. Under the new UPP system, the existing European patent will acquire a unitary effect, thereby extending its territorial coverage to 25 participant states. This confers a clear benefit to the patentee as the more states in which a patent can be enforced, the greater the monopolistic effect of the patent. The administrative system is centralized to ensure the unitary application of EPO patents. It promises that the administrative fees for coverage in all twenty-five member states will be less than the sum of the individual fees for each country. This administrative fee discount appears, at a first glance, to be an economic benefit of the unitary patent. SMEs, however, do not benefit much as they do not have many patents.

Only half a dozen states are usually selected when the EPO looks at the monopoly effect and territorial coverage of patents (Pagenberg, 2012, p.583). These are the biggest European markets. Making richer under the UPP those who are already rich under the current bundled system does not make any ground-breaking difference. Professional associations of patent law firms confirm that only a very small percentage of SMEs ever seek protection at a pan-EU level (Chartered Institute of Patent Attorneys in the UK, 2012, p.122), simply because they do not do business in the markets of all EU states. Consequently, a reduction in patent fees for wide territorial coverage is not much used. In addition, as the EPO (which will administer the unitary patent) is not an EU body, the EU cannot exercise direct control to guarantee its political promise of reduced patent fees. Recent studies suggest that patent fees are likely to increase (Stjerna, 2016). A reduction in patent fees is enjoyed by everyone, but mostly by large companies, which patent most. Equal rules for all can lead to more inequalities when the main players are a small number of large corporations from

a small number of states, most of which are from outside the EU. Most importantly, patent fee reduction alone is a factor at the very bottom of applicants' priorities. There are more important factors, often preconditions to applying for a patent.

It has been suggested in official documents that an international court (the UPC) and not a national court can better protect SMEs when they are sued in patent litigation. As the role of a national court is rooted in the constitutional structures, values and purpose of the democratic political system, the defence framework should be examined in relation to the national state and its system. The defence framework is particularly important for SMEs as they are more likely to be defendants than plaintiffs in trials for alleged infringement of patents. The same observation applies to the enforcement framework of the UPC since SME patenting activity is very small and, therefore, the enforcement aspect of litigation benefits mostly large companies and corporations. To paraphrase Stanisław Sołtysiński, the focus on reduced fees or the much wider territorial monopoly/reach of the unitary patent is like reducing train fares and expanding the rail network without providing access facilities for the disabled – meaning that both transport and its network are beyond their reach (Krakowiak, 2014, slide 12).

Could SMEs benefit from the patent system and the UPP?

The primary issue remains whether SMEs have benefited (actually) or can benefit (potentially) from the patent system, especially under the new international arrangement with the UPP. The examination should start from the current European patent system, as the UPP is an expansion of it. Certain aspects of patenting ability need to be identified: the UPC exacerbates them all.

Research and development

In a number of industries, such as pharmaceuticals and nanotechnology, innovation is inextricably linked to large spending on R&D (research and development). The role of funding is indispensable for competitive innovation and patenting activity (Bell *et al.*, 2017). The key observation is that SMEs do not have large funds to undertake R&D.

Existing and future market share

Substantial good market share helps secure the financial position of a company, allowing it to devote funds to R&D. Market share is facilitated considerably by patents and patent portfolios. Exclusivity and the monopolistic effect of commercially successful patents can increase a company's market share. As SMEs do not have many patents, the increasing ability of their large competitors to acquire new patents (through their own innovation and by buying others) reinforces and augments their market share, which in turn further boosts their ability to compete successfully in patenting activity and acquisition. This is the win-win circle of patent acquisition. In the formula below, the starting point is not patent acquisition, but rather the established market share through which funds are directly secured for the research and development required to achieve patent acquisition. The starting point favours established players in the European patent system and industrial markets.

... market share → funds for R&D → patent acquisition → market share → funds for R&D → patent acquisition → market share ...

Existing know-how

Competition in technological innovation does not start from a zero base in that existing patenting activity and presence in markets reinforces future patenting ability. In this respect, market share and patenting activity are seen as objective indicators demonstrating scientific and technological

know-how and technological ability. Conversely, they confirm that those with low or non-existing patenting activity (as is the case with most SMEs) cannot easily compete in sectors and markets where innovation is expensive.

State's educational and funding system

As industrial innovation requires a high level of scientific knowledge and often expensive laboratories and research equipment, the patenting ability of a company may be closely linked to the state's investment in scientific research and education (Lazonick and Mazzucato, 2012; Mazzucato, 2013; Buchanan, 2013; Cable, 2014). As state funding for education and research circumvent the state aid restrictions the EU imposes, much R&D funding is channelled through university research. This benefits domestic companies, whose subsequent success helps sustain the state's budget.

Room for innovation and market entry and sustainability prospects in reverse proportion to the number of granted patents

It can be argued that the more patents that enter the system, the more difficult it becomes to innovate. Consider the negative impact on innovation of patent thickets: '[p]atent thickets decrease entry (i.e. first time patenting in an area) by 20%, which is substantial bearing in mind that the average probability of entry into a technology area is only about 1.5%' (Hall, Helmers and Graevenitz, 2016). Under the UPP, the influx of foreign patents will restrict the opportunity for patenting innovation, especially for SMEs (Deloitte Polska, 2012, p.32).

Patent fees

Unless there is some prospect of a patent application arising from a technological invention, fees for a patent application are hardly relevant.

The wider impact of the UPP on national states

SMEs are not the real targets of the UPP. Rather, they are merely convenient slogans that appeal to state representatives at EU level. The average patent is secured by a company having more than 1573 employees (EUIPO, 2015, p.8 and p.36). This is a company four times larger than the maximum size of a SME. In such an environment, the issue is not about the innovative ability of SMEs, but how fast they can outperform their global, larger and stronger competitors. Therefore, the patenting ability of SMEs is a matter that is assessed mainly in relation to the ability of other competitors (and the supportive state systems of the foreign states in which they are based).

The European Commission is now revising the thresholds of the EU's SME definition so as to accommodate start-ups/scale-ups, opening the way to including intermediate-sized companies and possibly companies with links to large companies (European Commission, 2017; Xenos, 2018). If larger companies are included in the SME definition, this will distort all previous studies, and will show improved SMEs statistics. However, what matters ultimately is not the position of SMEs, as such, but their economic relevance to industrial and economic activity in national states. Equally important is how the patent system and the UPP will affect SMEs when it becomes operational.

To examine the UPP's impact on national states, it is necessary to rely on statistical information for SMEs because a many national states depend on the industrial and patenting activity of SMEs. The impact of the patent system is felt mainly at national level, where business activities are a living experience, and where a state's social-economic and security systems provide relevant avenues and infrastructure for economic development and sustainability. EU policies and measures

in the context of intellectual property rights affect the state's national security and defence systems. As patents exclude or limit the use of technological solutions in products and processes, vital technologies (in cybersecurity, for example) increasingly fall into the hands of a few foreign states. The EU has nothing to do with defence issues, and there is no pan-European co-operation among member states in defence technology.

The risk exposure of national states under the unitary patent system can be appreciated by looking first at the degree of a state's dependency on nationally based SMEs. This relates to the proportional patenting of SMEs in total European patenting of national businesses. Some SME shares from the Eurostat 2014 study have already been mentioned. The degree of risk exposure is lower in Germany and Finland, very high in Bulgaria and relatively high in Italy, Poland and the UK. The risk exposure of the national state to the negative effects of the patent system, and of the new unitary patent regime in particular, is related to the state's dependence on SMEs.

With the exception of some states, such as Italy and the UK, the European patenting activity of states increases in inverse proportion to the SME share in that activity. The higher the national SME share in the overall number of European patents of all nationally based companies, the lower the patenting activity of that state at European (EPO) level. Where the state depends on the patenting activity of SMEs, that state's innovation capacities, technological development and economic competitiveness in technology sectors tends to be weak compared with states where large companies and corporations have a more dominant share.

Even when states are not particularly dependent on the patenting capacity of SMEs, this does not mean that the European patent system or the UPP is risk-free. Thus, although Finland performs better than many other SME-dependent states because its degree of dependency on SMEs is relatively small, the concentration of economic and technological power in a small number of corporations and large companies has wide socio-political and economic dimensions. In such circumstances, the economic failure that may be caused by the successes of global competitors creates equally high risk exposure. By way of example, Nokia, the Finish telecommunications company, until recently one of the market leaders in mobile phone technology at global level, is now confined to a very small market and its presence is little noticed (Surowiecki, 2013; Taulli, 2013; Juan, Khanna and Snively, 2017). Finland does not have the number and size of multinational corporations of Germany. Neither do they cover a wide range of technological sectors which might allow loss of competitiveness in one sector to be mitigated by technological activities of large companies in other sectors.

An additional parameter that increases the national state's risk exposure relates to the actual numbers of patents owned by SMEs and state-based economic actors. Although both the UK and Poland have a similar, relatively high, degree of dependence on SME patenting, the actual number of patents of UK SMEs and all UK economic actors is much higher than Poland's. The observed differences in the numbers of actual patents granted annually is a pertinent factor in determining the states' risk exposure and reveals who benefits most at the expense of others. In general, this factor can be calculated by identifying a state's export-import ratio of patents, and estimating how this will change under the UPP.

Poland is the only state to prepare a comprehensive economic study (within the usual technocratic scope of accounting standards) when the UPP was passing its final legislative stages at EU level (Deloitte Polska, 2012; Xenos, 2013, p.268). It is also a European state with very low patenting activity, typical of many other European states. The relevance and value of the Polish study can be attested by its publication on the website of the Slovenian Intellectual Property Office, from which it is currently available. The Polish study finds that, in 2011, under the current patent system, Poland had 38,000 patents in its national market (Deloitte Polska, 2012, p.3; Krakowiak, 2014, slide 11). Most of these will be imports since the country's patenting activity was, and still is, very low. Under the UPP, patent numbers will increase dramatically at national level. For Poland, it is estimated to reach almost 900,000 patents within twenty years (Deloitte Polska, 2012, p.5).

For this study, it is necessary to look at the annual number of European patents the EPO grants to nationally based companies and compare it with the total number of all EPO patents that can potentially become enforceable in the much wider territorial market created. In this way, the difference between imported and exported patents under the UPP can be estimated, as follows:

$$(\text{annual number of European patents of state-based companies}) - (\text{total annual number of European patents}) = (-Y) \times (\text{five consecutive years})$$

In the statistical analysis of patent data in previous sections, a single year was sufficient to identify the share of economic actors and states. But the actual volume of industrial monopolies is not limited to one year only; it has a cumulative, piling up effect (year-after-year-after-year . . .). In 2011 and 2015, the EPO granted 62,112 and 68,400 patents respectively. In any given year, a high number of industrial monopolies enter national markets in Europe. If the average annual patent number is taken for the five-year period 2011–15 (approximately 65,000 patents), the total number of European patents in the last five years is around 325,000. As the number of granted patents increase,¹⁴ many European patents are to be expected when the unitary patent becomes operational. Although the current EPO system of bundled patents will still be available, it is expected that a great many of the hundreds of thousands of existing patents will be upgraded to take advantage of much wider territorial coverage than the current system offers. Consequently, as the unitary patent automatically extends the EPO patent to 25 member states, a much higher volume of imported patents will enter the national markets of 25 member states within the first five-year period, and will increase continuously.

The UPP will flood national markets with an unprecedented import of European patents, most of which are owned by non-EU-based companies. The sudden and massive increase of intellectual property monopolies will affect all innovative activity in the EU. In short, the unification of national patent markets through the UPP disturbs a very crucial factor in innovation and industrial activity, which is the available room for such activity.¹⁵

Constitutional implications and their economic effects

There are some serious constitutional problems with the UPP. At first glance, it may seem that the EU tried to create a federal patent system that would be institutionally similar to the existing EU federal trademark system. Instead, the result was an asymmetrical, unconstitutional arrangement under which the main, pseudo-‘federal’ institutions are international, non-EU organizations (i.e. the EPO and UPC). More seriously, involving international bodies as the main institutions of the new European patent system virtually eclipses the legislative power, national and EU, which could influence and control them. In addition, the EPO and the unified patent court (UPC) are not institutionally connected to each other. Therefore the new international court, the UPC, cannot exercise the fundamental constitutional function of judicial review to control the interpretation, application and development of patent law by the administrative body involved, the EPO – nor would it matter if it could as the UPC is not directly controlled by the elected representatives of the people.

The democratic deficit that is characterized by the absence of direct judicial and legislative control of the EPO at regional and European level has not been addressed by the new unitary patent

¹⁴ In the last two years, the number of granted patents has suddenly and substantially increased, reaching 100,000, but the patent application rate remains at the same. This is mainly attributable to management pressure and the EPO’s recruitment of more patent examiners. It is difficult to say whether this will be the new average or will last only until the current backlog in the EPO is reduced.

¹⁵ ‘[the unitary patent system] limits creation of [technical] solutions which do not infringe those patents, which may decrease willingness to invest in innovations.’ This should be considered in circumstances where innovation opportunities in patent-dependent industries is already very small (Deloitte Polska, 2012, p.32).

system of the EU.¹⁶ Indeed, the minimal and *ad hoc* control that currently exists at national level in the form of case-by-case national judicial examination of EPO decisions and principles is to be abolished. Even then, only 1% of EPO patents ever came before a court (European Commission, 2011, p.32 and fn.101; Xenos, 2013). In a domestic legal case (the Aerotel case) which involved a software patent the EPO had granted, the national judges modified the EPO test for the patentability of software by simply adding one additional question to the existing EPO test (Court of Appeal of England and Wales, 2006). Such issues are of relevance because they determine or adjust the rules from which the patent emerges and remains valid as a proprietary right. In a legal case under the current system (in the pre-UPP period), two stages are relevant: first, the EPO stage from which the patent emerges as an object of property in legally binding terms and, subsequently, the national courts, which deal with its enforcement. In the Aerotel case, these two stages produced two different legal tests to determine the emergence of patents, with the national court's being more difficult to establish since an additional question had to be examined and satisfied. This begs the reasonable question of whose test is more appropriate, that of the EPO or that of the national court of appeal?

A large number of patents or their concentration in a few companies may hinder innovation and the sustainability of other companies. Judicial control can mitigate against an unwarranted anti-competitive effect of patent monopolies. In the Aerotel case, the national court justified the application of a stricter test with reference to economic policy, a test that would suit the needs of UK industries. However, nobody really knows which policy and which state benefits from the EPO's tests. Certainly, the EPO's own interests are served – more patents mean more income from administrative fees (Drahos, 2010).

As the UPC is going to abolish the already limited, case-by-case-only, jurisdiction of national courts, there will be nobody to protect national economic actors from undesirable policies and actions of the EPO. National control will be needed more than ever because of the dramatic increase in the nationalization of international patents under the UPP. There will be nobody to protect national economic actors, especially SMEs. The UPC agreement says that a better 'enforcement' framework will be secured by international judges, but the total abolition of national judicial jurisdiction means there will be no judge who is genuinely concerned with the needs of SMEs. The judgment, and especially the reasoning, in the Aerotel case show, in the clearest possible way, that the national judge not only protects SMEs' innovation by controlling the flow of patent monopolies, but also discourages legal action being taken against SMEs (for US evidence, see Morton and Shapiro, 2015).

The single route that the UPC is supposed to provide is riven by local, regional and central divisions. Although the local base of the international court may determine the national language in which the defendant company is based, such a local base may not exist. Regional divisions may not allow the language of the defendant, and central divisions restrict their operational language to the one language in which the claimant's patent has been granted, which will be one of the three official languages of the EPO. Such direct discrimination contravenes constitutional human rights, namely the right to fair trial.¹⁷ Unlike economic law, constitutional law sees human rights as inalienable. They cannot be abolished without threatening the entire constitutional system.

¹⁶ 'In fact, the decisions of the EPO concerning patents can only currently be reviewed by the internal chambers of appeal created within the EPO, excluding any judicial appeal before an external court. There is no possibility of the European court of justice ensuring the correct and uniform application of union law to proceedings taking place before the chambers of appeal of the EPO' (Kokott, 2010, para.71). This important opinion was never published and archived on the website of the court of justice of the EU. It was only leaked on some websites, which have now cut most of its pages. This is yet another example of lack of transparency at EU level, including that of the court of justice, which never found it necessary to address the remarks of the Kokott (the advocate general; see Borrás, 2006; Drahos, 2010).

¹⁷ Article 6 of the European convention on human rights, and Article 47 of the charter of fundamental rights of the European Union, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:12012P/TXT> (accessed November 2019) (Xenos, 2014a; Zielonka, 2018).

Language discrimination also has economic implications in that it imposes financial burdens on the defendants in patent litigation (including those forced to settle in litigation threats). As SMEs do not have many patents, language discrimination will burden them in particular as the UPP will produce a great many patents. Given the adversarial nature of the patent system, any disadvantage or discrimination confers a benefit to one party only. It is perhaps in this context that the European Commission has recently admitted – under its standard *ex post facto* practice – that the cost of patent litigation under the UPC ‘hits SMEs disproportionately hard’ (European Commission, 2015, p.71). Where only official languages can be used (with the exception of English as the only international language), they are the languages of Germany and France, which favours these two states and especially Germany, which already dominates the patent system in Europe.

Conclusion

There is hardly any economic activity that is not, to some extent, influenced by patented technology. In some sectors, such as health care, environment, energy, security, defence and software, patents are particularly important. The democratic control of intellectual property in national markets is an essential responsibility of the state. Yet, the state is being stripped of democratic control by the EU’s new, pseudo-federal patent system.

The technocratic approach that characterizes institutional debate at EU level is convenient because a more thorough political-economic and social examination would reveal the paradox of federalization in the absence of a federation. As the EU is neither a state nor a federation, the inherently adversarial nature of the international/European patent system has already contributed to an ever-increasing transfer of wealth from less developed to more developed states. Had the EU actually been a federal state, such a transfer might have been offset by the redistribution of wealth to support other federal systems, such as education, social welfare and defence. Such a genuine federal system exists in the US, which – unlike the EU – maintains a reasonably balanced, patent import-export ratio. As a result, there is accumulation of wealth in the US which is subsequently redistributed to the common systems of the state. In Europe, the absence of federation means not only that there is little redistribution of wealth, but also that there is not much wealth to redistribute in that the majority of European patents are taken out by non-EU-based companies. Given the disadvantages under which the international patent system in Europe labours, the EU has pushed its pseudo-federalization by augmenting the key elements of its adversarial nature. First, it gives a unitary/federal effect to the European patent that increases the number of imports of patent monopolies from dozens of thousands to hundreds of thousands. Second, it abolishes national control, which results in a total loss of national sovereignty in circumstances where national control is needed more than ever because of the unprecedented increase in the volume of patent imports. The loss of national control is exacerbated by discriminatory procedures allowing foreign patent litigation in a foreign language. Such absolute surrender of national sovereignty in peacetime is institutionally and historically unprecedented. In this respect, the UPP facilitates the emergence of zombie states where democratic control and national elections play little role in state business and the well-being of the people.

The patent data confirm what is already apparent: European markets have long been dominated – and are increasingly being dominated – by large companies based in a few states, mostly outside the EU and many in Eastern Asia (China, South Korea and Japan). In the minority share of the total number of European patents, one state, Germany, has almost as many patents as all other member states of the EU combined, a situation that will become more dominant when the UK leaves the EU in 2020. The combined share in patenting of 23 member states is just 9%, and patenting is negligible in many. The EPO has been allowed to set itself beyond judicial and legislative oversight. Objective evidence reveals that the position of SMEs is very weak under the EPO regime: their share of annual European patents granted is less than 10% and 17% of patent

applications. These statistical results contradict the official justification for the UPP, which focuses on the benefits for SMEs.

The current study presents a manageable methodology for the collection and evaluation of patent data. Additionally, key economic factors that determine patenting capacity have been identified and evaluated. Such a holistic approach enables us to escape the framing of the debate within the terms dictated by the EU. Democratic control and effective oversight of such major economic-political issues requires external research and evaluation. Loss of national sovereignty removes not only national control, but also the contribution of external expert opinion.

References

- Arrowsmith, P. (2014) 'EPO: lies, damned lies and statistics', *Patently-O*, 16 March, available at <http://patentlyo.com/patent/2014/03/lies-damned-statistics.html> (accessed November 2019).
- Baker, D. (2016) *Rigged: How Globalization and the Rules of the Modern Economy Were Structured to Make the Rich Richer*, Center for Economic and Policy Research, Washington, DC.
- Bausch, T. (2018) 'The EPO's vision (III) – quality', *Kluwer Patent Blog*, 5 March, available at <http://patentblog.kluweriplaw.com/2018/03/05/epos-vision-iii-quality> (accessed November 2019).
- Bell, A., Chetty R., Jaravel X., Petkova N, and Van Reenen J. (2017) *Who Becomes an Inventor in America? The Importance of Exposure to Innovation*, working paper 24062, National Bureau of Economic Research, Cambridge MA, November, available at <https://scholar.harvard.edu/files/xavier/files/w24062.pdf> (accessed November 2019).
- Borrás, S. (2006) 'The governance of the European patent system: effective and legitimate?', *Economy and Society*, 35, 4, pp.594–610.
- Buchanan, M. (2013) 'Who created the iPhone, Apple or the government?', *Bloomberg*, 19 June, available at www.bloomberg.com/view/articles/2013-06-19/who-created-the-iphone-apple-or-the-government- (accessed November 2019).
- Cable, V. (2014) *Innovation and the UK's Knowledge Economy*, Department for Business, Innovation and Skills, London, 23 July, available from www.gov.uk/government/speeches/innovation-and-the-uks-knowledge-economy (accessed November 2019).
- Centre for Strategy and Evaluation Services (2012) *Evaluation of the SME Definition*, Kent, September, available at <http://bookshop.europa.eu/en/evaluation-of-the-sme-definition-pbNB0214126> (accessed November 2019).
- Chartered Institute of Patent Attorneys in the UK (2012) 'Written evidence' in House of Commons, European Scrutiny Committee (ed.) *The Unified Patent Court: Help or Hindrance?*, 65th Report of Session 2010–12, 1, 3 May, Evidence pp.39–46, available at <https://publications.parliament.uk/pa/cm201012/cmselect/cmeuleg/1799/1799.pdf> (accessed November 2019).
- Court of Appeal of England and Wales (2006) *Aerotel Ltd v Telco Holdings Ltd & Ors*, EWCA Civ 1371, Judgment of 27 October, available at www.bailii.org/ew/cases/EWCA/Civ/2006/1371.html (accessed November 2019).
- Deloitte Polska (2012) *Analysis of Prospective Economic Effects Related to the Implementation of the System of Unitary Patent Protection in Poland*, Deloitte Polska, Warsaw, October, available at www.uil-sipo.si/uploads/media/UPP-Analiza-PL.pdf (accessed November 2019).
- Drahos, P. (2010) *The Global Governance of Knowledge: Patent Offices and their Clients*, Cambridge University Press, Cambridge.

Erne, R. (2012) 'European industrial relations after the crisis: a postscript' in Smismans, S. (ed.) *The European Union and Industrial Relations – New Procedures, New Context*, Manchester University Press, Manchester, pp.225–35.

EUIPO (2015) *Intellectual Property Rights and Firm Performance in Europe: an Economic Analysis (Firm-Level Analysis Report)*, Alicante, June, available at https://euipo.europa.eu/ohimportal/en/web/observatory/ip-contribution#ip-contribution_2 (accessed November 2019).

European Commission (2003) *Definition of Micro, Small and Medium-sized Enterprises*, Recommendation, 2003/361/ EC, OJ L 124, 20 May, pp.36–41, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1540306699889&uri=CELEX:32003H0361> (accessed November 2019).

European Commission (2011) *Impact Assessment – Accompanying Document to the Proposal for a Regulation of the European Parliament and the Council Implementing Enhanced Cooperation in the Area of the Creation of Unitary Patent Protection and Proposal for a Council Regulation Implementing Enhanced Cooperation in the Area of the Creation of Unitary Patent Protection with Regard to the Applicable Translation Arrangements*, Staff Working Paper (SEC(2011) 482 final, Brussels, April, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011SC0482> (accessed November 2019).

European Commission (2015) *A Single Market Strategy for Europe – Analysis and Evidence*, Staff Working Document (SWD/2015/0202 final), Brussels, October, available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015SC0202&qid=1485438520140> (accessed November 2019).

European Commission (2017) *Revision of the EU SME Definition*, Inception Impact Assessment (Ares(2017)2868537), Brussels, June, available at <https://ec.europa.eu/info/law/better-regulation/initiative/1462/publication/30141/attachment/090166e5b2db51ea> (accessed November 2019).

Eurostat (2014) *Patent Statistics at Eurostat: Mapping the Contribution of SMEs in EU Patenting*, Publications Office of the European Union, Luxembourg, November, available at <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-14-009?inheritRedirect=true> (accessed November 2019).

Eurostat (2016) *Patent Statistics*, available at https://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Patent_statistics.

Farrell, H. and Quiggin, J. (2011) 'How to save the euro – and the EU: reading Keynes in Brussels', *Foreign Affairs*, 90, 3, pp.96–103.

Guzman, M., Ocampo, J. and Stiglitz, J. (eds) (2016) *Too Little, Too Late: The Quest to Resolve Sovereign Debt Crises*, Columbia University Press, New York.

Hall, B., Helmers, C. and Graevenitz, G. (2016) 'Patent thickets and first-time patenting: new evidence', Centre for Economic Policy Research, London, available at <http://voxeu.org/article/patent-thickets-and-first-time-patenting-new-evidence> (accessed November 2019).

Harhoff, D. (2009) *Economic Cost-Benefit Analysis of a Unified and Integrated European Patent Litigation System*, Tender MARKT/2008/06/D 1, Ludwig-Maximilians University, Munich, 26 February, available at <https://pdfs.semanticscholar.org/b880/e410a540cb368f97c1de90b11ded03f9efb8.pdf> (accessed November 2019).

Hopkin, J. (2012) 'Technocrats have taken over governments in Southern Europe: this is a challenge to democracy', *EUROPPblog*, 24 April, available at <http://blogs.lse.ac.uk/euoppblog/2012/04/24/technocrats-democracy-southern-europe/> (accessed November 2019).

Hughes, A. and Mina, A. (2010) *The Impact of the Patent System on SMEs*, Report to the Strategic Advisory Board for Intellectual Property (SABIP), available at <http://webarchive.nationalarchives.gov.uk/20140603121503/www.ipso.gov.uk/ipresearch-impact-201011.pdf> (accessed November 2019).

- Jaeger, T. (2012) *All Back to Square One? An Assessment of the Latest Proposals for a Patent and Court for the Internal Market and Possible Alternatives*, Research Paper 12-01, Max Planck Institute for Intellectual Property and Competition Law, Munich, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1973518 (accessed November 2019).
- Juan, A., Khanna, T. and Snively, C. (2017) 'The rise and fall of Nokia', Note 714-428, Harvard Business School, revised April.
- Kokott, J. (2010) *Statement of Position by the Advocates General – Opinion I/09*, 2 July (unreported).
- Krakowiak, B. (2014) 'The EU patent package – how Poland changed its tune', conference slides, VI Fórum Associação Portuguesa dos Consultores em Propriedade Intelectual, 12 February, available at www.acpi.pt/wp-content/uploads/2014/02/BK Krakowiak_Patent-Package_Lisbon-2014-final2.pdf (accessed November 2019).
- Lazonick, W. and Mazzucato, M. (2012) *The Risk-Reward Nexus in the Innovation-Inequality Relationship*, Discussion Paper, Finance, Innovation and Growth, Milton Keynes, October.
- Leška, D. (2013) 'The current economic and debt crisis in Eurozone and crisis of grand theories of European integration', *Human Affairs*, 23, pp.429–42.
- Louwerse, T and Otjes, S. (2019) 'How populists wage opposition: parliamentary opposition behaviour and populism in Netherlands', *Political Studies*, 67, 2, pp.479–95.
- Mahnkopf, B. (2012) 'The Euro crisis: German politics of blame and austerity – a neoliberal nightmare', *International Critical Thought*, 2, 4, pp.472–85.
- Mazzucato, M. (2013) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*, Anthem Press, London.
- Moody, G. (2016) 'Welcome to EPOnia, the strange land of European patents that is outside the law', *Ars Technica UK*, 2 March, available at <https://arstechnica.co.uk/tech-policy/2016/02/welcome-to-eponia-the-strange-land-of-european-patents-that-is-outside-the-law/> (accessed November 2019).
- Morton, F. and Shapiro, C. (2015) *Patent Assertions: Are We any Closer to Aligning Rewards to Contribution?*, Working Paper No. 21678, National Bureau of Economic Research, Cambridge MA, October, available at www.nber.org/papers/w21678 (accessed November 2019).
- Muscattelli, A. (2018) 'Italy's new government is on a collision course with EU fiscal rules – it's time for eurozone reform', *The Conversation*, 5 June, available at <http://theconversation.com/italys-new-government-is-on-a-collision-course-with-eu-fiscal-rules-its-time-for-eurozone-reform-97715> (accessed November 2019).
- Olson, M. (1982) *The Rise and Decline of Nations*, Yale University Press, New Haven, CT.
- Oltermann, P. (2015) 'Jürgen Habermas's verdict on the EU/Greece debt deal – full transcript', *Guardian*, 16 July, available at www.theguardian.com/commentisfree/2015/jul/16/jurgen-habermas-eu-greece-debt-deal?CMP=share_btn_tw (accessed November 2019).
- Pagenberg, J. (2012) 'Die EU-patentrechtsreform – zurück auf los?', *Gewerblicher Rechtsschutz und Urheberrecht*, 114, 6, pp. 582–589.
- Schestowitz, R. (2018) 'EPO staff as just warned the national delegates that EPO's decline (in terms of patent quality and staff welfare) would be beneficial to patent trolls', *Techrights*, 15 March, available at <http://techrights.org/2018/03/15/epo-decline-in-terms-of-patent-quality/> (accessed November 2019).
- Skelton, D. (2011) 'Government of the technocrats, by the technocrats, for the technocrats', *New Statesman*, 16 November, available at www.newstatesman.com/blogs/the-staggers/2011/11/european-greece-technocrats (accessed November 2019).

- Stjerna, I. (2016) ‘“Unitary patent” and court system – a poisoned gift for SMEs’, 28 April, available at www.stjerna.de/files/Unipat-SMEs.pdf (accessed November 2019).
- Surowiecki, J. (2013) ‘Where Nokia went wrong’, *New Yorker*, 3 September, available at www.newyorker.com/business/currency/where-nokia-went-wrong (accessed November 2019).
- Taulli, T. (2013) ‘Lessons from the fall of BlackBerry’, *Forbes*, 23 September, available at www.forbes.com/sites/tomtaulli/2013/09/23/lessons-from-the-fall-of-blackberry/#2ad8fe24544d (accessed November 2019).
- Ullrich, M. (2012) *Harmonizing Patent Law: the Untameable Union Patent*, Research Paper 12-03, Max Planck Institute for Intellectual Property and Competition Law, Munich, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2027920 (accessed November 2019).
- Varoufakis, Y. (2015) ‘In conversation with Joseph Stiglitz on the Eurozone Crisis’, INET-OECD conference, 9 April, available at www.yanisvaroufakis.eu/2015/04/11/in-conversation-with-joseph-stiglitz-on-the-eurozone-crisis-at-the-inet-oecd-conference-9-april-2015/ (accessed November 2019).
- Xenos, D. (2013) ‘The European unified patent court: assessment and implications of the federalisation of the patent system in Europe’, *SCRIPTed – Journal of Law, Technology & Society*, 10, 2, pp.246–77.
- Xenos, D. (2014a) ‘Language discrimination in the European Union’, *Gazzetta Amministrativa della Repubblica Italiana*, 3, pp.44–59.
- Xenos, D. (2014b) ‘Comments on the composition of EU Commission expert groups’, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2498560 (accessed November 2019).
- Xenos, D. (2018) ‘Comments for the EU Commission’s public consultation on the review of the SME definition’, 19 July, available at <https://ec.europa.eu/info/files/review-sme-definition-position-papers> (under University of Suffolk file name) (accessed November 2019).
- Zielonka, J. (2018) ‘Harakiri Italian style’, *Open Democracy*, 29 May, available at www.opendemocracy.net/can-europe-make-it/jan-zielonka/harakiri-italian-style (accessed November 2019).