

COMPARING PATENT LITIGATION ACROSS EUROPE: A FIRST LOOK

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ABSTRACT

Although patent litigation has become increasingly global, with litigants earning billion-dollar verdicts and seeking judgments in many different jurisdictions around the world, scholarship has been almost completely silent on how such litigation develops outside the United States. This void in understanding is particularly glaring in Europe, where U.S. and other litigants are increasingly drawn, and to which policy makers interested in harmonizing the U.S. patent system look in vain for answers. Courts, litigants, commentators, and policy makers speculate about how litigation and judicial outcomes differ, but have no factual basis for comparing or understanding what actually transpires. With a view to settling this uncertainty and allowing for the emergence of a more robust body of scholarship, this Article sets forth the results of an empirical study of a database including nearly 9,000 patent suits from seven of the largest and most judicially active countries in the European Union during 2000-2010. In the process, it shows that the incidence of litigation and the bases of judicial outcomes diverge radically across the different countries and types of patented technologies in Europe. Accordingly, the Article, for the first time, provides an empirically grounded, factual basis for examining stubborn questions relevant to those needing clarity about the legal environment in Europe, and to comparatively study the United States' system.

The results unveiled in this Article are profound, bringing clarity to a legal

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environment that has been heretofore shrouded in shadow. The results show that the frequency of patents reaching a judgment in litigation varies widely across European countries in ways that belie the simple differences associated with the quantity of domestic stocks of enforceable patents. By demonstrating that disputes are much more frequent in some countries (e.g., the Netherlands and France) as compared with others, the Article uncovers that practitioners' estimates—the sole previous baseline source—are not accurate. By showing how litigation varies widely across technologies, this Article provides critical insights into the likelihood of different kinds of patents reaching a judgment in the diverse European courts. It also offers surprising evidence regarding how litigants' raising of patent validity and infringement claims differs from one European court to another, and how outcomes too are starkly different.

The main policy implications of the Article follow from the reported patent litigation patterns across technologies and countries. The findings highlight both the fragmentation and variation within the European patent system, and the fundamentally different dynamics that will continue to shape patent enforcement across technology sectors and industries. The patterns also underscore the variation in predictability, and differences in legal certainty, that innovators, patent holders, and their technology competitors experience in the fragmented European system. These cross-country differences highlight institutional variation among the jurisdictions, which in turn drives the costs and incentives to use the courts, helping to provide critical comparative data as Europe moves to a continent-wide Unitary Patent and Unitary Patent Court in 2015. Moreover, since several of the changes proposed in Congress closely resemble rules already in place in the several European jurisdictions, the Article's findings are relevant to current U.S. policy debates on potential patent reform. The Article's important and unprecedented empirical analysis enable comparative patent system policy debate in a way which previously was impossible.

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INTRODUCTION

As innovation and industrial R&D become increasingly global,¹ patent licensing and enforcement increasingly spills over national boundaries. From 2011 through 2013, Samsung Electronics and Apple conducted a series of pitched patent litigation battles in different jurisdictions across Europe and around the world characterized by billion dollar verdicts and varying outcomes.² In August 2011, Apple won a preliminary injunction in the Netherlands against Samsung's sale of several of its electronic devices which were found to infringe a European patent held by Apple.³ During October 2011, Samsung filed suit in France and Italy claiming that the distribution of Apple's iPhone 4S infringed certain 3G wireless technology patents held by Samsung in those countries.⁴ And in April 2013, the German Federal Patent Court invalidated a Samsung 3G patent in response to an action brought by Apple.⁵ Why did the suits between these two giant technology competitors play out like they did? Was there a reason why Samsung sought an early injunction in one country (the Netherlands), but only years later did a court in another (Germany) rule to invalidate a Samsung patent? This global battle provides an exemplar: as patent litigation increasingly becomes cross-jurisdictional, litigants are faced with challenges and uncertainty driven by radically different "rules of the game" in the courts of different European countries.

Recognizing the downsides of a fractured patent system, European policy

1. See generally JERRY THURSBY & MARIE THURSBY, *HERE OR THERE? A SURVEY OF FACTORS IN MULTINATIONAL R&D LOCATION—REPORT TO THE GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE* (2006).

2. See generally Chris O'Brien, *Apple Wins Patent Ruling Against Samsung*, L.A. TIMES, Aug. 9, 2013 (reporting a preliminary \$1 billion patent infringement verdict for Apple in the United States, and additional patent litigation in Germany, Japan, Korea, and the Netherlands), available at <http://articles.latimes.com/2013/aug/09/business/la-fi-apple-legal-cases-20130810>.

3. The Dutch court found that Samsung's devices infringed upon Apple's European software patent 2,059,868, covering scrolling in mobile photo galleries. Devindra Hardawar, *Apple Scores Another Patent Win: Dutch Judge Bans Samsung Galaxy S Sales*, VENTUREBEAT (Aug. 24, 2011), <http://venturebeat.com/2011/08/24/apple-scores-another-patent-win-dutch-judge-bans-samsung-galaxy-s-sales>.

4. *Samsung Wants iPhone 4S Banned in France and Italy*, BBC (Oct. 5, 2011), <http://www.bbc.co.uk/news/technology-15184461>.

5. Florian Mueller, *Apple Wins Invalidation of 3G 'Standard-Essential' Samsung Patent in Germany*, FOSS PATENTS (Apr. 10, 2013), <http://www.fosspatents.com/2013/04/apple-wins-invalidation-of-3g-standard.html>.

makers in December 2012 began a process to establish a patent that will have unitary effect throughout most of the European Union by 2015—a so-called Unitary Patent.⁶ Patents in Europe have heretofore had only national scope, with patent litigation and court judgments on validity and infringement varying significantly from one country to another. Remarkably, these country-specific systems will continue to exist in parallel to the Unitary Patent, and national courts will continue to influence the way patent litigation happens in Europe well into the future.

Two former chief economists of the European Patent Office have argued that the European patent system, due to the fragmentation of its litigation environment, is far from optimal.⁷ But their studies, as well as many other formal and empirical analyses of patent litigation, have been seriously hampered by the lack of data concerning how litigation actually transpires in Europe. While patent litigation studies have been generated in large numbers for the United States since at least the 1990s,⁸ such studies are almost entirely absent for Europe. The limited evidence that does exist suggests that Europe is not monolithic in how it approaches patent enforcement. Moreover, previous findings generated from the U.S. experience do not present a good model from which to draw inferences about the fractured European patent litigation environment.

Accordingly, it is now more important than ever that litigants, lawyers, and

6. REGULATION 1257/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 17 DECEMBER 2012 IMPLEMENTING ENHANCED COOPERATION IN THE AREA OF THE CREATION OF UNITARY PATENT PROTECTION, 2012 O.J. (L 361) 1 [hereinafter REGULATION 1257/2012]. See also COUNCIL REGULATION 1260/2012 OF 17 DECEMBER 2012 IMPLEMENTING ENHANCED COOPERATION IN THE AREA OF THE CREATION OF UNITARY PATENT PROTECTION WITH REGARD TO THE APPLICABLE TRANSLATION ARRANGEMENTS, 2012 O.J. (L 361) 89 [hereinafter COUNCIL REGULATION 1260/2012]. Italy and Spain have indicated they will not join. See *CJEU Rejects Attempts to Derail Unitary Patent*, WORLD INTELL. PROP. REV. (Apr. 16, 2013), <http://www.worldipreview.com/news/cjeu-rejects-attempts-to-derail-unitary-patent>.

7. DOMINIQUE GUELLEC & BRUNO VAN POTTELSBERGHE DE LA POTTERI, THE ECONOMICS OF THE EUROPEAN PATENT SYSTEM (2007), available at <http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199216987.001.0001/acprof-9780199216987>.

8. See, e.g., JAMES BESSEN & MICHAEL MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008) (suggesting that the political system has produced a costly patent system); DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT (2009) (suggesting the inadequacy of legislative solutions to problems in the patent system); John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185 (1998) (analyzing litigated patents); James Bessen & Michael Meurer, *Patent Litigation with Endogenous Disputes*, 96 AMER. ECON. REV. 77 (2006) (setting forth a model of patent litigation); Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 247 (2006) (examining litigated patents); Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45 (2004) (examining how small companies fare in patent litigation) [hereinafter *Protecting Intellectual Property Rights*]; Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 RAND J. ECON. 129 (2001) [hereinafter *Characteristics of Patent Litigation*]; Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365 (2000) (examining judicial treatment of litigated patents).

policy makers—both in the United States and beyond—understand how patent litigation operates in the European Union, the single largest economic block in the world.⁹ Uncertainty remains over how the Unitary Patent system will be implemented. It is likely, however, that the best predictor of future outcomes at the Unified Patent Court—which will be seated in England, France, and Germany¹⁰—will be past experience and trends in these countries' courts. Astonishingly, there are no prior studies that analyze actual data and trends to aid practitioners and policy makers to better understand how patent litigation in the largest European nations transpires, how common it is, what technologies are litigated, or how various courts have ruled. Everyone has been in the dark. This Article fills that lacuna, providing, for the first time, empirical evidence on the incidence and outcomes of court-ordered patent disputes in Europe.

Our teaching in this Article is based on the analysis of a unique, and heretofore unavailable, dataset of European patent litigation during 2000-2010, comprising approximately 9,000 judicial patent decisions from seven European countries.¹¹ These data are extraordinarily revealing: they contain information not only on the type of action being prosecuted (e.g., patent invalidity or infringement) and judicial outcomes (e.g., an invalidity finding based on lack of novelty, unpatentable subject matter, or inadequate description), but also include the patent numbers at issue in these suits. This patent-based information allows us to match litigation outcomes to characteristics of the patents themselves, such as inventor nationalities and patented technologies, enabling us to provide detailed information on litigation in sectors (e.g., pharmaceuticals as compared with electronics) and characteristics of the international “family” of patents (the portfolio of patents issued in different countries on the same underlying invention). By so doing, we offer for the first time an empirically based, grounded view of an important legal environment that has been guided historically—at best—by the rough estimates made by patent law practitioners in the several European jurisdictions.

Our results are profound, bringing clarity to a legal environment that has been heretofore shrouded in shadow. We show that the frequency of patents reaching a judgment in litigation varies widely across European countries in ways that belie the simple differences associated with the quantity of domestic stocks of enforceable patents in these countries. For instance, we show that patent disputes are much more frequent in the Netherlands and France in comparison to other countries, and more

9. See, e.g., Angel Gurría, OECD Secretary General, Address to the Meeting of the Enlarged Parliamentary Assembly of the Council of Europe (Oct. 3, 2007) (reporting that the “EU is the world’s biggest economy and biggest exporter”), available at <http://www.oecd.org/economy/theoecdandtheworldeconomy.htm>. Moreover, during 2013 the United States exported over \$262 billion in goods trade to the European Union. See United States Census Bureau, 2013: *U.S. Trade in Goods with European Union* (2014), available at <http://www.census.gov/foreign-trade/balance/c0003.html#2013>.

10. AGREEMENT ON A UNIFIED PATENT COURT, 2013 O.J. (C 175) 1 [hereinafter AGREEMENT].

11. These decisions were collected and manually analyzed by Darts-IP, a Belgium-based information company. We thank Darts-IP for providing us with access to these data from their “Global IP Case Law Database” for analysis purposes.

common than previously published practitioners' estimates. We also show that patent litigation varies widely across technology sectors, with the majority of cases in Europe focusing on patents granted for industrial processes, civil engineering, consumer goods, machinery, and transport technology. While pharmaceuticals and chemical patents each represent only about 8% of all litigation judgments, we find that drug patents nevertheless experience a very high likelihood of reaching a judicial decision in the European courts. In this way, Europe mirrors patent litigation patterns found previously in the United States,¹² and supports the conclusion that pharmaceutical R&D, patenting, and legal enforcement are becoming increasingly global in nature.¹³ We also offer surprising evidence that both the likelihood of patent litigants raising patent validity and infringement claims differs widely among courts in the different European nations, and that outcomes are starkly different. Courts in England, for example, find against the patent's validity in nearly three-quarters of the cases in which "patentable subject matter" is raised, while the likelihood that the patentee wins on the same grounds in French courts is much lower (only about one-third).

The main policy implication of our study is derived from the patterns that we observe in patent litigation across technologies and countries. Our findings highlight both the fragmentation and variation within the European patent system, and the fundamentally different dynamics that will continue to shape patent enforcement across technology sectors and industries. The patterns we find also underline the variation in predictability, and differences in legal certainty, that innovators and competitors experience in the fragmented European system.

The European patent enforcement system, due to national borders and institutional differences, also offers researchers a rich opportunity to study patent litigation in a comparative context. But the complexity and fragmentation of the European system has thus far frustrated attempts to quantify the intensity, diversity and consequences of pan-European patent litigation. While there are a handful of notable exceptions,¹⁴ commentators have lamented the scarcity of European patent litigation data and the difficulty of formulating detailed policy recommendations in

12. See, e.g., *Characteristics of Patent Litigation*, *supra* note 8, at 136 (showing that patent litigation in drugs and health patents is most likely).

13. See, e.g., Kevin Shadlen, Samira Guennif, Alenka Guzmán, & N. Lalitha, *Globalization, Intellectual Property Rights, and Pharmaceuticals: Meeting the Challenges to Addressing Health Gaps in the New International Environment*, in *INTELLECTUAL PROPERTY, PHARMACEUTICALS AND PUBLIC HEALTH: ACCESS TO DRUGS IN DEVELOPING COUNTRIES* 1, 1-2 (Kenneth Shadlen & S. Guennif, eds., 2011).

14. See DIETMAR HARHOFF, *ECONOMIC COST-BENEFIT ANALYSIS OF A UNIFIED AND INTEGRATED EUROPEAN PATENT LITIGATION SYSTEM* 24-52 (2009), available at http://ec.europa.eu/internal_market/indprop/docs/patent/studies/litigation_system_en.pdf (summarizing the existing empirical evidence while analyzing the potential net benefits of a unified patent litigation system in Europe); Katrin Cremers, *Determinants of Patent Litigation in Germany* 10-16 (ZEW Discussion Paper 04-72, 2004), available at <ftp://ftp.zew.de/pub/zew-docs/dp/dp0472.pdf> (documenting the determinants of patent infringement suits in Germany during 1993-1995, based on a detailed case-level dataset covering disputes filed in the three primary German patent courts).

its absence.¹⁵

It is remarkable that the European patent litigation systems, and the soon-to-be introduced Unitary Patent and Unified Patent Court, have been designed with almost no empirical data to guide policy making. Evidence concerning the intensity and character of patent suits filed and judgments made in the various countries has been systematically missing from the debates. Conversely, patent litigation data have been available for decades in the United States, enabling a proliferation of influential studies in law and economics that have radically changed the way we think about patent enforcement.¹⁶ One goal of our study is to provide a platform to facilitate scholarship on European patent litigation, and comparative studies of the U.S. system therewith. In fact, we provide the first description of a dataset that is now available to researchers for license, thereby enabling proliferation of this scholarship.¹⁷

Moreover, our findings are relevant to current U.S. policy debates about new reforms intended to address perceived problems in patent litigation.¹⁸ As the U.S. Congress considers far-reaching changes in the U.S. patent litigation system, it is notable that some of the changes proposed in the recently-passed Innovation Act closely resemble rules and systems already in place in the several European jurisdictions.¹⁹ Several changes, such as loser-pays fee shifting²⁰ and tight subject-matter restrictions for software and business methods,²¹ have already been implemented in different ways across several of the European jurisdictions we study, thus providing an opportunity for examining what outcomes the U.S. may experience upon adoption. Because such evidence can influence U.S. policy as well as the way the Unitary Patent is implemented in Europe, our project also provides a platform for more evidence-based and rational patent harmonization, a goal that has been encouraged by the National Academies of Science as well as several other influential bodies.²²

15. See KIMBERLEE WEATHERALL, ELIZABETH WEBSTER & LIONEL BENTLY, IP ENFORCEMENT IN THE UK AND BEYOND: A LITERATURE REVIEW (2009), available at <http://www.ipo.gov.uk/ipresearch-ipenforcement-200905.pdf>.

16. See, e.g., *Characteristics of Patent Litigation*, *supra* note 8.

17. Darts-IP has begun providing licenses for academics and students. See DARTS-IP: CRAZY ABOUT CASE LAW, <http://www.darts-ip.com/world/patents/academics-and-students/issues-we-solve/> (last visited July 5, 2014).

18. See, e.g., White House Office of Press Secretary, *Fact Sheet: White House Task Force on High-Tech Patent Issues* (2013) [hereinafter “White House Fact Sheet”], available at <http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues>.

19. H.R. 3309, 113th Cong. (2013) (providing, *inter alia*, more transparency in pleadings, changes in the timing of validity determinations, and increases in judicial discretion to engage in fee shifting for frivolous suits).

20. See, e.g., Saving High-Tech Innovators from Egregious Legal Disputes Act, H.R. 845, 113th Cong. (2013) (proposing loser-pays fee shifting).

21. See White House Fact Sheet, *supra* note 18 (making a legislative recommendation to “[e]xpand the PTO’s transitional program for covered business method patents to include a broader category of computer-enabled patents”).

22. See NATIONAL ACADEMIES OF SCIENCES, A PATENT SYSTEM FOR THE 21ST CENTURY 123 (Stephen A. Merrill, Richard C. Levin, & Mark B. Myers, eds., 2004) (recommending that

Indeed, the more unique and insightful results of our study emerge from how legal institutions radically differ from one European country to the next, and from those in the United States. This diversity relates in turn to the differences we find in the likelihoods of patents being litigated, and to the divergent outcomes we observe for litigants involved in invalidity and infringement actions. We find that patented technologies are treated disparately across the various European courts, with some litigants faring better than others. Judicial outcomes vary widely, with litigants more likely to prevail with some causes of action—and some particular arguments—in some countries compared to others.

These observations, the high-stakes competitive legal battles like those fought by Apple and Samsung across the globe, and the recent development of a Unitary Patent and the Unified Patent Court serve to highlight unanswered yet critically important questions concerning European patent litigation. For instance: How frequent is patent litigation in different countries, and across different technologies and industries? How frequently do separate cases brought in more than one European nation arise out of a single dispute over the same patented invention? And what are the patterns of different *types* of disputes—such as patent invalidity and infringement—across nations, technologies, and industries?

Each of these questions raises important issues of patent-system design, useful for improving our understanding of how the innovation system operates and how patent litigation will operate in the wake of the new European Unitary Patent law. While until now these questions have gone largely unanswered, our objective in this article is to fill this vacuum in our understanding. Importantly, it is the first study that provides substantial empirical evidence on the incidence and outcomes of court-ordered patent disputes in European countries.

Our teaching in this Article is organized in six Parts. Part I assesses the literature on the law and economics of litigation, bridging distinctions between this literature and our European study environment. In Part II, we review the main distinctive features of the national patent systems in the major European countries in order to highlight the institutional differences across European nations that relate to our data analysis. Part III describes our patent case law dataset and details our method for matching these litigation cases to patents and patent families. In Part IV, we examine different trends and patterns in patent litigation in the six EU countries for which the data are the most comprehensive (Belgium, France, Germany, Spain, the Netherlands, and the U.K.). The final Part concludes.

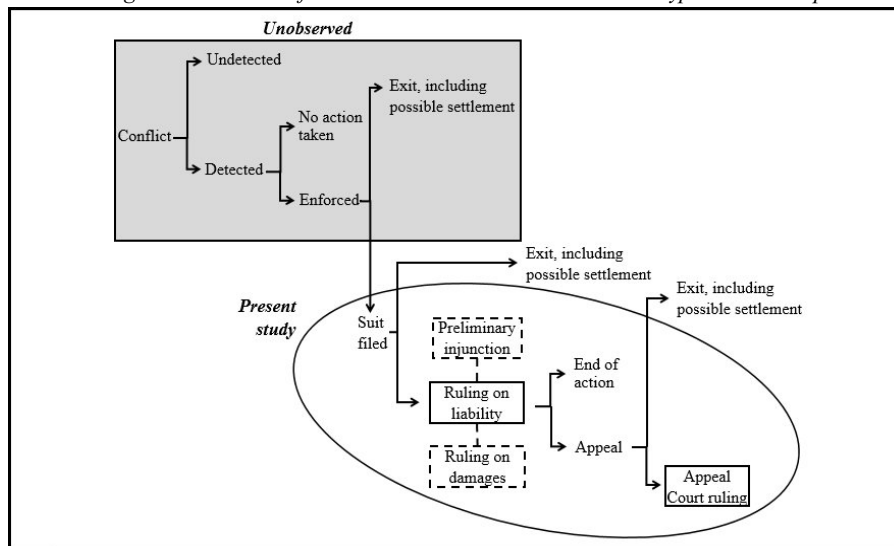
the U.S. patent system be harmonized with Europe and Japan); David J. Kappos, *Patent Law Harmonization: The Time Is Now*, LANDSLIDE, Jul./Aug. 2011, at 16-17 (Director of the USPTO calling for increased harmonization among the world's patent offices); Letter from Jeffrey I.D. Lewis, President, American Intellectual Property Law Association, to Theresa S. Rea, Acting Director, USPTO (Feb. 28, 2013), available at <http://www.aipla.org/advocacy/executive/Documents/AIPLA%20Comments%20to%20USPTO%20on%20Harmonization%20of%20Substantive%20Patent%20Law%202.28.13.pdf> (stating the organization's continuing support for "international harmonization of substantive patent laws").

I. THE LAW AND ECONOMICS OF PATENT LITIGATION

Patent litigation can be viewed as the result of a failure by disputing parties to reach a bargain. Scholars have given a good deal of attention to the law and economics of litigation, addressing the basic questions about settlement and avoiding the legal costs of litigation. Fundamentally, they have dealt with several related inquiries: Under conditions of legal conflict, what conditions lead to adverse parties being unable to bargain to a cooperative private solution (i.e., settlement)? Why do rational parties choose instead to endure costly public-ordering (court) solutions, and thus squander the joint gains that could be realized by avoiding the costs of litigation?

Foundational work in the early 1980s by economists George Priest and Benjamin Klein²³ led to several stylized models that help explain parties' choices between litigating and cooperating in the context of patent infringement.²⁴ These models, however, usually consider the simplest alternative of settling versus litigating to a judgment, and so abstract away from the complexity and dynamic nature of real patent disputes. As illustrated in Figure 1, an exit from suit (which may include a settlement among the parties) can occur at many different stages during the dispute process. Parties can settle prior to filing a court action, or at any point in time during the court proceedings. Even when a case goes to final judgment, the losing party may appeal the decision to a higher court instead of exiting the conflict.

Figure 1 – Schematic of Observed and Unobserved Elements in a Typical Patent Dispute



23. George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 6-22 (1984).

24. See, e.g., Jean O. Lanjouw & Josh Lerner, *The Enforcement of Intellectual Property Rights: A Survey of the Empirical Literature*, ANNALS ECON. & STAT., Jan.-June 1998, at 223, 225-29 (reviewing the relevant models).

Information about what actually transpires in a patent conflict is therefore often hidden from researchers. Figure 1 also illustrates the difficulty in empirically studying such litigation: the universe of potential patent-based conflicts, even those detected by the parties involved, is unobservable in any systematic way. Patent litigation studies—which have come primarily from the United States—have therefore investigated elements that can be directly observed or inferred from other evidence. Research has examined patent cases filed in the first instance at trial court,²⁵ on appeal to higher courts,²⁶ particular court proceedings,²⁷ or several of these elements together.²⁸ Inferences have also been made about what occurs when a case is started (suit filing) but not completed (final court judgment), with some assuming that a settlement has occurred; however, in reality parties may exit for other reasons. It is a truism of research into patent litigation that empirical researchers are always forced by circumstances to investigate a selected sample of conflicts. No study, to our knowledge, has been able to adequately overcome this limitation in doing research in this area.

Figure 1 also shows that the probability of litigating (versus the alternative of settling) first depends upon the patentee detecting a conflict (typically an infringement). Provided that a conflict is observed, there are different factors driving parties to select either court-ordered solutions or cooperative settlements. In a model offered by economists Jean Lanjouw and Josh Lerner, the most prominent factors are the legal costs and the “stakes”—the potential monetary transfer between parties.²⁹ Increasing litigation costs tends to encourage cooperative settlements in this model. In Europe, given that litigation costs tend to be much lower than in the U.S.,³⁰ we would therefore expect, all else equal,

25. See, e.g., *Characteristics of Patent Litigation*, *supra* note 8; *Protecting Intellectual Property Rights*, *supra* note 8, at 49-55.

26. See, e.g., David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 237-258 (2008) (examining the effect on District Courts of review by the Court of Appeal of the Federal Circuit).

27. See, e.g., Jean O. Lanjouw & Josh Lerner, *Tilting the Table? The Use of Preliminary Injunctions*, 44 J.L. & ECON. 573, 576-600 (2001) (investigating preliminary injunctions in patent cases).

28. See, e.g., Kesan & Ball, *supra* note 8, at 258-309 (examining patent litigation rates, the incidence of disposition at summary judgment, suit duration, and other case attributes).

29. Lanjouw & Lerner, *supra* note 24, at 225-29.

30. In a recent survey of patent attorneys in the U.S., total patent litigation costs were estimated at \$0.9m (million) per side when the risked transfer was less than \$1m; \$2.8m per side when the transfer amount was between \$1m-25m; and \$6.0m per side when the transfer exceeded \$25m. See AMERICAN INTELLECTUAL PROPERTY LAW ASSOCIATION, REPORT OF THE ECONOMIC SURVEY I-153-154 (2011) [hereinafter AIPLA]. In European litigation, the cost to prosecute disputes is substantially lower: it ranges between €100,000 and €400,000 per side in most continental jurisdictions for a transfer amount of about €1m, although total costs would be less than double these estimated amounts due to court fees paid only once. See BRUNO VAN POTTELSBERGHE, LOST PROPERTY: THE EUROPEAN PATENT SYSTEM AND WHY IT DOESN'T WORK (2009), available at <http://www.bruegel.org/publications/publication-detail/publication/312-lost-property-the-european-patent-system-and-why-it-doesnt-work/>;

that cases in Europe have a lower likelihood of settlement on account of costs, as compared to their U.S. counterparts. On the other hand, since judgment amounts also tend to be lower in European litigation, partly due to the absence of punitive damages,³¹ cooperative solutions should be relatively more common.

In reality, litigation costs are rarely evenly distributed over the life of the suit. The “lumpy” arrival of costs can generate sub-games within the structure of the suit, and create strong incentives for settlement at different stages during the process.³² Moreover, shocks may drive changes in the cost structure as information is revealed to the parties and the level of suit complexity changes. The probability of reaching a settlement after filing but prior to a final judgment is therefore nonzero, and suggests a complexity not captured in the static models.

Building on these basic considerations, the law and economics literature has developed several theories to help explain why legal disputes fail to settle, including hidden information,³³ divergent expectations,³⁴ and asymmetric stakes, or positive litigation externalities.³⁵ Studies of patent litigation in the U.S. context have typically emphasized the second and third factors, since it has been assumed that litigants are sophisticated parties with detailed knowledge of the relevant technology and market. In Europe, however, these elements may cut against settlement, given the language, cultural, and institutional differences among the various countries. And, regardless of geography, the differences in resources and sophistication among parties—such as between large and small firms—have been shown to drive significant differences in the incidence of litigation.³⁶ Since research has shown the involvement in the innovation

Harhoff, *supra* note 14.

31. No punitive damages are awarded by European courts; hence the only compensation awarded must be based on established lost profits of the patent owner or revenues of the infringer. For instance, in France in 1998, the high court in Paris awarded an average €21,343 in IP infringement cases. See *Patent Litigation in France*, LADAS & PARRY LLP (Jun. 5, 2002), https://web.archive.org/web/20130508171634/http://www.ladas.com/Litigation/ForeignPatentLitigation/France_Patent_Lit.html [hereinafter *France*, LADAS & PARRY LLP].

32. See, e.g., AIPLA, *supra* note 30, I-153-154 (reporting that the cost of patent litigation through the end of discovery was on average about 50-60% of the total costs of litigation through final judgment).

33. Barry J. Nalebuff, *Credible Pretrial Negotiation*, 18 RAND J. ECON. 198, 198-99 (1987); Kathryn Spier, *The Dynamics of Pre-trial Negotiation*, 59 REV. ECON. STUD. 93 (1992).

34. See Richard A. Posner, *An Economic Approach to Legal Procedure and Judicial Administration*, 2 J. LEGAL STUD., 399, 418-19 (1973); Muhamet Yildiz, *Waiting to Persuade*, 119 Q. J. ECON. 223, 223-26 (2004); Alberto Galasso, *Broad Cross-License Agreements and Persuasive Patent Litigation: Theory and Evidence from the Semiconductor Industry* (STICERD Discussion Paper EI45, 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1158322.

35. Michael Meurer, *The Settlement of Patent Litigation*, 20 RAND J. ECON. 77, 88 (1989); Peter Seigelman & Joel Waldfoegel, *Toward a Taxonomy of Disputes: New Evidence Through the Prism of the Priest/Klein Model*, 28 J. LEGAL STUD. 101, 109-11 (1999); Lanjouw & Lerner, *supra* note 24.

36. Lanjouw & Schankerman, *supra* note 8.

economy differs substantially by firm size across different EU countries,³⁷ such considerations are relevant for any study of European litigation.

II. THE (MANY) DIFFERENT LITIGATION SYSTEMS IN EUROPE

By adopting the December 2012 regulation³⁸ that began the process toward establishing a Unitary Patent, Europe was creating an additional layer, or a new option, in its innovation system. With this new option, the European Patent Office (EPO) will be able to issue—at the patentee's request—a unitary European-wide patent instead of a bundle of national ones.³⁹ Previously the EPO could only conduct a single examination that the successful patentee could implement in the patent offices of the various European states, so there had not before been a true European patent with unitary effect.⁴⁰

This process continued in February 2013 with an agreement to create a Unified Patent Court (UPC) with exclusive jurisdiction to hear infringement actions, invalidity actions and counterclaims, and actions for provisional and protective measures and injunctions.⁴¹ The jurisdiction of this court will apply to both the bundles of national patents granted by the EPO, and to the new Unitary Patent.⁴² The newly created UPC will be comprised of a central division (with its main seat in Paris with divisions in London and Munich) and of local and regional courts.⁴³ The Court of Appeal, from which first-instance decisions may be appealed, will sit in Luxemburg.⁴⁴ Claimants will be allowed in most circumstances to choose between a local-regional court and the central division when filing suit.⁴⁵ An exception applies to declarations of non-infringement and standalone invalidity actions which will be required to be brought to the central division.⁴⁶

37. See, e.g., Reinilde Veugelers, *The Role of SMEs in Innovation in the EU: A Case for Policy Intervention?* 53 REV. BUS. & ECON. 239, 241 (demonstrating the wide variance among EU countries when comparing research capacity by firm size).

38. See REGULATION 1257/2012, *supra* note 6. See also COUNCIL REGULATION 1260/2012, *supra* note 6.

39. Italy and Spain have not signed into the new system and will only recognize national patents or national validations of EPO-granted patents. See Alex Barker, *Europe Finally Agrees Single Patent System*, FINANCIAL TIMES, Dec. 11, 2012, at World 1.

40. See generally Stuart J. H. Graham & Dietmar Harhoff, *Separating Patent Wheat from Chaff: Would the U.S. Benefit from Adopting a Patent Post-Grant Review?* (SSRN Working Paper No. 1489579, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1489579.

41. See AGREEMENT, *supra* note 10.

42. Note that this new system has been agreed upon by twenty-five Member States, but will not enter into force until at least thirteen member countries have ratified, which must include Britain, France, and Germany. See Jane Farren, *The Low Down: Tips for Start-ups*, SUNDAY BUS. POST, Jun. 23, 2013, at Small Business 1.

43. See AGREEMENT, *supra* note 10.

44. *Id.*

45. *Id.*

46. *Id.*

Table 1 – Main Features of European Patent Litigation Systems, in Comparison to the U.S.

Attribute	Belgium	France	Germany	Italy	Netherlands	Spain	UK	USA
Average costs	50-100k€	50-200k€	50-250k€	200-400k€	60-200k€	50-100k€	150-1,500k€	1,000-10,000k€
Damages	Low	Low	Average	Low (capped)	Average	Low	High	Very High
Punitive damages	No	No	No	No	No	No	Limited	Yes
Separate trial for damages	No	No	Yes	No	No	No	Yes	No
Average months to judgment	24-36	18-24	12-18	24-36	12	12-18	24-36	18-42
Specialized courts	No	Semi	Yes, for validity	No	Semi	No	Yes	Yes (first appeal)
Courts (trial, first instance)	5 since 2007	10 until 2009, now 1	12 + 1 validity	12	1	16	2 (+1 Scotland +1 No. Ireland)	94
Separate validity court	No	No	Yes	No	No	No	No	No
Supreme Court review	Limited	Limited	Full	Full	Full	Limited	Full	Full
Pan-Europe application	Yes	No	No	No	Yes	No	No	N/A
Preliminary injunctions	Yes + <i>in rem</i> ⁴⁷	Yes + <i>in rem</i> ⁴⁸	Limited	Yes	Yes (<i>Kort Geding</i>)	Yes	Yes	Yes

Within the central division, specialized courts will be created based on technology competence. Cases will be dispatched to one of the three sections in Paris, London, and Munich subject to the technical area of the disputed patent.⁴⁹ The Munich section will hear cases on patents in the “F” section of the International Patent Classification (IPC) (i.e., mechanical engineering, lighting, heating, weapons, blasting); London will hear all cases in the “A” and “C” sections (i.e., human necessities, chemistry, and metallurgy); and Paris will hear patents classified in all other sections, including “B,” “D,” “E,” “G,” and “H” (i.e., performing operations, transportation, textiles, papers, fixed constructions, physics, and electricity).⁵⁰

Despite the progressive harmonization of IP laws in Europe manifested in these agreements, litigation in Europe remains fragmented. In fact, the Unitary Patent system will become available only in early 2015,⁵¹ and will be layered on

47. This is the *Saisie-description*. See *infra* note 155 and accompanying text.

48. This is the *Saisie-contrefaçon*. See *infra* note 73 and accompanying text.

49. See AGREEMENT, *supra* note 10.

50. *Id.*

51. See European Council, *Implementing the Patent Package*, N 15819/13 PI 159 (Annex) 6 (Nov. 18, 2013), available at <http://www.parlament.gv.at/PAKT/EU/XXV/EU/00/>

top of the existing, national litigation systems. Moreover, the wide variation in litigation systems among the European countries was exhibited throughout the period of our study, 2000-2010. Key differences in these systems derive from variation in laws and institutions; others result from divergent professional practice and case law.

In terms of institutional settings, two major differences relate to whether jurisdictions have adopted specialized patent courts, and whether litigants are permitted or required to address infringement and invalidity claims within the same court and suit. In general, national systems in which more patent litigation occurs have created specialized patent courts, or specialized sections within national or district courts, at least for first instance (trial) cases.⁵² In practice, however, most patent courts are either semi-specialized (as in the Netherlands or Spain) or not specialized at all (as in Belgium).⁵³ In most countries we study, courts are allowed to rule on invalidity and infringement claims simultaneously.⁵⁴ Germany however stands apart with its dual treatment: in the German judicial system, infringement and invalidity are examined in different courts, located in different cities.⁵⁵

Table 1 summarizes the main features of the national patent litigation systems we study. In addition to the above institutional differences, jurisdictions differ in the costs associated with the proceedings, from a low average of 50,000-100,000€ for a medium-intensity case in Belgium and Spain, to a high of 150,000-1,500,000€ for a medium-intensity case in the U.K.).⁵⁶ There is also variance in the amount of awarded damages and the time lag from filing to final decision: from an average 12 months in the Netherlands to 24-36 months in Belgium and Italy.⁵⁷ Moreover, we see that some jurisdictions, such as Belgium and the Netherlands, apply (either currently or previously) cross-border injunctions that go beyond the common EU Regulation 44/2001 on the

23/EU_02345/imfname_10423126.pdf.

52. See, e.g., European Council, *Towards an Enhanced Patent Litigation System and a Community Patent—How to Take Discussions Further*, Document WD 11622/07 PI 135 (Jul. 12, 2007) [hereinafter EC Document], available at <http://register.consilium.europa.eu/pdf/en/07/st11/st11622.en07.pdf>; Harhoff, *supra* note 14.

53. See, e.g., Harhoff, *supra* note 14.

54. See, e.g., EC Document, *supra* note 52.

55. *Id.*

56. See, e.g., Harhoff, *supra* note 14; Bruno van Pottelsberghe de la Potterie & Malwina Mejer, *The London Agreement and the Cost of Patenting in Europe* (Bruegel Working Paper No. 2008/5, Oct. 2008), available at <http://www.bruegel.org/publications/publication-detail/publication/264-the-london-agreement-and-the-cost-of-patenting-in-europe/>.

57. See, e.g., Miguel Vidal-Quadras, *Spain: Enforcing IP Rights*, in IP VALUE 2005 249 (Globe White Page Ltd. ed., 2005); Paolo Perani, *Italy: The Enforcement of IP Rights*, in IP VALUE 2005 249 (Globe White Page Ltd. ed., 2005); Pierre-André Dubois, *England and Wales: Making the Jurisdiction More Attractive*, in IP VALUE 2005 223 (Globe White Page Ltd. ed., 2005); Jean-François Bretonnière & Grégoire Corman, *France: How to Stop Counterfeiting from Being a Profitable Activity*, in IP VALUE 2005 230 (Globe White Page Ltd. ed., 2005); Jan Brinkhof, *The Netherlands: Enforcement of Patents: Rambo Lawyers and Cowboy Judges?*, in IP VALUE 2005 263 (Globe White Page Ltd. ed., 2005).

applicability of national decisions within the European Union (see below). These features highlight the substantial differentiation among the various national innovation systems in these countries,⁵⁸ which substantially determines the observed patterns of patent litigation (e.g., costs and damages).

The next Subparts briefly highlight the distinctive features of the patent litigation systems in the European countries analyzed in this article.

A. Patent Litigation in France

In France, patent infringement and nullity (i.e., invalidity) actions are brought to the same court.⁵⁹ French courts have the authority to decide questions of infringement and validity for French national patents, as well as for French validations of patents granted by the EPO.

Prior to 2009, ten “*Tribunaux de grande instance*” (*TGI*) courts were allowed to deal with patent litigation actions, although only two (those in Paris and Lyon) had specialist patent judges.⁶⁰ The Court of Paris has historically heard the largest share (50%) of patent actions in the country prior to 2009.⁶¹ In 2009, patent litigation in France was centralized, with the Paris *TGI* given exclusive jurisdiction over patent disputes throughout the country.⁶²

Decisions by the *TGI* can be appealed to the Regional Court of Appeal and subsequently to the *Cour de cassation* (Supreme Court).⁶³ The *Cour de cassation* cannot decide the case *de novo* but may quash a decision by the lower court due to improper application of law.⁶⁴ In that instance, the case is remanded to, and reexamined by, a different court of appeal.⁶⁵ Overall, first instance decisions occur relatively quickly after the suit is filed (averaging about 1.5 to 2 years for final judgment at trial, and the same average time to decision on appeal) and are comparatively inexpensive (50,000-200,000€).⁶⁶

Patent infringement can theoretically give rise to both civil and criminal liability in France.⁶⁷ But in a criminal patent action, punitive sanctions levied against the infringer are limited, and are collected by the state (not paid to the patent owner), so most infringement actions are brought by owners in the civil

58. See, e.g., NATIONAL INNOVATION SYSTEMS: A COMPARATIVE ANALYSIS (Richard R. Nelson ed., 1993) (comparing the innovation systems of Denmark, France, Germany, Italy, Sweden, and the U.K., among others).

59. See, e.g., EC Document, *supra* note 52.

60. See, e.g., France, LADAS & PARRY LLP, *supra* note 31.

61. See, e.g., EC Document (2007), *supra* note 52.

62. See, e.g., Pierre Véron & Isabelle Romet, *On the Way to Fair Balance, the French Approach to Patent Litigation*, WHO'SWHOLEGAL (2011), available at <http://whoswholegal.com/news/features/article/28961/on-fair-balance-french-approach-patent-litigation.html>.

63. See, e.g., France, LADAS & PARRY LLP, *supra* note 31.

64. *Id.*

65. *Id.*

66. See van Pottelsberghe, *supra* note 30, at 14.

67. See, e.g., Bretonnière & Corman, *supra* note 57, at 231.

branch.⁶⁸ In practice, damages awarded by French courts in infringement actions are low compared to other countries; in 1998, for example the *TGI* in Paris awarded an average amount of 21,343€ in IP infringement cases.⁶⁹ These smaller awards may be the result of evidentiary requirements: the claimant is required to prove its own losses or lost profits, without regard to the infringer's profits.⁷⁰ Developments in the French criminal and civil case law since 2004 have, however, led to increasing penalties for infringement and damages awarded to IP rights holders in recent years.⁷¹ Moreover, plaintiffs increasingly seek and are successful in winning damages based on ancillary grounds (such as infringement of moral rights or unfair competition) to circumvent the difficulty of proving lost profits.⁷²

The French system offers patentees a very powerful way of obtaining pre-trial evidence through the *saisie-contrefaçon*, in which a bailiff or other court officer records the infringement in an *ex parte* proceeding.⁷³ This method is used in about 80% of infringement cases to initiate an action in France.⁷⁴ Within a few weeks, the court may order a seizure at the alleged infringer's premises and, if sufficient evidence of infringement is found, a case on the merits must then be filed within twenty working days.⁷⁵ Defendants in infringement actions may counterclaim for revocation of the patent in the same court and action.⁷⁶ A French court is permitted to decide collectively on both the infringement and the validity of patent claims.⁷⁷

B. Patent Litigation in Germany

The German litigation system is a dual system where infringement and validity are addressed in different courts.⁷⁸ Invalidation challenges can only be brought to the Federal Patent Court (*Bundespatentgericht*, or *BPatG*), a federal specialized court that may only receive cases concerning the validity of patents

68. *Id.*

69. *Id.* at 230.

70. *Id.* at 231 (noting that the basic rule in French courts is that compensation for damages must be equal to the prejudice suffered).

71. *Id.* at 231-232; Jean-Guillaume Monin and Solène Vilfeu, *Patent Litigation in France*, in *Patents Without Borders* (2013), <http://www.cmslegal.com/patentswithoutborders/Documents/CMS%20International%20Patent%20Litigation%20Guide%202013.PDF>, downloaded on May 16, 2014, at 41.

72. Bretonnière & Corman, *supra* note 57, at 231.

73. See, e.g., Pierre Véron, *The French Saisie-Contrefaçon* (Jan. 9, 2009), available at http://www.veron.com/publications/Colloques/The%20practice%20of%20multijurisdictional%20patent%20litigation_France.pdf.

74. *Id.*

75. *Id.*

76. See, e.g., *France*, LADAS & PARRY LLP, *supra* note 31.

77. *Id.*

78. See, e.g., EC Document, *supra* note 52.

and applications.⁷⁹ Such cases may either be standalone invalidation challenges (about 250 cases received and processed in 2008)⁸⁰ or appeals of decisions rendered by the German Patent Office (about 750 cases received in 2008).⁸¹ These latter cases can either be appeals by a patentee of the decision to grant or reject a patent, or appeals of an administrative “opposition” decision.⁸² Judgments by the Federal Patent Court can only be appealed to the Federal Court of Justice, where on average 50 *BPatG* decisions per year were appealed during 2004-2008.⁸³ The *BPatG* may decide on the validity of both German national patents, and German validations of EPO granted patents.⁸⁴

Infringement actions can be lodged in any of the twelve district courts competent to hear patent infringement cases.⁸⁵ By far the busiest of these courts in Germany—and in fact in Europe—is the district court in Düsseldorf, which receives about 50% of the infringement cases in Germany.⁸⁶ While plaintiffs may initiate an infringement action in any of the dozen district courts, in practice three—those in Düsseldorf, Mannheim and Munich—receive about 80% of the infringement cases in Germany.⁸⁷

The cost of a first instance infringement action in Germany is comparable to that in France (50,000-250,000€)⁸⁸ and decisions are reached relatively quickly (typically within 12 to 18 months).⁸⁹ The measure of damages is typically based on lost profits.⁹⁰ However, if a basis for lost profits cannot be determined, the infringers’ own profits or standard “market” license fees may be used as an alternative basis.⁹¹

Due to Germany’s bifurcated system (in which invalidity and infringement are examined in different courts, in separate actions), invalidity is ordinarily not raised as a defense in infringement cases.⁹² However, a validity challenge can be filed at the *BPatG* after the infringement action has been started, which may in

79. See, e.g., Cremers, *supra* note 14.

80. German Patent & Trademark Office (DPMA), *The Federal Patent Court* (Regina Hock, ed., 2009), 19.

81. *Id.*

82. German patents can be opposed by any party before the patent office within three months from the grant of a patent, and the decision of this procedure appealed at the *BPatG*. See *Procedures*, GERMAN PATENT & TRADEMARK OFFICE (DPMA) (Aug. 5, 2014), available at <http://www.dpma.de/english/patent/procedures/index.html>.

83. DPMA, *supra* note 80, at 19.

84. See, e.g., *id.* at 8.

85. See, e.g., Johann Pitz & Gerhard Hermann, *Germany: Interplay between Opposition Proceedings and Patent Litigation*, IP VALUE 2005 at 233 (Globe White Page Ltd., ed., 2005).

86. Cremers, *supra* note 14.

87. *Id.*

88. See van Pottelsberghe, *supra* note 30.

89. *Patent Litigation in Germany*, LADAS & PARRY LLP (Jun. 25, 2002), https://web.archive.org/web/20130508171634/http://www.ladas.com/Litigation/ForeignPatentLitigation/Germany_Patent_Lit.html [hereinafter *Germany*, LADAS & PARRY LLP].

90. *Id.*

91. *Id.*

92. See, e.g., Pitz & Hermann, *supra* note 85, at 233.

turn lead to the infringement suit being stayed until a decision is reached on validity.⁹³ In practice, German courts are reluctant to grant such a stay unless there is some evidence that the patent court is likely to invalidate the patent, either partially or fully.⁹⁴ Accordingly, prior art and validity arguments may be raised by the defendant in infringement cases in the trial courts—not to obtain an invalidation *per se*, but instead to convince the court to stay its proceedings.⁹⁵ Evidence suggests that such postponements are granted in less than half of all cases.⁹⁶

C. Patent Litigation in the United Kingdom

The UK is made of three distinct jurisdictions, each having a slightly different patent litigation system: (a) England and Wales, (b) Scotland, and (c) Northern Ireland.⁹⁷ In Northern Ireland, patent cases are brought before the Northern Ireland High Court, and in Scotland before the Outer House of the Court of Session.⁹⁸ Most patent cases in the UK are brought in London where the patent courts for England and Wales sit.⁹⁹

Patent litigation in England and Wales is conducted in two different courts: the Patent Court (a division of the High Court) and the Patents County Court (created in 1988 to deal with simpler cases).¹⁰⁰ The law requires that simple cases (or lower-value cases) be directed to the Patents County Court while more complex (or higher-value) cases go to the High Court.¹⁰¹ Both courts have jurisdiction over infringement and validity issues concerning UK national patents and UK validations of EPO granted patents.¹⁰² Appeals can be brought before the Court of Appeal and, in some circumstances, to final appeal in the British House of Lords.¹⁰³

Upon a showing of infringement at trial court, a second trial is required to assess damages to the plaintiff on the basis of damage suffered.¹⁰⁴ In practice,

93. *Id.*

94. *Id.*

95. This process is analogous to a summary judgment in the U.S. *See generally* Cremers, *supra* note 14.

96. Pitz & Hermann, *supra* note 85, at 233.

97. *Patent Litigation in the United Kingdom*, LADAS & PARRY LLP (Jun. 25, 2002) [hereinafter *UK*, LADAS & PARRY LLP], https://web.archive.org/web/20130508172150/http://www.ladas.com/Litigation/ForeignPatentLitigation/UK_Patent_Litigation.html.

98. *Id.*

99. *See generally* Christian Helmers & Luke McDonagh, *Patent Litigation in the UK* (LSE Legal Studies, Working Paper No. 12/2012, Sept. 23, 2012), available at <http://ssrn.com/abstract=2154939>.

100. *UK*, LADAS & PARRY LLP, *supra* note 97.

101. *Id.*

102. *See, e.g.*, EC Document, *supra* note 52.

103. *UK*, LADAS & PARRY LLP, *supra* note 97.

104. Chris Forsyth & Justin Watts, *Patent Litigation in Europe: England and Wales*, FRESHFIELDS BRUCKHAUS DERINGER LLP (Dec. 28, 2007), <http://www.lexology.com/library/detail.aspx?g=dbda7a52-3a28-46e2-935e-dcabb26683d8>.

however, most cases settle between the parties once liability is determined.¹⁰⁵ First instance decisions take a bit longer in the UK than in France and Germany (typically 2 to 3 years in the Patent Court, but less in the Patents County Court).¹⁰⁶ Litigation costs are considerably higher than in other countries (150-1,500k€), which may explain the lower number of cases brought to court in the UK.¹⁰⁷ Interlocutory injunctions are, however, relatively easily available at comparatively low cost.¹⁰⁸ Probably due to high costs, a large number of English patent cases settle early in the proceedings, prior to the bulk of costs being incurred at trial.¹⁰⁹ If damages are awarded to the successful plaintiff, they are required to be based on actual damages suffered.¹¹⁰

D. Patent Litigation in the Netherlands

All patent matters in the Netherlands must be brought exclusively before the courts in The Hague (*Gravenhage*).¹¹¹ First instance actions must be lodged at the patent chamber of the district court (*Rechtbank*), with appeals taken to the patent chamber of the court of appeal (*Gerechtshof*).¹¹² Judges in both courts receive technical as well as legal education, and former members of the Dutch patent office may serve in the patent chamber.¹¹³ After the case has been decided on appeal, parties may initiate proceedings in the Dutch Supreme Court (*Hoge Raad*), where procedure focuses on matters of law rather than fact.¹¹⁴ First instance decisions are usually speedy and comparable in costs with French litigation (60-200k€).¹¹⁵ In compensation for infringement, the patentee may choose between an award of damages or an accounting of the infringer's profits earned from the infringement.¹¹⁶

Besides proceedings on the merits, which may address both the alleged infringement and patent validity, the Dutch litigation system offers a particular type of preliminary relief proceedings, called the *KortGeding*, to deal with urgent cases.¹¹⁷ Contrary to other European jurisdictions like the UK, France and Italy where interim relief can only be requested and urgency claimed within a limited time window (from a few weeks to a few months), Dutch courts may at any time

105. *Id.*

106. UK, LADAS & PARRY LLP, *supra* note 97.

107. Van Pottelsberghe, *supra* note 30, at 14.

108. UK, LADAS & PARRY LLP, *supra* note 97.

109. Helmers & McDonagh, *supra* note 99, at 27.

110. UK, LADAS & PARRY LLP, *supra* note 97.

111. *See* Brinkhof, *supra* note 57, at 264.

112. *Id.*

113. Peter Hendrick, *Patent Litigation in Europe: The Netherlands*, FRESHFIELDS BRUCKHAUS DERINGER LLP (2007) (on file with author) at 2.

114. *Id.* at 4.

115. *See* Harhoff, *supra* note 14, at 31; Van Pottelsberghe, *supra* note 30, at 14.

116. Brinkhof, *supra* note 57, at 266.

117. *Id.* at 265.

find urgency in IP-related matters and award a preliminary injunction.¹¹⁸ As a result, the patent holder may obtain a preliminary decision by the judge at any point, and within a week or two win an injunction to stop any infringing activity. Injunctions are generally accompanied by an order to the accused infringer to pay a penalty sum as insurance against possible violation of the injunction.¹¹⁹ As a result, injunction orders play a more important role in Dutch litigation than do damage claims.¹²⁰

Importantly, Dutch judgments in preliminary relief proceedings can have effects across Europe, and Dutch courts may assume competence for jurisdictions outside the Netherlands and grant cross-border injunctions.¹²¹ Dutch judges began this practice in the mid-1990s, commonly forbidding accused infringers from practicing the litigated patents both in the Netherlands and also abroad.¹²² As a result, with a single, quick, and affordable action in the Netherlands, patent holders may stop infringement of their patent throughout Europe.¹²³

When combined with the *KortGeding* procedure, this cross-border injunction effect is a very powerful weapon for patent holders.¹²⁴ Consequently, Dutch courts are continuing to receive large numbers of patent cases in a sort of European “forum shopping.”¹²⁵ Although this procedure—when used internationally—is not without risk, it has become quite popular among patent owners despite several legal changes and cases that have reduced its scope and efficiency in recent years.¹²⁶ While powerful, the cross-border reach of Dutch judgments is nevertheless limited: although they apply to infringements, they do not extend to patent invalidity actions,¹²⁷ and following a European Court of Justice ruling are now limited to cases where the defendant is located in the Netherlands and patent validity is not raised.¹²⁸

E. *Patent Litigation in Italy*

Patent litigation in Italy has traditionally been considered unusually lengthy

118. Peter Hendrick et al., *Dealing with Cross-border Litigation*, MANAGING INTELL. PROP. 2005 at 4.

119. Brinkhof, *supra* note 57, at 263.

120. *Id.*

121. Hendrick, *supra* note 114, at 1.

122. Brinkhof, *supra* note 57, at 263.

123. *Id.*

124. Hendrick, *supra* note 116, at 4.

125. Brinkhof, *supra* note 57, at 264.

126. Willem Hoorneman, *Patent Litigation in the Netherlands*, in PATENTS WITHOUT BORDERS (2013), available at <http://www.cmslegal.com/patentswithoutborders/Documents/CMS%20International%20Patent%20Litigation%20Guide%202013.PDF>, downloaded on May 16, 2014, at 65.

127. For instance, a Dutch court may not invalidate a German patent. *See generally* Brinkhof, *supra* note 57.

128. Hoorneman, *supra* note 126, at 65.

and costly.¹²⁹ Italy has, however, made substantial progress since 2005, when all IP matters became regulated under the Code of Industrial Property that superseded all previous IP regulations.¹³⁰ Presently, all patent matters (infringement and invalidity) are the exclusive province of a number of IP chambers created within twelve Courts of Appeal districts,¹³¹ the largest being Milan where most patent cases in Italy are heard.¹³² Proceedings in Italy since the reforms are still typically longer than anywhere else in Europe (about 2 to 3 years or more to first instance judgment), but have now become comparatively less expensive.

Infringement proceedings in Italy have generally involved a detailed examination of the validity of the patent at stake, because historically there had been no systematic substantive examination of Italian patent applications.¹³³ As a result, a patent holder willing to bring an infringement action to court had to be prepared for a detailed examination of his patent.¹³⁴ Under legislation and case law, a patent could be enforced even prior to grant so long as the patentee showed *prima facie* evidence of patentability—often simply the preliminary application search report issued without adverse information being found.¹³⁵ This situation changed in 2011 when the Italian Patent and Trademark Office announced it would add an examination phase to its proceedings.¹³⁶

The legal definition of infringement includes not only the manufacture, sale, and use of patented products and processes in Italy, but also manufacturing abroad with intent to export to Italy, supplying non-patented but essential components, and preparing the means to produce patented goods.¹³⁷ In cases where infringement is found, patentees may be awarded damages up to the limit of either the actual lost profits or a reasonable royalty.¹³⁸ And given that punitive damages do not exist in Italy, it may sometimes be a dominant strategy for counterfeiters to infringe.¹³⁹ In either case, appeal of a first instance decision may be lodged in the corresponding Court of Appeal and ultimately to the

129. Perani, *supra* note 57, at 249.

130. See generally Micaela Modiano, *Italy: When to Take Action Against Infringement in Italy*, IAM MAGAZINE (SPECIAL ISSUE: BUILDING AND ENFORCING INTELLECTUAL PROPERTY VALUE) 113 (2011). The code was updated in 2010. *Id.*

131. EC Document, *supra* note 52.

132. *Patent Litigation in Italy*, LADAS & PARRY LLP (Jun. 25, 2002), https://web.archive.org/web/20130508172150/http://www.ladas.com/Litigation/ForeignPatentLitigation/Italy_Patent_Litigation.html [hereinafter *Italy*, LADAS & PARRY LLP].

133. Perani, *supra* note 57, at 250.

134. *Id.*

135. Edgardo Deambrogi, *Patent Office Launches Examination of National Applications*, IAM MAGAZINE (Nov. 2, 2011), <http://www.iam-magazine.com/reports/Detail.aspx?g=57ff155b-bdeb-47de-a088-acb684537749>.

136. *Id.*

137. Modiano, *supra* note 130, at 113.

138. Perani, *supra* note 57, at 231. As regards reasonable royalty calculations, standard rates are applied by the courts, said to be lower than “market” licensing rates. *Id.*

139. *Id.* at 231.

Supreme Court.¹⁴⁰

F. *Patent Litigation in Spain*

First instance patent matters can be brought to any commercial court (*Juzgados de lo mercantil*) in the country.¹⁴¹ These courts are part of the high court of the region in which infringement took place or where the alleged infringer resides.¹⁴² Some appellate courts (such as that in Barcelona) tend to concentrate patent and other IP cases in one of their sections, thus establishing an informal specialization.¹⁴³ Appeal decisions may be challenged in the Supreme Court under some conditions. On average, first instance cases are judged comparatively quickly, with estimates ranging from within 10 to 14 months to within 2 to 3 years.¹⁴⁴

Commercial courts are allowed to decide on the infringement and validity of Spanish national patents or Spanish validations of patents issued by the EPO.¹⁴⁵ In case an infringement is established, the court may grant the patent holder, beside the order to cease infringement and the seizure of infringing products, damages to compensate for the real losses and lost profits incurred, and possibly also for the depreciation of the invention resulting from the infringing actions.¹⁴⁶ Alternatively, the court may estimate the amount of damages on the basis of the infringer's profits or a normal royalty.¹⁴⁷

G. *Patent Litigation in Belgium*

Since 2007, the five commercial courts collocated with the national courts of appeal have been given exclusive competence to hear patent matters in first instance, including infringement and invalidity challenges.¹⁴⁸ In practice, most patent cases are brought to the commercial courts in Brussels and Antwerp.¹⁴⁹ Although these courts have developed some expertise with patent cases, they are

140. EC Document, *supra* note 52.

141. *Id.*

142. Vidal-Quadras, *supra* note 57, at 292.

143. Vicente Sierra & Sergio Miralles, *Patent Litigation in Europe: Spain*, FRESHFIELDS BRUCKHAUS DERINGER LLP (2007) (on file with author).

144. Sergio Miralles, *Patent Litigation in Europe: Spain*, FRESHFIELDS BRUCKHAUS DERINGER LLP (2013) (on file with author) (estimating 10 to 14 months); Blanca Cortés Fernández, *Patent Litigation in Spain*, in *Patents Without Borders* (2013), <http://www.cmslegal.com/patentswithoutborders/Documents/CMS%20International%20Patent%20Litigation%20Guide%202013.PDF> (accessed on May 16, 2014), at 87 (estimating 2 to 3 years).

145. Vidal-Quadras, *supra* note 57, at 292.

146. Sierra & Miralles, *supra* note 143, at 8-9.

147. *Id.* at 8.

148. *See, e.g.*, EC Document, *supra* note 52.

149. Interview with Jean-Christophe Troussel and Bruno Vandermeulen, Patent Attorneys, in Brussels, Belgium (Jan. 7, 2011).

not legally specialized.¹⁵⁰ Appeals may be made to the appeal court corresponding in location to the commercial court, and the Supreme Court (*Cour de cassation*) will only review appeal decisions on the grounds of procedural or formal issues.¹⁵¹ The Supreme Court does not examine cases on the merits, but may only quash a prior appeal verdict and send the case back for reexamination to another of the Belgian courts of appeal.¹⁵² Functionally, Belgian courts—and particularly those in Brussels—have had a reputation for being particularly overloaded and slow.¹⁵³

As in most European countries, Belgian courts can render judgments on the infringement and validity of national patents or on the domestic validations of EPO patents, and validity is often challenged in reaction to an infringement pursuit. In their preliminary injunctions, Belgian courts assume the *prima facie* validity of the patents, even when an opposition was pending or appealed at the EPO.¹⁵⁴ Moreover, patentees may seek a *saisi description* order from the court, allowing the seizure of evidence of infringement at the premises of the accused infringer.¹⁵⁵ As a result, since the early 2000s, Belgium has become a preferred venue for patent owners who wish to quickly enforce their patent rights, even when other proceedings are pending.¹⁵⁶

Developments in Belgian law in the last decade have substantially improved the Belgian patent litigation system.¹⁵⁷ In 2007, a new Patent Act was adopted that limited the number of courts allowed to deal with patent matters (hence gradually improving the specialization of judges).¹⁵⁸ Moreover, Belgian case law has developed to prevent recourse to “torpedo” actions,¹⁵⁹ a strategy used by defendants to avoid or delay infringement judgments.¹⁶⁰

150. See, e.g., EC Document, *supra* note 52.

151. Annick Mottet Haugaard & Christian Dekoninck, *Belgium*, IAM MAGAZINE (APR. SUPPLEMENT: PATENTS IN EUROPE) 42 (2008).

152. *Id.*

153. *Id.*

154. Bruno Vandermeulen, *Belgian court issues first pan-European patent injunction*, Bird & Bird (Oct. 4, 2001), http://www.twobirds.com/English/News/Articles/Pages/2001/belgian_court.aspx.

155. Christophe De Groote, *Enforcing patents in Belgium*, IAM Magazine, Aug. 2005, at 39.

156. Bruno Vandermeulen, *Cross-border patent litigation in Belgium: The next generation*, Managing IP, Apr., 2005, available at http://www.twobirds.com/English/News/Articles/Pages/2005/Crossborder_patent_litigation_in_Belgium.aspx.

157. See generally Haugaard & Dekoninck, *supra* note 151.

158. LOI RELATIVE AUX ASPECTS DE DROIT JUDICIAIRE DE LA PROTECTION DES DROITS DE PROPRIÉTÉ INTELLECTUELLE DU 19 AVRIL 2007, *Moniteur Belge*, May 10, 2007, 25694 (implementing patent law reforms).

159. *Roche e.a. v. Glaxo Wellcome*, IRDI, 2001.168-175 (Brussels Court of Appeal, Feb. 20, 2001) (eliminating torpedo actions).

160. Pierre Véron, *ECJ Restores Torpedo Power*, 35 INT'L REV. INTELL. PROP. & COMPETITION L. 638 (2003); see *infra* notes 171-72 and accompanying text.

H. *Cross-Border Considerations in Patent Litigation*

Goods and services are routinely sold across Europe by entities based in different countries. Cross-border issues are therefore pervasive, and may take two forms: an entity may infringe a patent in several different European countries, or a patent may be infringed in a given country by an entity residing in another nation.¹⁶¹ Because the European patent litigation system is fragmented along national and institutional lines, several considerations loom large, not the least of which is the difference between how infringement and invalidity actions are prosecuted.

According to the European Regulation on Jurisdiction and the Enforcement of Judgments in the European Union, national courts exert exclusive jurisdiction over questions about the validity of their domestic patents. It is therefore not possible to invalidate, for instance, a German patent with a Dutch decision (even if the decision corresponds to the same EPO patent). Invalidity challenges are therefore necessarily a national issue.

On the contrary, infringement actions are frequently international in nature, either because infringement in one country is allegedly performed by an entity residing in another country, or because infringement is observed in multiple countries. The former case raises a question as to which court is competent to hear a dispute. In theory, EU regulations allow the plaintiff to file an action in the competent court of the defendant's domicile country.¹⁶² Because infringement may occur in other European countries, the EU regulations create a conflict.

Take for instance a German owning a Belgian patent who observes a French entity infringing the patent in Belgium. Because the infringement occurs in, on a patent granted by, a country different than the domicile of the alleged infringer, the French court is competent to decide on the potential infringement but not upon the validity of the infringed Belgian patent (according to the above-mentioned regulation). While this anomaly can lead some courts to decline jurisdiction over such cross-border actions, most national patent courts will hear infringement cases when the defendant is a foreigner and the alleged infringement occurred in the court's jurisdiction on a national patent.

Accordingly, nothing prevents a single dispute from being brought simultaneously before multiple courts across Europe. However, projections by Dietmar Harhoff suggest that duplicate actions should be uncommon in

161. Bruno Vandermeulen, *Recent Developments in European Cross-Border Patent Litigation*, IAM Magazine, Apr. Supplement *Patents in Europe 2008*, Apr. 2008, at 13.

162. Council Regulation 44/2001, of 22 Dec. 2000 on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters, 2001 O.J. (L 012 (treaty covering most EU member states and replacing the 1968 "Brussels Convention"). Another convention, the "Lugano Convention," was adopted in 1988 and applies similar rules to several other European countries. *See generally* Oliver Browne, *Reform of the Brussels Regulation: Developments in Questions of Jurisdiction and the Recognition and Enforcement of Judgments Across the European Union*, IN PRACTICE, (Latham & Watkins, London, U.K.) Oct. 2012, at 1.

Europe.¹⁶³ This may be partly explained by the EU Regulation 44/2001, which provides that the enforcement and recognition of judgments are applicable in most European countries.¹⁶⁴

Given that timing is often critical in patent litigation, preliminary injunctions and delay can be used by patent holders and infringers respectively. Patent owners may be interested in obtaining a preliminary injunction to prevent ongoing infringement prior to a lengthy trial on the merits. But until the mid-1990s such actions were required to be initiated in all countries where infringement was observed. As discussed above, the Dutch *KortGeding* procedure combined with the cross-border outreach of Dutch decisions made the Netherlands a very attractive court to quickly put an end to infringing activities throughout Europe at once at low cost.¹⁶⁵ In the late 1990s Belgian courts followed this move, and because Belgian law does not hold patent holders liable for damages to defendants resulting from preliminary injunction, even absent an infringement finding, it offers an extra protection that also attracted suits by IP owners.¹⁶⁶ Such cross-border injunctions have, however, been restricted in their use and validity by successive rulings of the European Court of Justice.¹⁶⁷ There remain, however, some specific situations in which they may be awarded.¹⁶⁸

Belgian courts, and particularly the Brussels court, had gained international visibility for other reasons in the 1990s. As in most countries, Belgian courts can also render declaratory judgments of non-infringement.¹⁶⁹ If the court is slow in rendering its judgment, then the filing of such a request could preempt any infringement action from being filed in Europe, by virtue of Article 21 of the Brussels Convention, until the declaratory judgment is made.¹⁷⁰ Given their workload and slow decision process, Belgian courts—along with some slow Italian courts—had been flooded with such defensive actions, sometimes called “torpedo” attacks.¹⁷¹ Since then, Belgian courts have declared some of these actions abusive and have considerably reduced their backlog so that they are no

163. See Harhoff, *supra* note 14, at 38-40.

164. The main thrust of the Regulation is that once a judgment has been obtained in one European country, it is enforceable in all countries where these conventions apply. This may, however, become less straightforward in practice. See Vandermeulen, *supra* note 161.

165. Brinkhof, *supra* note 57, at 263.

166. Vandermeulen, *supra* note 156, at 3.

167. Case C-04/03 (ECJ Report, 2006), I, 6509; Case C-539/03 (ECJ Report, 2006), I, 6535.

168. See Vandermeulen, *supra* note 161, at 14.

169. See Vandermeulen, *supra* note 156, at 1.

170. See Véron *supra* note 160, at 639 (stating that Article 21 of the Brussels Convention of 1968, replaced by Regulation No. 44/2001, which has been effective since 2002, provides that “[w]here proceedings involving the same cause of action and between the same parties are brought in the courts of different Contracting States, any court other than the court first seized shall of its own motion stay its proceedings until such time as the jurisdiction of the court first seized is established” and “[w]here the jurisdiction of the court first seized is established, any court other than the court first seized shall decline jurisdiction in favour of that court”).

171. *Id.*

longer used for torpedo actions.¹⁷²

An unsettled question is how courts should deal with parallel infringement and invalidation actions in different jurisdictions. In the absence of a central court of appeal, an outcome that will not be provided by the Unitary Patent, there is no certainty that divergent outcomes will be consolidated and reconciled at the European level. Although some cases of divergent outcomes have been reported,¹⁷³ data are lacking to evaluate the frequency with any certainty.¹⁷⁴

III. OUR EUROPEAN PATENT CASE LAW DATASET

With the institutional details of the various European patent courts as background, we now move to an empirical examination of patent litigation across Europe, the first published of which we are aware. Our analysis employs a new proprietary dataset of patent litigation events across Europe that has heretofore been unavailable to researchers. These data were provided by Darts-IP, a Belgian-based company offering information on IP case law to practitioners, collected over the course of several years.¹⁷⁵ The dataset we use for analysis (a subset of the Darts-IP database) contains 8,745 judicial decisions issued from 2000 to 2010 from seven European countries: Belgium, France, Germany, Italy, the Netherlands, Spain, and the United Kingdom. According to the data provider, these data cover between 40% and 90% of the judicial patent decisions published in these countries.

While previous U.S.-centered patent litigation studies have commonly used “suit filing” data, our dataset departs from the setting generally examined in earlier works in two important respects (see Figure 1). First, we observe judgments across different court levels, e.g., trial or “first instance,” intermediate appeal, and ultimate “supreme” appeal. Second, we examine court decisions, not suit filings.¹⁷⁶

Nevertheless, for some of the countries we investigate, our data derived from “court decisions” are virtually identical to the population of “patent suits filed”

172. See, e.g., Vandermeulen, *supra* note 156, at 2.

173. For instance, the “Senseo” patent litigation between Sara Lee and Philips Electronics resulted in different rulings on indirect infringement by Belgian and Dutch courts in 2005. See van Pottelsberghe de la Potterie and Mejer, *On the Consequences of a Highly Fragmented European Patent System*, in REFORMING RULES AND REGULATIONS: LAWS, INSTITUTIONS, AND IMPLEMENTATION 70 (Vivek Ghosal ed., 2011).

174. See generally Harhoff, *supra* note 14.

175. Darts-IP provides “The Global IP Case Law Database,” available at <http://www.darts-ip.com/world>.

176. Just as previous litigation studies could not observe the selection that led to a case arriving at the court, our data do not allow us to observe the universe of cases filed or to determine what cases settled before reaching a decision by a court. See, e.g., Lanjouw & Schankerman, *supra* note 8 (study of U.S. patent litigation unable to observe controversies and settlements prior to suit filing). Our data reflect cases receiving a decision issued by a court, whatever its nature. Whereas earlier works typically analyzed litigation in the shadow of (unobserved) infringement, our study examines court decisions in the shadow of (unobserved) patent suit filing. *Id.*

in that country. As a matter of process in several nations, formal decisions are made very quickly and are a matter of common—virtually universal—procedure. In other words, observing the universe of early court decisions can be almost equivalent to observing the universe of patent suit filings.

In France and Belgium, courts almost always issue a formal decision publicizing a settlement or suit abandonment, which we can observe in our data.¹⁷⁷ We have similarly complete information for the Netherlands since the patent court seldom closes or dismisses a suit before reaching a decision on the merits.¹⁷⁸ Because we observe that most infringement actions in the courts of these three nations start with a preliminary injunction, court decisions tend to follow the filing of the suit quickly. As a result, our data for these three countries most closely mirror a “suits filed” dataset. For the other countries represented in our dataset, the data most likely represent a “cases decided” compilation.¹⁷⁹

A. *How Much Actual Litigation Activity Does Our Dataset Capture?*

How much of actual European litigation is being captured in the Darts-IP data? It is important for statistical purposes to develop estimates of the share of actual cases included in the sample provided by Darts-IP. That task is a challenging one, due to the absence of official registers of patent judgments in most European countries. While information is sparse, we were able to rely upon several practitioners’ estimates from the several countries to assess the completeness of the data.¹⁸⁰ These sources provide estimates by country of the

177. By procedure, French and Belgian courts are among the rare jurisdictions to issue official communications (a desist order) whenever a case is abandoned. See Pierre Véron, *Les Contentieux de Brevets d’invention en France*, ÉTUDE STATISTIQUE 2000-2009, Nov. 18, 2010, at 1. Véron indicates that 17% of all patent cases filed at the Court of Paris result in such desist orders, presumably due to a settlement between the parties. In addition, as soon as a case is filed to a Tribunal de Grande Instance in France and Belgium, a judge (“Juge de mise en état”) will meet the parties’ counsels to examine the nature of the claims, the regularity and legality of the procedure, and their main arguments. *Id.* If formalities have not been met, the judge will issue an order (“ordonnance de mise en état”) requesting that arguments, conclusions, or any missing information be supplied. *Id.* Over time, the responsibilities of the “juge de mise en état” in France have been expanded, resulting in a growing number of such orders. *Id.* Because these orders appear in our data, we often observe the equivalent of a case filing in France.

178. According to a Dutch lawyer and a patent court judge we interviewed, the share of cases that settle before reaching a decision on the merits in the Netherlands is between 10% and 15%. Telephone interview with Willem Hoyng, patent attorney (Nov. 29, 2010); Telephone interview with Raoul Souillé, judge, Court of The Hague (Dec. 1, 2010).

179. In the UK, where costs are comparatively high and settlement during suit is relatively common, the difference between the population of filed cases and our “decided cases” sample may be more substantial. Little is known on settlement rates in Germany, Spain, and Italy, but to the extent that infringement actions start with a preliminary injunction in these countries, such cases will also be included in our data.

180. Estimates are derived from Council of the European Union, Working Party on Intellectual Property (Patents), *Towards an Enhanced Patent Litigation System and a Community Patent—How to Take Discussions Further*, (working document, Jul. 12, 2007), available at <http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2011622%202007%20INIT>, and Walter Holzer, *Patent Litigation in Europe: An Adventure* (unpublished

number of patent cases filed per year, which we reproduce in Table 2. To compare these, we collected from the data provider the share of decisions in each court system they have been able to obtain.¹⁸¹ We report these figures in the second row of Table 2, showing that Darts-IP estimates its coverage to be 90% complete between 2000-2009 in France and the Netherlands. In Belgium, Italy, Spain and the UK,¹⁸² they estimate 60-80% coverage, while in Germany their estimated yield rate is comparatively low, with our dataset estimated to comprise only about half the available decisions.¹⁸³

Table 2 – Availability of Cases in the Dataset, 2005 Patent Suits¹⁸⁴

	BE	DE	ES	FR	UK	IT	NL	TOTAL*
Darts-IP Dataset								
(A) Count of cases included in dataset	26	321	119	355	32	106	72	912
(B) Coverage according to data provider ¹⁸⁵	60%	50%	60%	90%	80%	70%	90%	67%
(C) Calculated judgments per year ¹⁸⁶	43	642	198	394	40	151	80	1,351
Practitioners' Estimates								
(D) Cases filed, Holzer (2005) ¹⁸⁷		700		300	85		70	1,440
(E) Cases filed, European Commission ¹⁸⁸	30	870		459	54	285	52	1,748
(F) Comparison of dataset with estimates ¹⁸⁹	143%	82%	N/A	104%	58%	53%	131%	80%

* Totals exclude Spain

presentation from *IP Protection in Europe: Reaching the Market* conference, Bangkok, Thailand, Jul. 19-20, 2005) (on file with author).

181. While Darts-IP has subject-matter expertise and proximity to courts that may lead to confidence in their accuracy, as a commercial provider they may also have incentives to inflate their estimates. We therefore remain agnostic as to their estimates.

182. In the UK, our data could be matched to the official England and Wales High Court (Patent Courts) Decisions, available at <http://www.bailii.org/ew/cases/EWHC/Patents/>. This matching suggests that our data include over 90% of all cases decided in the period 2000-2009. An estimated 40% of the cases from the diary are reported as “settled” and do not appear in our data. *Id.* But since there may exist cases that settle before being scheduled for a hearing, and thus never appear in the official records as settlements, this 40% may represent only a lower-bound estimate of patent suit settlements in the UK.

183. Interview with Evrard Van Zuylen, Partner & Eric Sergheraet, Legal Patent Manager, Darts-IP (June 23, 2011) (estimating the coverage for Germany at about fifty percent).

184. Based on data and estimates for 2005 cases.

185. Van Zuylen and Sergheraet, *supra* note 183.

186. Ratio of counts in row (A) divided by row (B).

187. Holzer, *supra* note 180. For missing values, “Total” column reflects values imputed from row (E).

188. EC Document, *supra* note 52, at 23-35. When ranges were reported, we used the midpoint.

189. Comparison is the ratio “Calculated judgments per year,” row (C), divided by the average of the different practitioners’ estimates, rows (D) and (E). For missing values in row (D), values were imputed from row (E).

The comparison in Table 2 offers a view into the completeness of our dataset, and how consistent practitioners' estimates are compared with the data provider's coverage assessments. For France, the Netherlands, and Belgium, where we expect to see a comparatively small difference between filed and judged cases, the data provider's estimates of *judgments* exceed those of practitioners for *all filed* cases by 4-43%.¹⁹⁰ In other countries, the data provider's estimates of judgments are lower than those of practitioners for all filed cases, by about 20% in Germany, 40% in the UK, and 50% in Italy.¹⁹¹ Although very rough, these figures may indicate the relative frequency of settlements in the different jurisdictions, or may be the result of under-inclusion in our data.¹⁹²

Overall, the third row of Table 2 gives a first-order estimate of patent litigation decisions in seven European countries, representing about 1,350 judgments per year. Of these, 41% were rendered in Germany, 25% in France, 12.5% in Spain, 9.5% in Italy, 5% in the Netherlands, 3% in the UK, and 2.5% in Belgium. The available evidence suggests to us that we have a useful dataset upon which to conduct analysis and draw conclusions about the state of European patent litigation.

B. *What Information Is Available on the Claims Asserted in Litigation?*

What share of patent litigation in the several countries show actions based on infringement, invalidity, and counter-claiming? Using our database, we are able to conduct a detailed analysis of the legal posture of the various cases we

190. Note however that our counts are judgments, not cases, and that our data may contain multiple judgments over a single case, so that our numbers are not directly comparable with the practitioners' estimates. However, we observe that only 30% of all litigated families in the seven countries in our dataset were involved in more than one decision within the same country. Also note that the practitioners' estimates are based on suit filing dates, whereas our figures are based on judgment dates, which arrive later. We therefore look at judgments rendered two years later, since the average decision lag is about 2 years. However, cohorts will not perfectly match since actual lags are distributed around the mean, and the measurement of a "year" also adds some randomness.

191. Note that these figures should be read with care, consistent with the caveats in note 190 *supra*.

192. Clearly, under-inclusion of records in our dataset may be due either to failure by the data provider to collect the data, or because some suits may be filed, and settled, without experiencing a formal court decision.

observe.¹⁹³ We present our findings in Table 3.¹⁹⁴

Table 3 – Actions in Suit, by Country Jurisdiction

Type of action	FR		DE		ES		NL		UK	
Infringement actions (all)	1,192	60.4%	622	56.8%	172	44.4%	169	60.8%	146	45.6%
<i>Infringement including invalidity counterclaim</i>	565	28.6%	108	9.9%	37	9.6%	35	12.6%	82	25.6%
Invalidity actions (all)	916	46.4%	485	44.3%	155	40.1%	116	41.7%	177	55.3%
<i>Stand-alone invalidity, without counterclaim</i>	351	17.8%	377	34.4%	118	30.5%	81	29.1%	95	29.7%
Other (ownership, employee inventor, etc.)	430	21.8%	97	8.9%	97	25.1%	28	10.1%	79	24.7%
Totals	1,973		1,096		387		278		320	

Among the 4,054 decisions across all countries presented in Table 3, about 47% include an invalidity claim and 57% relate to an infringement action. Furthermore, we find that about 25% are stand-alone invalidity actions, and that about 20% are infringement actions for which an invalidity counterclaim has been asserted. We also found that other issues, such as ownership and inventor rights, were raised in about 18% of suits. These shares can sum to greater than 100% since, of course, different types of claims may be raised in any single case.

Across the courts of individual countries, we find significant variation in the types of actions pursued. In France, the ratio of infringement actions to stand-alone invalidation actions is 60% to 18% (about 3 to 1),¹⁹⁵ similar to what

193. Darts-IP conducts a manual analysis of each decision, employing structured descriptors to qualify legal issues raised in the suit. It is important to raise a caveat here, however, since these determinations are based on the subjective judgment of Darts-IP, which we cannot independently verify. Nevertheless, there are grounds to have confidence in the descriptions they provided, insofar as Darts-IP's business model is to sell these results to attorneys who will demand quality and exercise quality control, thus creating incentives for Darts-IP to be accurate.

194. We calculated the share of suits in each country for which we know the actions upon which decisions were based in the courts. The shares vary between a low of 32% in Spain, 41% and 43% respectively in Germany and the Netherlands, 64% in France, and a high of 86% in the U.K. Overall, about 51% of all decisions have nature-of-suit descriptors available to us for analysis purposes.

Cases for which:	FR		DE		ES		NL		UK		Total	
Action Known	1,973	64.0%	1,096	40.8%	387	32.1%	278	42.7%	320	85.6%	4,054	50.7%
Action Unknown	1,110	36.0%	1,587	59.2%	817	67.9%	373	57.3%	54	14.4%	3,941	49.3%
Total	3,083		2,683		1,204		651		374		7,995	

195. Table 3 reports cases in France based upon all decisions. When compared to the pool of "filed" patent suits, we believe that our dataset has more coverage in some nations (e.g., France and Holland) compared to others (e.g., Germany). In order to test the hypothesis that the patterns we find are not different for "early" cases as compared to "late" cases, we examine French suits, since we can differentiate among decisions that occurred "early" in the

we observe in the Netherlands (61% to 29%), suggesting that decisions in these nations are much more likely to include infringement claims. In Spain and the U.K., the ratio of infringement actions to standalone invalidation actions is about 45% to 30% (about 1.5 to 1), suggesting that stand-alone invalidation cases are more common, but also that other types of actions comprise more of the caseload. Among the case decisions we have from German courts, we find that the ratio of infringement actions to standalone invalidation actions is about 57% to 34% (about 1.7 to 1), suggesting that infringement claims are not uncommon, but also that stand-alone invalidity actions show the highest share among all countries.¹⁹⁶ We surmise that these findings for Germany are a consequence of that country's bifurcated court system, which deals with infringement and invalidity claims independently.¹⁹⁷

C. *How Do We Match Patent Information to Our Litigation Data?*

While such aggregate statistics at the country level are informative, our more precise analysis included matching individual court decisions to patent information. This matching process enables us to go beyond a description of the types of actions involved in these suits. It allows us to analyze the characteristics of the patents being litigated in these European cases, such as the patented technology, the size of the international patent family, and the age of the patent when litigated.

In order to conduct such analysis, we matched cases to patent data using the patent numbers in dispute in the litigation, which often appear somewhere in the full transcript of the legal decisions. Darts-IP manually extracted the information on patent numbers in about 75% of the records made available to us.¹⁹⁸ We then

litigation from "late" decisions. When we exclude preliminary actions and settlements that we may not observe in other countries, the ratio of infringement to stand-alone nullity actions remains qualitatively unchanged. Compared to the ratio of invalidity to stand-alone nullity for all decisions in France (60% to 18%, reported in Table 3), we find a similar ratio among cases that reached a decision late in the procedural progress (59% to 21%). However, we also find that the share of invalidity challenges increases about 10% (from 46.4%, reported in Table 3, to 56.1%). We surmise that this increase reflects a rise in the hazard of receiving an invalidity counter claim simply because the case is "older," since the defendant has had relatively more time to prepare a defense and to raise these counter claims (and more incentive, if, as we suspect, cases that are fought longer are also more costly and thus likely to be based on a more valuable asset).

196. For Germany, the figures need to be taken with great care, as they may be strongly biased by the availability of decisions across courts, given that—except for the German Supreme Court—each court can only deal either with the validity or with all the other types of disputes. Therefore, if the decisions from the Federal Patent Court are under-sampled in our data as the case may be, then our figures will underestimate the true share of nullity challenges. In the other countries, given that all courts may deal with both types of arguments, there is no reason why decisions in our data should have been selected on one particular type of decisions.

197. *See supra* notes 78-96 and accompanying text.

198. We have no reason to believe that the unavailability of patent numbers is driven by any systemic factor other than the availability and workload of legal experts working for Darts-IP in the corresponding languages. It is, for instance, not related with the year of judgment

matched these identifiers to *PatStat*, a patent information dataset built from the EPO's Worldwide Patent Statistics Database.¹⁹⁹ After machine matching the publication numbers and, where necessary, manually cleaning the data to harmonize publication number formats, we matched in excess of 98% of the identifiers available to us.²⁰⁰

In addition to creating a patent-level analysis dataset, we also created a patent-family level sample in order to examine the international incidence of patent litigation. To do that, we had to rely on a definition of "equivalent" patents granted for the same invention in different countries.²⁰¹ By generating this

(the share of decisions taken in each country-period is consistent across decisions with or without patent numbers) or with particular courts.

199. EUROPEAN PATENT OFFICE, PATENT STATISTICAL DATABASE, EDITION 04/2008 (2008), available at <http://www.epo.org/searching/subscription/raw/product-14-24.html> (known as "PatStat").

200. The frequencies and shares of national judicial decisions for which patent numbers were both available and successfully matched are as follows:

Country	Cases	Patents reported		Match to <i>PatStat</i>	
BE	214	182	85.0%	181	99.5%
FR	3083	2461	79.8%	2429	98.7%
DE	2683	2390	89.1%	2351	98.4%
IT	517	64	12.4%	50	78.1%
NL	651	567	87.1%	562	99.1%
ES	1204	661	54.9%	638	96.5%
UK	374	273	73.0%	269	98.5%
Total	8,726	6,598	75.6%	6,480	98.2%

Patent numbers were available from the case file in at least 80% of the cases from Belgium, France, Germany, and the Netherlands. Patent numbers were less commonly reported by Darts-IP for cases in the UK (71%) and Spain (52%), and were largely absent for Italian suits (only 12% coverage). When a match could not be made, it was generally due to unreadable numbers in the primary data. To create an analysis sample, we discarded records for which we had no matched patent number, and all Italian decisions due to the very small share of matched cases. This operation produced a dataset of 6,430 decisions from six countries (Belgium, France, Germany, Spain, the Netherlands and the UK), covering 74% of all judicial decisions in the original dataset.

201. The definition of what is an "equivalent" patent is controversial, and different definitions of patent families have been proposed in the literature, each of which is based on patent priority documents. See, e.g., Stuart J. H. Graham et al., *Patent Quality Control: A Comparison of U.S. Patent Re-examinations and European Patent Oppositions*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 74, 100-04 (Wesley M. Cohen & Stephen A. Merrill eds., 2003); H  l  ne Dernis & Mosahid Khan, *Triadic Patent Families Methodology 7* (Org. for Econ. Co-operation & Dev. Sci. Tech. & Indus., Working Papers 2004/2, 2004), available at <http://www.oecd-ilibrary.org/content/workingpaper/443844125004>; Graham & Harhoff, *supra* note 40, at 8. The methods differ in the character of the priority documents that patents must share to be considered equivalents. According to the most inclusive definition, two publications are equivalents as soon as they have one priority number in common, but we prefer a more conservative (restrictive) definition in which two patents are considered equivalents (hence part of the same family) if and only if they share the exact same set of priority documents. See Graham & Harhoff, *supra* note 40, at 8.

alternate sample we minimize possible “double counting,” but, more importantly, are able to gain a better perspective on the dynamics of cross-border suits.²⁰² We are thereby able to see how international portfolios of patents are used to protect a single invention as it is litigated across Europe.

Table 4 – Patent Families per Decision, by Country²⁰³

Country	Mean	Test	Minimum	Maximum	Share
DE	1.13		1	17	8.6%
UK	1.23	**	1	6	16.3%
BE	1.27		1	6	18.5%
NL	1.29		1	10	17.9%
FR	1.43	**	1	47	22.3%
ES	1.61	**	1	10	38.4%
Total	1.33		1	47	18.3%

How many patent families are involved in each unique case? Table 4 reports the number of patent families per judicial case in each of the six countries we analyzed. We find that the average number of patent families involved in each case is around 1.3 overall, with over 80% of the cases involving only one family. This confirms that a large majority of patent litigation cases involve only one family, and is consistent with the notion that the unit being disputed in most European litigation is a patent, and possibly a single invention. These averages nevertheless hide substantial variation across countries, since the average number of families per decision ranges from 1.13 (Germany) to 1.61 (Spain), and the share of multi-family decisions vary between 8.5% in Germany and 38.5% in Spain.

We can also ask this question in the obverse: how many decisions is each patent family triggering? Table 5 summarizes our findings on the number of decisions per patent family in each country. Overall, 6,757 patent families were subject to a court decision in 7,882 cases, with an average of 1.52 decisions per litigated patent family and a maximum of 37 cases for a single family (observed in France). In most other countries, the maximum number of decisions for a single family is about 13 (but even smaller, 6, in the UK).

We also find that a patent family being involved in multiple cases is not rare. In fact, 31.5% of all patent families involved in litigation across Europe were involved in more than one suit in a country. Interestingly, this share is fairly consistent across countries (ranging between 30% in Germany and the UK and

202. We use patent family information derived from Dietmar Harhoff, *Patent Citation Project—PatStat Equivalent Dataset, 04/2008 Edition*, INNO-TEC, http://www.inno-tec.bwl.uni-muenchen.de/forschung/forschungsprojekte/patent_cit_project/index.html (last visited on Feb. 18, 2009)

203. Ranked by “Mean,” with differences in rank reported in “Test,” * significant at 1% on *t*-test. “Share” is the share of all cases in a country in which more than one family of patents was litigated.

37% in France) except for Spanish cases, where the share is significantly smaller (18.6%), possibly due to the lower availability of first-instance (trial) cases in our data for this country.²⁰⁴

Table 5 – Decisions per Patent Family, by Country²⁰⁵

Country	Cases	Families	Decisions per family				Shares	
			Mean	Test	Minimum	Maximum	All cases	Trial only
ES	696	851	1.34		1	15	18.6%	15.8%
UK	335	289	1.44	*	1	6	29.8%	10.4%
DE	2,549	2,002	1.51	+	1	15	30.0%	18.2%
NL	1,055	872	1.60	*	1	13	32.0%	27.9%
BE	198	157	1.68		1	12	33.8%	20.3%
FR	3,049	2,586	1.77		1	37	36.9%	26.9%
Total	7,882	6,757	1.52		1	24	31.5%	22.4%

It is noteworthy that these shares also include patents with multiple independent judgments (e.g., a single family litigated in different independent cases), as well as patents with multi-level single actions (e.g., a single action brought from trial to appeal, then to judicial review, and perhaps back to trial or appeal). Accordingly, we calculated and report, in the last column of Table 5, the share of litigated patents associated with multiple decisions in the first instance (trial only); this statistic ought to be a better approximation of the share multi-dispute patents. This share varies between a low of 10% (in the U.K.) to a high of 27.5% (in France and the Netherlands), with Spain (16%), Germany (18%) and Belgium (20%) in between.

Table 6 provides statistics on the highest court level reached by each patent family involved in a decision in our final dataset.

Table 6 – Highest Level of Decision Reached in Litigated Patent Families, by Country²⁰⁶

Country	First Instance (Trial)	Intermediate Appeal	Final Appeal
BE	100	54	3
FR	1,517	931	138
DE	1,143	405	451
NL	793	60	17
UK	172	109	8
Total	3,725	1,559	617

204. These statistics are likely low (lower-bound approximations) given that the data are not complete in all countries, and because we face observation censoring in the later years—i.e., we cannot observe cases in more recent years that have not generated a decision yet.

205. Ranked by “Mean,” with differences in rank reported in “Test,” significant at +10% and *5% on *t*-test. “Share” is the share of all families patented in a country in a decision was reported, reported as “All cases” (which include appeals and first-instance cases) and “Trial only” (including only first-instance cases).

206. Cases are reported only if court level data was available. Court levels are not available for cases in Spain.

It shows that overall 63% of litigated patent families do not show a decision beyond the first instance (trial), 26% end during appeal, and 10.5% are reviewed by the country's highest jurisdiction. However, the Netherlands is an outlier with 91% of patent families showing no decision in a court beyond the first instance (trial). Shares of families for which we show decisions beyond the first instance in other countries range between a high of 43% in Germany and a low of 36% in Belgium. These differences may stem from institutional differences, or from different expectations with respect to probabilities of a judgment being overturned on appeal. These figures may be biased by right truncation, however, given that a number of actions may still be pending and hence not observed in our data, particularly in the later years.

IV. PATTERNS AND TRENDS IN PATENT LITIGATION IN EUROPE

We set out to examine cross-country litigation rates and trends in those rates over time.²⁰⁷ Wanting to account for differences in the scale of the respective economies, we compute different litigation rates for different countries in different years. Following lessons from prior research, we compare the number of patent applications to two different statistics from the same country and year: (i) the number of patents litigated and (ii) the number of patent suits.²⁰⁸ As a first simple statistic, we specify the *litigation rate patenting* (LRP) as the ratio of patent families litigated in a country in a given year divided by patent families applied-for in the national patent office during that same year.²⁰⁹

However, that rate is not very informative since patents applied-for in any given year have virtually no chance of being litigated in that same year—in fact, there is generally a substantial time lag between patent application and grant, as well as ultimate litigation. To correct for this problem, we specify the *litigation rate aged* (LRA).²¹⁰ This ratio is an approximation of a country's enforcement

207. Unless otherwise specified, all following tables and figures are based on patent litigation cases decided in the six focal countries (Belgium, France, Germany, Spain, the Netherlands, and the U.K.) over the period 2000-2010.

208. See Lanjouw & Schankerman, *Characteristics*, *supra* note 8, at 134-36 (defining litigation rate as suits filed per number of patents filed in a given period of time).

209. The variable "LRP" is the share of patents from a given country applied-for in a given year that has reached a judgment in the focal country. This rate is expressed per 1,000 eligible patents.

210. For analysis, we calculate the number of decisions in each country and year relative to the number of patents of the same average age in that country. Our variable "LRA" is the number of decisions in the focal country and year relative to the number of patents of the same average age in the same country, taking account of the average age of patents at the time of judgment, expressed as the rate per 1,000 eligible patents. In order to express LRA for each country, we were required to calculate the average age of patents at the time of judgment in the several countries. We present our results of that exercise here:

intensity, for which we would ideally compare the number of patent disputes in a given country with the population of patents actually enforceable during that year in that country. Unfortunately, assessing the universe of enforceable patents requires patent-level data on renewal events and maintenance-fee payment lapses that are not available to us. We therefore approximate the population of enforceable patents in a given country and year by examining the number of patents filed in the same year as the typical disputed patent in that country.

We specify a third, alternative measure, the *litigation rate GDP* (LRG), that accounts for the amount of patent litigation compared to the overall economic activity in a country, as measured by gross domestic product (GDP).²¹¹ We calculated the number of patent cases decided in a particular country and year relative to GDP expressed in \$100 millions of U.S. dollars.²¹² Since the supply of possible cases and the demand for court action is an important determinant of litigation, we use this measure which tends to capture the litigation intensity relative to the size of the domestic market.

Table 7 reports these three litigation rates in each country, after adjusting for missing cases. In terms of litigation incidence within a group of country patents from a given year (LRP) and in cases per same-age patents (LRA), the Netherlands shows the highest litigation rates with about 15 patent cases per 1000 patent families (applied-for in the same year), and 29 decisions per 1000 patent families (of the same age at litigation). It is interesting to note, however, that the Netherlands ranks much lower in terms of decisions per GDP unit (1.9 decisions per \$100 million GDP), suggesting that accounting for the size of a

Country	Decisions**	Age from filing*		Age from grant*	
		Mean age	S.D.	Mean age	S.D.
Belgium	240	12.09	6.06	8.09	6.49
France	3,675	13.65	7.41	9.59	6.35
Germany	2,785	13.12	5.73	8.40	5.06
Spain	1,060	12.30	6.54	10.43	6.36
Netherlands	717	11.97	6.88	7.09	5.43
United Kingdom	323	12.59	6.07	7.97	5.44
Total	8,800	13.11	6.72	9.02	5.95

Notations: *Measured to case closing; **Decisions that include a date.

These figures are in themselves interesting, since despite substantial variation in legal settings and workloads across courts and countries, the delay we calculate is remarkably stable across the six nations studied. This delay ranges between a minimum of 12.0 years in Belgium to a maximum of 13.7 years in France, with an average across all decisions in all countries of 13.2 years. This finding suggests that patent disputes themselves may have a stable “life cycle,” and tend to happen at relatively consistent intervals regardless of the legal environment.

211. We use the OECD’s GDP figures at constant prices and constant exchange rates. See Org. for Econ. Co-operation & Dev., *National Accounts at a Glance*, OECD.STATEXTRACTS (downloaded August 13, 2010), <http://stats.oecd.org/Index.aspx?DataSetCode=NAAG>.

212. The variable “LRG” is the number of patent cases decided in the focal country and year relative to the country GDP expressed in \$100 millions of U.S. dollars.

nation's economy can matter substantially in interpreting patent litigation rates among countries.

Table 7 – Litigation Rate per 1,000 Granted Patents, by Country²¹³

Country	Simple rate (LRP)	Aged rate (LRA)	Sized rate (LRG)
BE	10.2	34.7	1.5
DE	3.2	7.7	3.7
ES	3.9	9.6	3.1
FR	9.2	23.2	2.7
FR (final only)	7.2	15.1	1.7
NL	15.3	28.7	1.9
UK	0.8	2.1	0.4
USA		25.2	2.2

Our calculations yield other important differences. We find that litigation rates are relatively high in France, with about 9 families being involved in a decided case and 23 decisions per 1000 same-age family patents. Germany exhibits relatively low rates when we restrict our view to application-year and suit-age patent families (3.2 and 7.6 per 1000, respectively), but ranks highest among all countries with respect to decisions per \$100 million GDP (3.7). This latter finding suggests that—in terms of its economy—Germany has a higher patenting intensity compared to the other countries in Europe. Interestingly, the U.K. shows the lowest patent litigation rates among the European countries regardless of how we measure litigation intensity, with less than 0.5 decisions per GDP unit, and the lowest ratios when examining current-year and same-aged families (0.75 and 2.1 per 1000, respectively).

All of these estimates must be read in context, however. Recall that in several

213. Figures were computed from litigation data supplied by the Federal Judicial Center for the years 2000-2005. See Fed. Judicial Ctr., *Federal Court Cases: Integrated Database Series*, ICPSR, <http://www.icpsr.umich.edu/icpsrweb/ICPSR/series/00072> (last visited May 11, 2014). While adjustment is appropriate given the likely incompleteness of our data, it is also useful to report calculations based on actual data, as well as indicators about missing data, and other relevant characteristics:

Country	Based on actual data			Missing Cases	Filings / GDP	% EPO grants
	LRP	LRA	LRG			
Belgium	6.12	20.80	0.9	40%	4.15	29%
Germany	1.28	3.06	1.5	60%	42.39	42%
Spain	2.34	5.78	1.8	40%	28.90	59%
France	8.30	20.88	2.4	10%	10.45	33%
France (final only)	6.51	13.56	1.6	10%	10.45	33%
Netherlands	13.77	25.81	1.7	10%	5.97	33%
United Kingdom	0.56	1.57	0.3	25%	15.54	16%

countries (France, Belgium, and the Netherlands), our data are more likely to show a decision compared to the pool of actual litigation events, which seemingly would inflate the above rates compared to other nations (Germany, for instance). To better compare our measured rates with the existing literature, we derived litigation data from the United States Federal Judicial Center, focusing on filed cases from 1980-2008.²¹⁴ We find that the patent litigation intensity (LRA) in the U.S. (25 disputes per 1000 patents) is comparable in magnitude with Belgium, the Netherlands, and France. It is interesting to note, however, that on the LRG measure, the U.S. ranks fourth (between the Netherlands and France) in GDP terms (with 2.2 disputes per \$100 million GDP), well below Germany and Spain. Given that we surmise that our court decision data for these countries may be under-representative of all patent suits, this finding suggests that patent suits as a share of economic activity in these nations may actually be significantly higher than in the U.S., a jurisdiction criticized as being “highly litigious” with respect to patent rights.²¹⁵

A. *How Many Disputes Trigger International (Cross-Border) Litigation?*

What is the incidence of multi-country patent litigation in the European jurisdictions? This important policy question has largely defied empirical examination, although economist Dietmar Harhoff offers an estimate of the number of duplicated cases in the year 2008 at between 146 (lower bound) and 311 (upper bound).²¹⁶ Our data enable us to give an upper-bound estimate by identifying patent families that are subject to litigation in multiple countries.

*Table 8 – Patent Families Litigated in Single and Multiple Countries, by Country*²¹⁷

	BE	DE	ES	FR	GB	NL	Totals
# Cases filed only in single jurisdiction	108	1,807	811	2,410	192	735	
Share of cases only in single jurisdiction	69%	90%	95%	93%	66%	84%	95.3%
# Cases filed in multiple jurisdictions	49	195	40	176	97	137	
Share of cases in multiple jurisdictions	31%	10%	5%	7%	34%	16%	4.7%

Table 8 reports the number and share of single- and multi-country litigated patents among the families we have identified being involved in a suit.²¹⁸ We find that the vast majority of patent families litigated anywhere are litigated *only*

214. Fed. Judicial Ctr., *supra* note 207.

215. *See generally*, BESSEN & MEURER, *supra* note 8.

216. Harhoff, *supra* note 14, at 5.

217. A suit which populates the “multiple jurisdictions” cell for any country will also populate that cell for (at least) one other country.

218. Country case totals are omitted from Table 8 since figures do not sum cleanly. Cases counted for any one country may be counted (again) in another country’s figure (thereby adding multi-counts in the total sum).

in one country's courts: less than 5% of litigated patents are subject to a decision in the courts of more than one country. While not reported in the table, we find that 3.6% have cases in 2 countries, 0.8% in 3 countries, 0.3% in four countries, and 0.3% in five countries. The table shows substantial variation across countries, with less than 10% of all litigated patents in Germany, France, and Spain reaching final judgment in other countries, but upwards of one-third of all patents litigated in Belgium and the U.K. reaching a judgment in some other country. Accordingly, while U.K. patent cases represent only 5% of all disputes in our dataset, they account for 32% of all multinational disputes. We therefore find that while patent disputes in France, Spain, and Germany are more likely to be purely national, that is less true of Belgium and the U.K. It is still worth noting, however, that German courts hear two-thirds of the cases involving patents disputed in multiple countries.

*Table 9 – Number of Patent Families Litigated in Pairs of Countries*²¹⁹

Country	BE	DE	ES	FR	GB	NL
BE	108	20	8	21	9	32
DE	20	1,807	16	123	49	58
ES	8	16	811	16	9	18
FR	21	123	16	2,410	31	53
UK	9	49	9	31	192	55
NL	32	58	18	53	55	735
Total	198	2,073	878	2,654	345	951

To shed more light on the combinations of countries receiving cross-border disputes, Table 9 summarizes the number of families litigated in pairs of countries. The most common pairing occurs between France and Germany. This national pairing accounts 41% of the patents involved in multi-country disputes, largely because each of these countries, independently, hears a large share of cases in Europe. For other countries (Belgium, Spain, and the U.K.), the most frequent nation hearing cross-border cases is the Netherlands. This finding is consistent with the international outreach of Dutch decisions and the practitioners' statements about the attractiveness of Dutch courts for patent holders willing to enforce their rights across Europe.²²⁰ Combined with the abnormally high patent litigation intensities we observed in the Netherlands,²²¹ this result suggests that cross-border cases may be disproportionately imported into the Netherlands from abroad, and may indicate a higher likelihood of international forum-shopping focused on Dutch courts.

219. Families litigated in three or more countries double-counted in all pairwise combinations of countries in which they were litigated.

220. See *supra* notes 121-126 and accompanying text.

221. See *supra* table 6; *supra* note 213 and accompanying text.

B. *What Can We Learn About the Outcomes of European Patent Suits?*

For some set of litigation outcomes in our sample, we can determine whether the court found infringement and/or upheld that patent's validity. Darts-IP characterizes each decision according to what issues were raised in court, and our data include dummy variables indicating whether the decisions of the courts were positive or negative on that particular allegation. In case of infringement-related demands, a positive outcome indicates that infringement was found. For validity-related allegations, a positive outcome indicates that the validity of the patent at issue was confirmed by the court. In some cases, though, the decision of the court may be more balanced than that and it could hold the patent valid only partially (i.e., invalidate some of its claims but not all). The exact scope of invalidation is unfortunately unobservable to us.

While they can be summarized and analyzed, these outcomes are defined at the level of the individual allegation. When we aggregate to the level of the patent, it is therefore possible, if not likely, that each decision will be associated with both positive and negative outcomes. For instance, in an invalidity action, validity objections may be raised by the defendant on several different issues, such as over the patent's novelty, its inventive step, its subject matter, or its industrial applicability. Ideally, the court will render a judgment on each of these allegations, and these judgments may vary. For instance, a patent may be found non-obvious and industrially applicable (the associated outcome variables will then be positive), but lacking inventive step and falling outside of a patentable subject matter (with negative outcome variables). On the whole, the patent's validity may be upheld on some issues, and invalidated on others. Similarly, in infringement actions, multiple acts of alleged infringement may be alleged by the patent holder during the proceedings, and a court may find that some of these acts infringed the patent while others were not infringing. In all such cases, when aggregating the outcome at the decision or patent level, we are left with a mixed decision—we refer to such decisions as “ambiguous” ones in our analysis hereafter.²²²

222. This is a conservative approach which is motivated by the fact that in such cases our data do not allow us to assess whether each point associated with a certain outcome was a major or a side one (e.g., whether the court invalidated just a few dependent claims, or whether it invalidated the whole patent). More explicitly, we do not feel we have sufficient knowledge to conclude in a systematic way that a positive outcome should be considered as a dominant or absorptive state. As a result, cases that led to mixed outcomes will be qualified as ambiguous throughout this Part and the reported positive and negative outcomes should be read as lower-bound estimates.

Table 10 – Outcomes of Infringement and Invalidity Actions, by Jurisdiction²²³

Country	Infringement							Validity						
	Infringed		Not Infringed		Ambiguous	Total		Valid		Invalid		Ambiguous	Total	
FR	338	41.8%	401	49.6%	70	8.7%	809	575	55.7%	241	23.4%	216	20.9%	1,032
DE	272	52.3%	227	43.7%	21	4.0%	520	216	42.7%	187	37.0%	103	20.4%	506
ES	33	41.3%	46	57.5%	1	1.3%	80	69	48.3%	69	48.3%	5	3.5%	143
NL	27	31.0%	59	67.8%	1	1.1%	87	27	38.0%	36	50.7%	8	11.3%	71
UK	57	44.9%	55	43.3%	15	11.8%	127	72	35.3%	67	32.8%	65	31.9%	204
Total	727	44.8%	788	48.6%	108	6.7%	1,623	959	49.0%	600	30.7%	397	20.3%	1,956

We report in Table 10, by jurisdiction, statistics on our analysis of outcomes, using valid descriptors that can be qualified as conclusive decisions on infringement (i.e., in which at least one infringement-related claim has been raised) and on validity (i.e., in which at least one validity argument has been discussed). Ambiguous cases are relatively uncommon (less than 7% overall, with a low 1% in Spain and the Netherlands and a high 12% in the U.K.).

Table 11 – Detailed Outcome of Invalidity Actions, by Jurisdiction

		FR	DE	ES	NL	GB	Total						
Inventive Step	Yes	509	62%	197	46%	35	54%	16	36%	62	39%	819	54%
	No	268	33%	197	46%	28	43%	28	64%	77	49%	598	40%
	Ambiguous	41	5%	34	8%	2	3%	0	0%	19	12%	96	6%
	Total	818	79%	428	85%	65	45%	44	62%	158	77%	1,513	77%
Novelty	Novel	484	79%	169	69%	58	51%	12	52%	57	57%	780	71%
	Not novel	107	18%	53	22%	54	48%	10	43%	32	32%	256	23%
	Ambiguous	19	3%	23	9%	1	1%	1	4%	11	11%	55	5%
	Total	610	59%	245	48%	113	79%	23	32%	100	49%	1,091	56%
Disclosure	Sufficient	196	81%	41	87%	1	25%	6	75%	30	60%	274	78%
	Insufficient	44	18%	5	11%	3	75%	1	13%	15	30%	68	19%
	Ambiguous	2	1%	1	2%	0	0%	1	13%	5	10%	9	3%
	Total	242	23%	47	9%	4	3%	8	11%	50	25%	351	18%
Claim Drafting	Satisfying	30	38%	13	26%	1	25%	8	67%	39	75%	91	46%
	Not satisfying	8	10%	4	8%	2	50%	3	25%	3	6%	20	10%
	Ambiguous	40	51%	33	66%	1	25%	1	8%	10	19%	85	43%
	Total	78	8%	50	10%	4	3%	12	17%	52	25%	196	10%
Subject Matter	Patentable	39	64%	6	38%	1	100%	0	0%	8	24%	54	48%
	Not patentable	21	34%	6	38%	0	0%	1	100%	25	74%	53	47%
	Ambiguous	1	2%	4	25%	0	0%	0	0%	1	3%	6	5%
	Total	61	6%	16	3%	1	1%	1	1%	34	17%	113	6%
Total decisions on invalidity		1,032		506		143		71		204		1,956	

223. Decisions involving both infringement and invalidity claims appear in both columns.

Among infringement actions in all nations, outcomes were fairly evenly split, with 45% of decisions finding infringement of the plaintiff's patent rights, and 49% finding no infringement. These shares nonetheless vary across countries: the most even outcomes are observed in the U.K. (45% infringing versus 43% non-infringing) and the most uneven in the Netherlands (31% infringing versus 68% non-infringing). Only German courts find significantly more in favor of the patentees (52%) than in favor of the defendants (44%).

On validity issues, courts across these nations upheld patents entirely (i.e., rejected all invalidity arguments) in 50% of the cases in our sample. This figure ranges between 35% and 38% in the U.K. and the Netherlands, respectively, to 42% in Germany and 56% in France. On this evidence, it might be tempting to conclude that the most favorable courts to patent holders with respect to invalidity are in France, although these simple statistics do not account for the underlying characteristics of the patents involved, or the character of the process that leads to a court judgment. This same caveat is appropriate to recognizing that the Netherlands appears to offer the least favorable courts, with statistics suggesting a low likelihood of an infringement finding, while also invalidating patents at the highest rates. Our simple statistics show that Dutch courts endorse all the defendant's invalidity arguments in 50% of the cases, and affirm at least one invalidity argument in 61% of cases. In German cases in our sample, we find that the court accepted all invalidity arguments in 37% of the cases and in part in another 20%. Finally, in the U.K., patents are entirely upheld in 35% of the cases, declared invalid on all counts in 33%, and invalid in some respects in another 32%.

We further refine our analysis by examining the nature of the claims raised in the proceedings in Table 11. We categorize the five most frequently raised allegations in invalidation challenges and as counterclaims in infringement actions. By far the two most frequent claims are related to the inventive step (raised in about 75% of cases) and the novelty of the patented invention (raised in about 55% of the cases). The quality and extent of the disclosure of the invention is challenged in about a fifth of the cases, whereas the validity of the claims and the subject matter patentability is questioned in only 6-10% of the decisions in our database. These simple statistics suggest that the success rates of such claims first depend on the type of arguments raised. For instance, courts across these six jurisdictions find that patents reaching final judgment in litigation are valid in terms of the inventive step in roughly 50% of the cases. Whereas novelty is upheld in over 70%, the disclosure is found sufficient in nearly 80% (although it is likely that the raising of these arguments is endogenous to the quality of the underlying case). These outcomes vary substantially across jurisdictions, with the upholding of inventive step ranging between a 36% in the Netherlands and 62% in France. Defendants' novelty arguments were rejected by the courts in about 50% of the cases in Spain and the Netherlands but in 80% in France. These figures once again may suggest that some jurisdictions (e.g., the Netherlands) are less favorable to patent holders than others, which could in turn be triggering forum-shopping in Europe.

Table 12 – Litigation Rates (per 1,000 Patents), by Technology and Country²²⁴

CLASS	BE	DE	ES	FR	FR*	GR	NL	EU6
ELEC	4.6	0.7	1.3	4.5	2.8	0.5	3.0	1.4
INST	6.3	0.8	0.8	5.0	3.7	0.5	4.9	1.6
CHEM	3.7	0.5	0.7	4.5	3.2	0.6	4.6	1.4
PHAR	8.1	1.0	1.1	9.0	6.3	2.0	15.7	3.0
IND.P	2.7	1.1	2.3	6.1	4.9	0.5	6.7	2.4
MECH	1.6	0.8	0.8	3.3	2.5	0.3	3.9	1.4
CONS	2.9	1.3	2.9	5.9	4.6	0.4	5.7	2.4

C. Do Judgments Differ Across Suits for Different Patented Technologies?

We turn next to examining the technology-specific characteristics of patent litigation across Europe. In order to investigate the intensity of patent disputes in different fields, we rely on the OST classification for patents, that includes seven broad technology categories: electrical engineering and electronics (ELEC); instruments (INST); chemicals and materials (CHEM); pharmaceuticals and biotechnology (PHAR); industrial processes (IND.P); machines and transportation (MECH); and consumer goods and civil engineering (CONS).²²⁵ Table 12 reports the litigation rate (per 1,000 patents) for each aggregate technology class in each of the six European countries we study.²²⁶ Consistent with findings for suits filed in the United States,²²⁷ overall litigation intensity is highest in the “pharmaceuticals and biotechnology” sector (3 patent cases per 1,000 patents filed in the aggregate EU6).²²⁸ It is notable that we see a

224. Based on patents filed during 1980-2004. “FR” includes all cases in France, while “FR*” includes only cases that reached a final judgment in the French courts. Double counts are possible in the cells due to patents being assigned by patent offices to multiple IPC classes that straddle OST technology classifications.

225. OBSERVATOIRE DES SCIENCES ET TECHNIQUES, INDICATEURS DE SCIENCE ET DE TECHNOLOGIES: EDITION 2010, at 507, http://www.obs-ost.fr/sites/default/files/R10_Complet_1.pdf (downloaded on September 10, 2010).

226. This litigation rate is consistent with the LRA defined above at note 210 and accompanying text. To help interpret these rates, we report here the class-share of patent filings (P%) in 1980-2004 (note that 90% of the patents litigated in our sample were filed during these years) and the share of cases we observe (L%):

Technology (OST)	BE		DE		ES		FR		FR*		GR		NL		EU6	
	P%	L%	P%	L%	P%	L%	P%	L%	P%	L%	P%	L%	P%	L%	P%	L%
ELEC	9.5	11.8	17.7	14.1	9.7	8.7	16.6	15.0	16.6	12.6	19.4	17.2	15.0	7.9	17.3	13.2
INST	10.3	17.4	14.8	14.1	11.2	6.0	14.1	14.0	14.1	14.1	15.5	13.9	12.1	10.5	14.5	12.8
CHEM	17.5	17.4	11.9	7.0	17.4	7.8	9.7	8.7	9.7	8.5	11.4	12.9	13.0	10.6	11.1	8.5
PHAR	8.0	17.4	4.5	5.3	10.2	7.8	4.9	8.8	4.9	8.4	5.7	20.5	6.2	17.2	4.6	7.7
IND.P	21.0	15.2	17.1	21.1	19.6	30.6	16.5	20.2	16.5	21.8	15.2	13.6	22.9	27.3	17.1	22.4
MECH	16.6	7.3	21.3	19.9	16.7	9.4	23.2	15.5	23.2	16.0	18.3	11.3	15.7	11.0	20.6	16.0
CONS	17.0	13.5	12.8	18.7	15.2	29.7	15.0	17.7	15.0	18.6	14.5	10.6	15.1	15.4	14.7	19.4

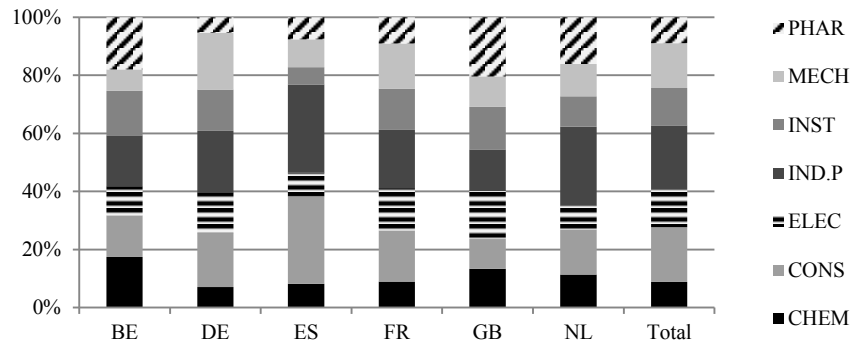
“FR” includes all cases in France, while “FR*” includes only cases reaching a final judgment in France.

227. Lanjouw & Schankerman, *Characteristics*, *supra* note 8, at 135-36.

228. Filing in this sense counts both granted patents that were filed in the focal country,

comparatively high rate in the “industrial processes” and “consumer goods & civil engineering” classes (2.4 litigated patents per 1,000 patents filed), a finding that is quite different from the results in studies of U.S. litigation.²²⁹ In other technology classes, the litigation rates vary between 1.4 (“electricity and electronics,” “chemistry and materials,” “machines and transport”) and 1.6 (“instruments”).

Figure 2 – Litigated Patent Families, by Technology and Country



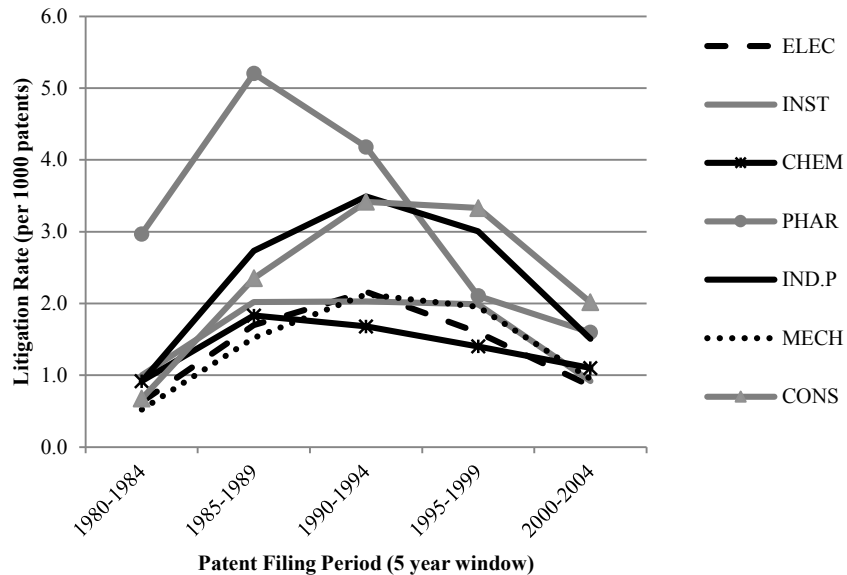
These averages across the EU6 in aggregate mask considerable variation across countries, represented in the varying bar charts in Figure 2. For example, “industrial processes” and “consumer goods and civil engineering” represent a substantial share of patent cases in Spain (about 30% each, from Figure 2), and represent classes in which these rates are highest (2.3 and 2.9 litigated patents per 1000 applications respectively, from Table 12). “Industrial process” disputes also represent the largest share of cases in the Netherlands, France, and Germany (27%, 20%, and 20%, respectively, from Figure 2). Overall, “pharmaceuticals and biotechnology” patents are more likely to have a decision lodged than other patents in five of the seven countries (but interestingly not in Germany and Spain). When we look at classes outside of “pharmaceuticals and biotechnology,” the rankings tend to differ by country, which may be driven by either country-specific factors or characteristics of industrial organization. We note that “industrial processes” patents are the subject of one quarter of court actions across all countries, and show decision rates ranked second or third highest in five countries. “Machines and transport” and “chemicals and materials” are consistently less likely than other inventions to result in a suit, across all countries.²³⁰

and also validated from an EPO grant. In this case, when summing across nations, because we are dealing with patent families we do not double-count patents that may be validated from the EPO in more than one nation.

229. See Lanjouw & Schankerman, *Characteristics*, *supra* note 8, at 135-36.

230. Since we suspect that our dataset has more coverage in some nations than others, we also compared the technology distribution in litigation for “late” or “more complete” French cases, following the procedure we explained above *supra* in note 189. By excluding preliminary actions and settlements that we may not observe in other countries, we analyzed a subsample of cases for France that is more comparable with the later progress of cases

Figure 3 – Litigation Rate by Technology, 1980-2004



In an attempt to gauge the historical specialization of the three countries chosen to hear patent cases in the new Unitary Patent system,²³¹ we examine the share of cases in Germany, France, and the U.K. The United Kingdom, chosen to be the specialist court for patents in chemical and pharmaceutical technologies, has historically handled a larger share of those cases than either of the other two nations (34% in the U.K. compared to 12% in Germany and 18% in French courts). Similarly, Germany—chosen to specialize on patents in the mechanical sector—shows a higher propensity to hear those cases historically (20% of cases compared to 11% in the U.K. and 16% in French courts). French courts, although chosen to specialize in electronics patents, show no particular historical comparative proclivity toward these cases (15% compared to 17% in the U.K. and 14% in German courts).

We examine the variation in relative court decision rates across technological fields over time, and graph our findings in Figure 3. While in every technological area the rates follow an inverted U-shape evolution over time, this pattern is an artifact of right censoring. As we showed earlier, the average age of patents at the time of judgment is consistently around 13 years in all countries, suggesting that many cases for patents issued in the 2000s have not yet arrived in the data.

More interesting in Figure 3 is the evolution in relative decision rates across technological fields, i.e., the evolution in the ranking of technological fields with the highest rates, about which we make two observations. First, with the

available in other nations. Our results showed a strong consistency between the statistics in the two French litigation samples, thus giving us some confidence in our overall findings.

231. See *supra* notes 43-50 and accompanying text.

exception of “pharmaceuticals and biotechnology” patents, all OST fields follow a reasonably parallel evolution in decision per patent intensities (although the rate for “chemicals and materials” patents starts declining earlier than the other five classes). Second, three distinct patterns emerge. A group with low decision rates is formed by the “chemicals and materials,” “instruments,” “electricity and electronics,” and “machines and transport” classes. A second group follows a parallel evolution but with substantially higher rates in the middle filing periods (1985-1999): the “consumer goods and civil engineering” and “industrial processes” classes. Finally, “pharmaceuticals and biotechnology” patents are clearly an outlier, showing by far the highest decision rates in the first three patent cohorts (1980 to 1994), but falling to average rates in the two youngest patent cohorts. This evolution, when compared to the other fields, may suggest that the timing of litigation in this area is systematically different than in others, i.e., patents may tend to be litigated later in this field than in others. This finding is consistent with the lags in the innovation process observed generally in this technology space (e.g., lengthy product development, clinical testing, and regulatory delays).²³²

232. See, e.g., Matthew J. Higgins & Stuart J.H. Graham, *Balancing Innovation and Access: Patent Challenges Tip the Scales*, 326 SCIENCE 370 (2009) (describing delays in U.S. clinical drug trials). In order to test the “pharmaceutical delay” hypothesis, we computed the average age of patents, from date of first application to date of judgment in each OST class. The results are reported by country, in years:

Technology	BE	DE	ES	FR	GB	NL	EU6
ELEC	11.2	14.1	15.9	14.6	12.5	13.6	14.3
INST	10.5	14.4	18.0	16.2	14.0	13.9	15.2
CHEM	14.1	16.2	20.0	18.1	14.6	15.3	17.0
PHAR	14.0	17.0	20.8	18.3	14.9	15.4	17.4
IND.P	11.2	13.4	12.5	15.0	13.0	11.4	13.6
MECH	9.8	13.3	15.7	14.7	13.1	12.4	14.0
CONS	10.7	12.6	11.4	14.3	11.9	11.6	13.0
Average	11.7	14.4	16.3	15.9	13.4	13.4	14.9

Age is measured from the earliest priority date in the patent family (beginning) to suit closing (ending). These observed patterns are robust to the use of patent grant date instead of priority date. They reveal that the age of patents in our suit data varies significantly across technological fields, much more so than across countries. In most countries, “consumer goods and civil engineering” patents are on average involved in a suit relatively early after filing, followed by patents from the “electrical and electronics,” “industrial processes” and “machines and transport” classes, which are typically one to two years younger at the time of decision than the average patent in our data. But two sectors systematically show older patents on average in our case data: the “pharmaceuticals and biotechnology” and “chemicals” technologies, in which patents reach a decision between 1 and 4.5 years later on average than other litigated patents in all countries. Accordingly, the average age difference is approximately 4 years in most countries (but 3 years in the U.K. and about 9 years in Spain). This added delay among patents litigated in the “pharmaceutical and biotechnology” space suggests a solution to the patterns we observed in Figure 3, adding evidence to the notion that patents in the pharmaceutical and chemical technologies tend to be litigated later than in other sectors.

D. *Do the Types of Claims Litigants Raise in Patent Suits Vary as Technology Changes?*

Figure 4 shows the share of actions by type across focal patents assigned to the seven primary technology (OST) classes. Overall, about 58% of the cases correspond to infringement actions, less than half of which (22% of the decisions in total) involve invalidity counterclaims by defendants (noted as “Invalidity & Infringement” in Figure 4). Standalone invalidity actions account for about a quarter of the cases in our data (26%), and the remaining 16% are a mix of other types of actions, generally related to ownership and inventor issues.

These shares are fairly stable across OST classes. In particular, the shares of pure infringement and standalone invalidity actions are quite stable, with the difference between maximum and minimum not exceeding 8% in either type. Hybrid actions (involving infringement and invalidity claims) vary more widely across technological areas: in the consumer goods area, hybrid actions represent a 27% share of the cases, while in the chemicals and pharmaceuticals areas the share is about 15%. In these two technology classes, “Other issues” comprise a quarter of the cases, which may reflect that the “Other” category includes issues relating to supplementary protection certificates peculiar to the pharmaceuticals industry.

Figure 4 – *Nature of Suit in Patent Litigation, by Technology*

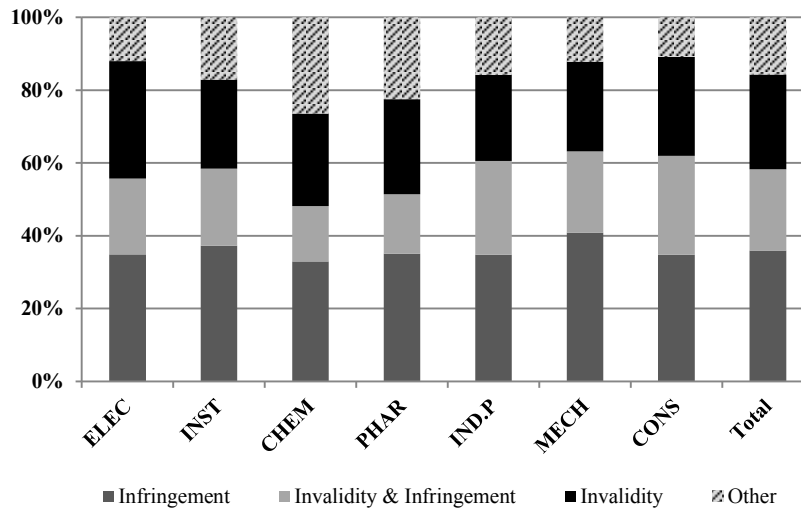


Figure 5 – *Nature of Suit in Patent Litigation, by Patent Class*²³³

233. We calculated from our data the ten most common international patent classes assigned to European patents from 1980-2004.

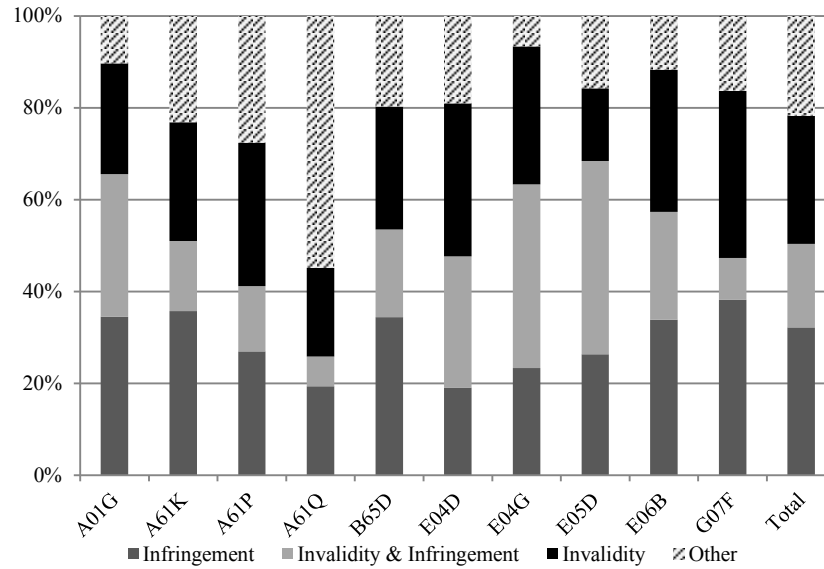


Figure 5 shows results generated from conducting these same analyses upon cases involving patents assigned to the ten IPC4 classes showing the highest decisions-per-case ratios in our data. The share of each action type over these ten classes is consistent with the overall figures across all technology (OST) classes (32% of infringement actions without validity counterclaims, 18% infringement actions with validity counterclaims, and 28% standalone invalidity actions). But variation between these IPC classes appears wider than across aggregated OST classes. In particular, pure infringement actions comprise only 19% of cases in the E04D class (roof coverings) while invalidation challenges account for only 24% of cases in the A01G class (horticulture, forestry and watering). Both types of actions show a much higher share among patents in the G07F class (coin-freed apparatuses) with about 37% each. “Other” actions are most frequent in the pharmaceutical and human necessity classes: A61K (23%), A61P (28%), and particularly A61Q (“Specific use of cosmetics preparations,” 55%). These high shares are driven mainly by a large number of inventor rights-related disputes in France, especially in class A61Q.

The next set of figures and tables investigate differences in the outcomes of infringement and invalidity claims across cases involving patents assigned to different technology (OST) classes. Figure 6 and Figure 7 depict infringement and invalidity actions, respectively, in each OST class for all cases in our sample. Figure 7 includes both standalone invalidity actions and counterclaims in infringement challenges. While it appears that infringement decisions vary less across technological fields than invalidation actions, we note that infringement was reported in 43% of all cases, but not at all in another 50%. The remaining 7% is comprised of unclear cases, in which infringement was confirmed by the court on some grounds but rejected on others. Infringement is established less

often in the instruments and pharmaceuticals areas (about 36%) and more often among mechanical patents, which include automotive technologies (about 48%).

Figure 6 – Outcomes in Infringement Actions, by Technology

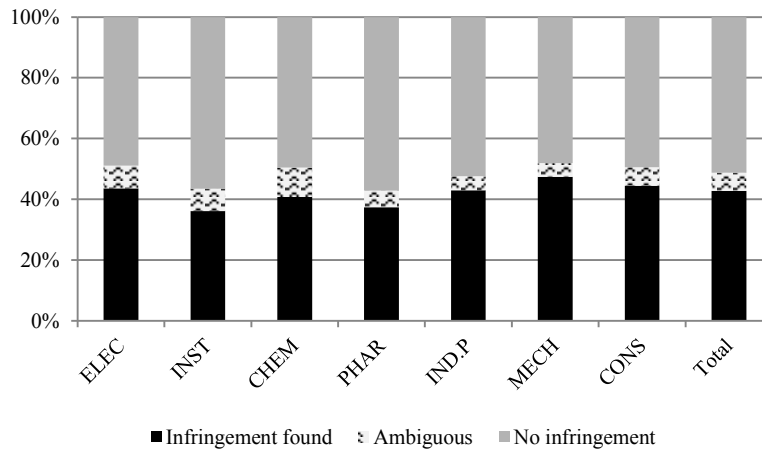
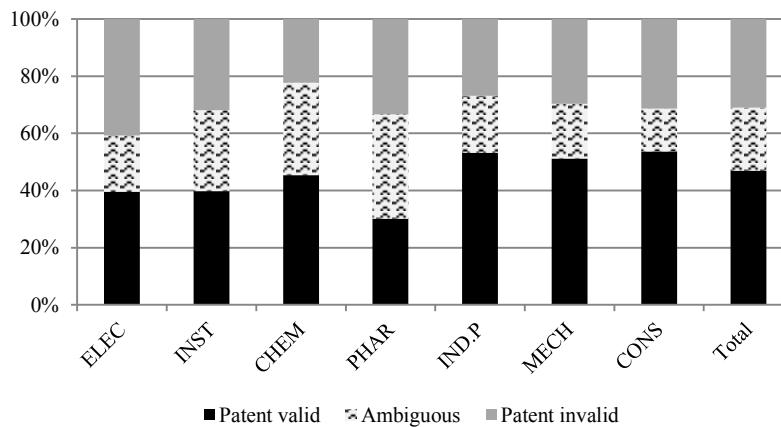


Figure 7 – Outcomes in Invalidation Actions, by Technology



Invalidation claim outcomes are more varied across technological classes. All invalidity claims were rejected in 30% of the cases in the pharmaceuticals and biotech area, compared with over 50% in mechanical engineering, industrial processes, and civil engineering. The share of ambiguous outcomes (i.e., cases where some invalidity allegations were upheld and others rejected) is comparatively high among pharmaceutical and biotech patents, accounting for

almost 40% of the cases (versus 20% among all cases). If “ambiguous” outcomes are in fact partial wins for challengers, then pharmaceutical patentees enjoy a lower likelihood of winning on invalidity grounds than do those in the mechanical or engineering sectors.

Table 13 – Validity Outcomes, by Technology

Judicial Outcomes		ELEC	INST	CHEM	PHAR	IND.P	MECH	CONS	TOTAL CASES	SHARE OVERALL
Inventive Step	Yes	44%	42%	50%	35%	57%	55%	60%	742	51%
	No	48%	47%	40%	53%	37%	36%	36%	589	41%
	Ambiguous	8%	11%	9%	12%	7%	9%	3%	111	8%
	Total	73%	78%	78%	81%	81%	77%	73%	1,442	77%
Novelty	Novel	69%	67%	68%	54%	78%	75%	71%	748	70%
	Not novel	28%	27%	26%	36%	18%	19%	25%	262	25%
	Ambiguous	3%	6%	6%	10%	4%	6%	4%	56	5%
	Total	54%	54%	63%	63%	55%	54%	59%	1,066	57%
Disclosure	Sufficient	71%	82%	93%	71%	80%	74%	80%	272	79%
	Insufficient	22%	18%	5%	22%	17%	26%	20%	64	19%
	Ambiguous	6%	0%	2%	7%	3%	0%	0%	9	3%
	Total	19%	22%	29%	29%	17%	12%	14%	345	18%
Claims Drafting	Satisfying	33%	59%	29%	56%	47%	25%	34%	79	41%
	Not satisfying	19%	4%	0%	11%	9%	11%	13%	19	10%
	Ambiguous	48%	37%	71%	33%	44%	64%	53%	94	49%
Subject Matter	Total	11%	12%	12%	17%	9%	10%	8%	192	10%
	Patentable	48%	45%	75%	39%	94%	29%	60%	61	53%
	Not patentable	48%	45%	25%	44%	0%	43%	30%	43	37%
	Ambiguous	5%	10%	0%	17%	6%	29%	10%	11	10%
Total	16%	9%	3%	12%	4%	2%	2%	115	6%	
All court decisions on invalidity arguments									1,877	

Table 13 summarizes the outcomes of different types of invalidity allegations across cases on patents in different technology (OST) classes. We find that the frequency of alleging different claims remains fairly stable across technologies, varying only within about a 10% interval. We observe this relative stability in the incidence or raising inventive step (raised in 73% to 81% of invalidation challenges), novelty (questioned in 54% to 63% of the cases), and validity (challenged in 8% to 17% of the cases). Lack of disclosure is invoked in 12% (in the mechanicals area) to 29% (in chemicals and pharmaceuticals). Raising challenges to patent validity based on subject matter occurs in a relatively low 2-4% of cases for patents in the chemicals, industrial processes, mechanics and civil engineering fields, but is invoked in 9% of instruments patent cases, 12% in pharmaceuticals and biotechnology, and is raised most frequently—in 16% of cases—for electricity and electronics patent suits.

How successful are these claims? We find that patents in the fields of industrial processes, mechanics and civil engineering are the most likely to survive inventive-step challenges (with a 55% to 60% success rate), and also most likely to survive non-novelty allegations (71-78%). Conversely, pharmaceutical and biotechnology patents are most likely to fail in terms of inventive step (35% success), and are comparatively weak in the face of non-novelty allegations (surviving in only 54% of cases).

E. *How Does the Technology of the Patent Affect Whether the Suit Is an International (Cross-Border) or Single-Jurisdiction Dispute?*

Are some technologies, and by extension some industries, more likely to engage in cross-border, multi-jurisdiction patent litigation in Europe? We find that the frequency of cross-country disputes exhibits substantial variation across technological fields, as depicted in Table 14. On average, about 5% of all patent families litigated in one of the six focal countries were also disputed in at least one other nation. Multinational cases are less frequent (about 3%) in three particular technology classes (industrial processes, mechanical engineering and transport, and consumer goods and civil engineering), but 3 to 4 times more likely to occur in the chemical and pharmaceutical technologies (showing 13% and 18% multi-country disputes, respectively).

Table 14 – Share of Patent Families Litigated in Multiple Countries, by Technology

Technology	Number of Countries Where Litigated				
	1	2	3	4	5+
ELEC	92.8%	6.4%	0.3%	0.4%	0.1%
INST	93.6%	4.9%	1.1%	0.4%	0.1%
CHEM	87.2%	8.6%	2.7%	1.3%	0.3%
PHAR	81.9%	11.1%	5.2%	1.3%	0.6%
IND.P	96.3%	2.9%	0.6%	0.1%	0.1%
MECH	97.8%	1.8%	0.4%	0.0%	0.0%
CONS	97.3%	2.3%	0.3%	0.1%	0.1%

This large variance in frequency of internationally disputed patents may give rise to two (non-mutually exclusive) interpretations: it may indicate a higher frequency of duplicated cases (i.e., cross-border actions between the same parties over the same patent), or it may indicate distinct cases in multiple countries. Our data unfortunately do not allow us to determine which of these interpretations may be at work, but we may nonetheless advance some speculation.

If these “multinational” cases are in fact new cases involving different parties as opponents—but involving the same invention patented in different countries—we might expect that infringement tends to be “local,” maybe due to differentiated markets or market fragmentation. In other words, patent holders in some industries may face higher hazards of relatively more numerous potential infringers in different countries, with a possible outcome that a patentee is more

likely to enforce its patents against different entities in different countries. We note, however, that this description does not map well onto the industrial organization of the pharmaceuticals and chemicals industries—in which economies of scale tend to drive consolidation across countries. Actually, it is among pharmaceutical patents where we observe the largest share of multinational patent cases in Table 14. Nevertheless, vertical specialization—such as the emergence of biotechnology specialists alongside large, incumbent drug companies—has become more common in the pharmaceutical sector.²³⁴ Moreover, our earlier analysis suggests that patents in this sector may be more valuable, since they tend to be litigated to final decision more frequently.²³⁵ Both these factors may help explain the increased incidence of multinational judgments.

If instead the “multinational” cases are primarily repeat actions involving the same patent between the same parties in different countries, at least two explanations may be driving this repeated game. First, the cases we observe may be repeated invalidity actions, with competitors systematically invalidating problem patents in each of its markets, especially given that invalidity in a national court is limited to the boundaries of that nation.²³⁶ We find some support for this hypothesis insofar as invalidity actions are overrepresented in pharmaceuticals and chemicals where multination judgments are most common, but seemingly not in sufficient frequency (about 10% more on average) to explain the totality of the increased share of cross-border challenges (about a 400% increase in the pharmaceuticals sector compared to the cross-technology average).

Defensive litigation offers a second possible explanation for the disproportionately large share of multination judgments among patents in the pharmaceutical and chemical areas. Previously we briefly described the defense strategy for an infringer that consists of “torpedoing” a potential infringement action by either challenging the validity of the patent or by asking a declaratory judgment of non-infringement in a delay-prone court before the patent holder files the infringement action.²³⁷ To the extent that this strategy is sector specific, then differences in the likelihood of multinational suits would offer a window into the practice. Unfortunately, we have no data with which to test this hypothesis.

234. *See generally* GARY P. PISANO, *SCIENCE BUSINESS: THE PROMISE, THE REALITY, AND THE FUTURE OF BIOTECH* (2006).

235. Value in this context may simply refer to the amount of revenue and profits associated with a patent. *See, e.g.*, Higgins & Graham, *supra* note 232, at 370-71 (suggesting that a few patents covering Merck’s product Fosamax supported a revenue stream of \$3 billion in 2007, which subsequently fell by half in 2008 after losing a patent challenge in the courts).

236. Invalidity actions are a purely national matter and a court in one European country never has jurisdiction to nullify a patent in another European country. So for challengers interested in invalidating a European patent, they must file, and win, invalidity suits in the courts of all European countries where the patent has been granted. *See supra* notes 41-50 and accompanying text.

237. *See supra* note 159 and accompanying text.

The explanations that seem to have some potential for explaining the large discrepancies in international disputes relate in the end to industry practices in patent enforcement, or the underlying value distribution or asymmetric stakes associated with complementary assets across industries. Perhaps defense mechanisms by infringers induce more cross-border actions in the pharmaceuticals and chemicals industries than in the others, perhaps national decisions are more necessary in these industries than in the others to put an end to an infringing behavior in multiple countries.

CONCLUSION

There is ample evidence that patent litigation is a critical issue because it conditions the enforcement of patents and therefore helps to set their value and significance in the market place. The balancing act that courts must undertake, in deciding questions of the scope of validity and infringement, helps determine incentives to innovate, to commercialize, to litigate, and even to copy (or not) competitors. If courts fail to enforce valid patent rights, or do so too generously in favor of infringers, then infringement will tend to be a dominant strategy. If courts impose complex rules and procedures so that enforcement is made more expensive, then the threat of infringement actions may not be credible, with patent owners enforcing fewer rights at the margin. Similarly, excessively strong IP rights, enforced too severely by courts at a relatively inexpensive price, may produce a greater supply of infringement actions, with possible reduced entry due to excessively high threats of litigation. Nevertheless, the effective operation of the patent system is predicated upon market players having the capacity to challenge invalid patents at reasonable prices, and so courts face a delicate balancing act between procedural and substantive rules of law which will invariably influence the cost of litigation and the relative attractiveness of enforcement and infringement.

The European patent litigation system has been intensively debated and finally subject to political agreements that will transform it substantially. These changes include the creation of unitary protection and the creation of a Unified Patent Court (UPC). But the design of the new litigation system and the rules for allocating cases across sections of the central division of the UPC have been decided largely in the absence of reliable statistics on the actual incidence and character of patent litigation in Europe.

Using new and never-before analyzed data on patent litigation in several of the largest European countries, this study offered a first view into the complex and fragmented European patent litigation environment. This exceptionally rich data source provided the opportunity for a first cross-country empirical analysis of patent litigation in Europe. Our analysis provides well supported orders of magnitude and identifies country, technology, and procedural patterns in European patent litigation, contributing meaningfully to our knowledge of legal disputes over European patent rights. The results both challenge and complement practitioners' estimates of the frequency of patent litigation in Europe, which

have heretofore been used as a baseline.

Our analysis suggests that the dynamics of patent litigation and its practices are substantially different from country to country and from technology to technology. Following prior theoretical models, the difference in patent litigation incidences across industries may suggest, in particular, that the fixed cost to engage in litigation is not perceived evenly across industries, that the stakes are lower or higher across industries, that the asymmetries of information vary substantially (possibly influenced by the predictability of the courts decisions), or any combination of these. More research is therefore desirable to aid in uncovering how these different litigation systems perform in an otherwise unified Europe.

The differences that our data uncover in the rates and incidence of suits across countries may be driven by technological specialization (which we know exists among the oft-patenting countries of France, Germany, and the U.K.) or by institutional differences, local laws, and country-specific factors. These latter differences may include litigation costs (much higher in the U.K. than in continental courts) or the “attractiveness” of each system as it relates to the types of disputes or competitive realities among parties. While our findings suggest that opportunities for and instances of forum-shopping exist in Europe, more research is needed to uncover the exact dimensions of that phenomenon.

Overall, our data confirm the existence of substantial variation across countries in the European patent litigation system. Some commentators have suggested that such variability creates uncertainty, and that a solution may lie in the type of unified system that European policy makers are now implementing.²³⁸ Since prior research has shown that more harmonization and consistency of decisions across courts and over time tends toward easier and faster settlement in disputes,²³⁹ the Unitary Patent Court scheduled to begin operations in 2015 may yield benefits to society.²⁴⁰ While we remain agnostic about such a solution, we believe that our data and analyses—which offer some tantalizing first insights into the system of European patent litigation—deserve to be complemented by more research in this area. We are confident that this research is forthcoming, now that more European litigation datasets, including the one we describe here, are becoming available to researchers and students.

238. *E.g.*, Harhoff, *supra* note 14; Pottelsberghe, *supra* note 30.

239. Alberto Galasso & Mark Schankerman, *Patent Thickets, Courts, and the Market for Innovation*, 41 RAND J. ECON. 472, 501 (2010).

240. *See* AGREEMENT, *supra* note 10.