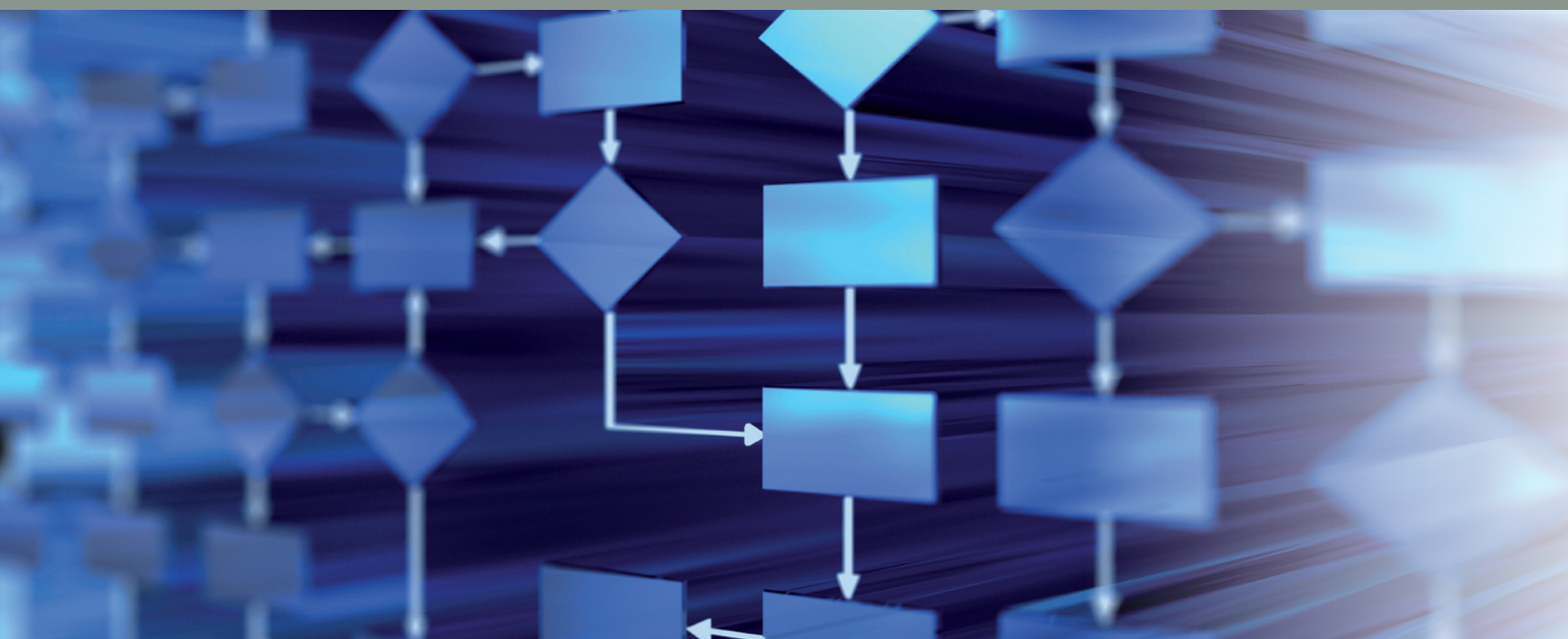


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The economic analysis of patent litigation data

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Abstract

Enforceability of patent rights is the backbone of the patent system. We review differences in the way patent litigation systems are designed across jurisdictions. We also discuss challenges in collecting and accessing patent litigation data as well as their economic analysis. We provide some descriptive analysis of patent litigation in the U.S. and UK for the period 2010-2016 and 2007-2013, respectively. We also analyze administrative post-grant validity challenges in form of the *inter partes* review in the U.S. and oppositions at the EPO.

Keywords: Patent litigation, data, analysis

Disclaimer

The views expressed in this paper are those of the authors, and do not necessarily reflect the views of the World Intellectual Property Organization or its member states.

1. Introduction

For a long time considered a highly specialized form of legal dispute, over the last decade or so, patent litigation has made it into the headlines of the popular press and to the forefront in policy discussions on the patent system.¹ This happened to a large extent because of high-stakes litigation between companies that sell popular consumer products around the globe, most notably the global litigation between Apple and Samsung.² Apart from interest in the global patent wars that occurred recently in the information and communication technology (ICT) industry, patent litigation has also been in the public spotlight for the proliferation of so-called patent assertion entities (PAE), also referred to as trolls.³ In the U.S., litigation by PAEs accounts for the majority of patent assertions since 2012 (see Section 7) and triggered a controversial policy debate (FTC, 2016). More recently there have been concerns by European policy makers that PAEs might start asserting their patents more aggressively in Europe in the future (Europe Economics, 2016).⁴ Policy makers and antitrust agencies in particular have also been paying increased attention to patent litigation involving standard essential patents (SEPs). In the U.S., fundamental questions about enforceability of (undeclared) SEPs through injunctions and the determination of what constitutes a reasonable and non-discriminatory royalty rate (RAND) have had to be addressed by the courts with potentially wide-reaching consequences for patenting and innovation and therefore triggered a controversial policy debate (Barnett, 2018).

While public interest in patent litigation has sparked in recent years, there is a long-standing economic literature that analyzes patent litigation from a theoretical as well as empirical perspective.⁵ It is however an area where the theoretical analysis has arguably outpaced the empirical work. In part this is due to the interest that theorists took in explaining why rational parties would end up in court and expend substantial resources to let a judge come to a decision that could be replicated by a less costly out-of-court settlement (Cooter and Rubinfeld, 1989). Another reason was and continues to be in most jurisdictions the difficulty of obtaining data on patent litigation. Yet another and often underappreciated reason is the complexity of the patent litigation process. This creates challenges in the data construction and analysis. Substantial legal expertise is required to process and extract the relevant qualitative information and to convert it into data that can be used for quantitative analysis. It also requires striking a delicate balance between the complexity inherent in the legal process and simplification and abstraction required by quantitative analysis.

From a policy perspective, enforceability of patent rights is crucial for the functioning of the patent system. In-court litigation has direct effects on the patent system as a whole. In fact, it is the ability to enforce an intangible property right if it is infringed upon that confers value to it. It is therefore important that patent owners can enforce a patent if infringement is detected. At the same time, the litigation system has to allow alleged infringers to defend themselves in court if necessary, including by challenging a patent's validity.

¹ The popular press has been reporting and commenting regularly on major patent cases and a myriad of blogs has sprung up that provide regular commentary and background information on patent court cases.

² See e.g. [New York Times](#) (June 27, 2018).

³ PAEs do not engage in production or R&D themselves, but acquire patents from (usually) defunct companies to assert them against producing entities. There is evidence to suggest that NPEs have negative effects on innovation (Tucker, 2014; Cohen et al., 2017).

⁴ There is little available empirical evidence on this question. The evidence that does exist, however, does not suggest that PAE litigation is widespread in Europe nor is it on the rise (Love et al., 2017).

⁵ For a review of the literature see Weatherall and Webster (2014)

The system should also discourage strategic behavior, plaintiffs seeking overly broad injunctions, excessive damages, or engaging in nuisance lawsuits. At the same time, the system should be designed to discourage defendants from driving up enforcement costs to deter assertion or force settlements. Courts have to strike a balance between allowing patent owners to enforce their rights and to obtain appropriate remedies while avoiding incentives for excessive litigation. This is also important because despite the high costs of litigation for the parties involved, only part of the costs are born by the litigating parties.

As a result, patent enforcement systems are often the subject of intense public scrutiny. For example, in the U.S., the creation of the inter partes review (IPR) and the Patent Trial and Appeal Board (PTAB) to adjudicate IPRs as a result of the 2011 Leahy-Smith America Invents Act (AIA) was the outcome of extensive debates on the functioning of the patent system. Since its creation, the IPR which provides a way to challenge patent validity administratively, has been highly controversial and the policy debate on potential reforms continues. In Europe, a controversial debate on the Unified Patent Court (UPC) has been ongoing for more than a decade. The UPC will be competent to issue judgments that take effect in all EU member states which are part of the UPC Agreement. Proponents of the UPC argue that it will reduce enforcement costs and uncertainty due to the possibility in the current system of divergent outcomes across jurisdictions with regard to infringement and invalidity. Others worry that it might lead to a more complex enforcement landscape in Europe and create incentives for opportunistic patent enforcement behavior.

Availability and access to litigation data is crucial in order to evaluate the functioning of patent litigation systems and therefore to assess the merits of proposals to reform them. However, availability of data necessary for evidence-based analysis and policy recommendations differs greatly across jurisdictions. In some jurisdictions, such as the U.S., comprehensive data on court cases are available through both public and private sources that allow detailed analysis of litigation. In contrast, in other jurisdictions, such as Germany or Korea, only incomplete data are available. In some cases, there have been individual efforts to collect and analyze litigation data, but these efforts are usually not continued over time and the data often not made publicly available (see Section 5 below).

The objective of this article is threefold. First, we discuss the design of patent litigation systems in general and provide a more detailed discussion of the most important patent litigation systems in the world including the U.S., Japan, China, Korea, UK, Germany, France, and the Netherlands. Next, we discuss some of the main challenges in accessing and analyzing patent litigation data. Third, we provide a number of stylized facts about patent litigation drawing on data for the U.S. and the UK (England & Wales).⁶ We also provide some analysis of administrative post-grant validity challenges in form of IPR in the U.S. and oppositions at the EPO and their interaction with litigation in court.

While the patent system in general makes enormous amounts of information and data available to the public, our review confirms that patent litigation has been occurring largely in the shadows of the court system, with the exception of the U.S. As a result, often no answers to questions even as basic as “how much litigation is there?” can be provided. There have been a number of attempts to address this issue outside of the U.S. and substantial progress has been made in some jurisdictions, notably China publishes all court decisions since 2014. Also commercial data providers have tapped into this market and invested significantly in improving the existing data infrastructure. However, major problems still exist. This creates challenges for policy making since some of the most contentious current issues surrounding the patent system revolve around litigation, including NPE litigation, enforcement of SEPs, or invalidity of granted patents. Apart from these headline-

⁶ The UK consists of three distinct jurisdictions, England and Wales, Northern Ireland, and Scotland. Throughout the remainder of this article, we refer to the jurisdiction of England and Wales as the UK.

grabbing issues, basic questions such as access to justice for smaller companies or individual inventors also require fact-based analysis of patent litigation data.

The remainder of this article is structured as follows. Section 2 provides a general overview of the structure of patent litigation systems. Section 3 reviews the litigation system in a number of major jurisdictions. Section 4 discusses methodological challenges in collecting and analyzing patent litigation data. Section 5 presents existing data sources and Section 6 discusses the data used in our analysis. Section 7 shows the results of our data analysis. Section 8 discusses a number of future developments in the area of patent litigation. Section 9 briefly concludes.

2. Patent litigation systems

As in any type of litigation, the judicial system deals with disputes that could not be settled by the parties out of court and therefore requires adjudication. The main objective of patent litigation is to allow patent owners to enforce their patent claims against potential infringers. There are, however, also other patent related claims asserted in court, such as disputes with regard to inventorship or ownership of a patent, issues concerning patent licensing agreements, or declaratory actions where a party seeks confirmation from a court that a patent is valid, not infringed, or unenforceable. Yet, empirically these types of claims account for a small share of all patent cases compared to infringement actions (see Section 7 and Cremers et al., 2016a).

While the structure of patent proceedings in court is similar across jurisdictions, there are nevertheless important differences virtually along all dimensions that characterize a litigation system. These differences are the result of differences in the law (including case law), procedures, institutions, as well as professional practice and therefore evolve constantly over time. Here we discuss the basic structure that is common to all litigation systems to then discuss how systems differ around the world. The next section then presents litigation systems in a few jurisdictions in more detail.

2.1 Structure of litigation

The starting point of patent litigation is usually the allegation of patent infringement. The objective of the patent owner is to get relief in form of a preliminary or permanent injunction, or monetary damages. Usually, the patent owner alerts the alleged infringer to the infringement by sending a notice of infringement, although this step is often skipped for different reasons.⁷ In most cases, the dispute is either resolved through an exchange of letters or dropped by the patent owner in case no response from the alleged infringer is received. However, in case of no response or if direct communication does not lead to a resolution, the patent owner files a complaint with a competent first-instance civil court asserting patent infringement. Once the complaint has been filed, the legal process of litigation in court begins. The objective of the plaintiff is to argue that the claims of one or several patents have been infringed while the defendant argues that there is no infringement. In some jurisdictions, the defendant can also rely on an invalidity defense in court, arguing that the claims are invalid and therefore cannot be infringed.

⁷ In the U.S. one reason to skip sending a letter is forum shopping, i.e. to avoid giving the defendant an advantage by allowing the defendant to take preemptive action and filing a declaratory action with the defendant's preferred court.

There are several steps before a trial takes place, such as a case management conference, pre-trial discovery, pre-trial hearings, motions for a preliminary injunction, a stay, or summary judgment, etc. The precise structure of the proceedings depends on the jurisdiction in question (see Section 3). This means that parties have ample opportunity to settle the dispute before it goes to trial and are often explicitly encouraged to do so. Even during a trial, parties usually have the opportunity to settle at any point. Only if no settlement is reached, judges (or a jury) hand down a verdict. Once the verdict has been handed down, there may be additional steps, for example to decide the amount of damages to be paid or the allocation of litigation costs. Verdicts can be appealed before a court of 2nd instance and in some, albeit rare cases, another appeal before the highest court of the jurisdiction is possible.

2.2 Unified vs bifurcated litigation systems

One of the most important differences between patent litigation systems is between unified and bifurcated systems. In a unified system, infringement and invalidity are dealt with within the same proceedings, where invalidity is usually raised as a defense by the defendant to the infringement claim by the plaintiff. The judge will assess both claims simultaneously which implies that a patent that is found invalid cannot be infringed. In a bifurcated system, in contrast, there are separate proceedings in different venues to establish infringement and invalidity. In Germany, for example, regional courts decide infringement claims while the Federal Patents Court (*Bundespatsentgericht* - BPatG) has exclusive jurisdiction to hear validity challenges. In a bifurcated system, usually invalidity is not an admissible defense to an infringement claim (although there are exceptions such as Japan, see Section 3.2). The defendant will concentrate on a non-infringement defense while potentially attempting to invalidate the patent in parallel at the competent venue. Since the question of validity has a direct effect on infringement proceedings, courts have the option to stay infringement proceedings until validity has been decided. However, courts usually have substantial discretion in their decision to stay proceedings and depending on the jurisdiction may proceed with a decision on infringement regardless of a pending validity challenge.

In most jurisdictions, validity is decided not only by the courts but also administratively by the patent office and in some jurisdictions, such as China, exclusively by the patent office. Such administrative validity challenges can take the form of a post-grant opposition that allows third parties to challenge validity within a certain period after grant. For example, at the EPO patents can be challenged through opposition within 9 months after grant. There are systems that allow an administrative post-grant validity challenge also after the opposition window has closed, such as the IPR in the U.S. These administrative proceedings interact with infringement court proceedings much in the same way as validity challenges in a court that has exclusive jurisdiction to hear validity challenges such as the BPatG in Germany. In fact, in some jurisdictions, such as Germany, validity cannot be challenged in court as long as the window to oppose a patent at the patent office is still open or an opposition is pending. This also illustrates how administrative post-grant review and in-court proceedings can act as substitutes.

Whether infringement and validity are dealt with in a unified or bifurcated system has a number of important effects on patent litigation behavior and outcomes. For example, depending on the design of the bifurcated system, it is possible that the infringement decision is made before the invalidity decision. This implies that patents may be found infringed that are eventually invalidated (Cremers et al., 2016b). Bifurcation may also affect directly litigation behavior. Evidence for Germany and the UK suggests that a bifurcated system, in which infringement is usually decided first, leads to fewer validity challenges than in a unified system. Moreover, infringement actions are more likely to settle (Cremers et al., 2016b).

2.3 Number of courts and specialization

The number of courts competent to hear patent cases differs significantly across jurisdictions. In the U.S., 94 federal district courts are competent to hear patent cases.⁸ In Germany 12 regional courts are competent to hear first-instance patent infringement claims. In other jurisdictions, such as France or the Netherlands, there is only a single court competent to hear patent cases. In the UK, there are two courts that hear patent cases where one court (Intellectual Property Enterprise Court - IPEC) hears less complex cases of lower value than the other court (Patents Court). Jurisdictions also differ in terms of whether patent cases are heard by specialist courts, divisions, or judges within general civil courts. In the UK for example, the Patents Court is a specialist court within the Chancery Division of the High Court of Justice of England and Wales. In Germany, some regional courts have specialist chambers that hear patent cases. In the U.S., the court of appeal (CAFC) is a specialized court while first-instance district courts are not.

The availability of different courts to file a claim may provide the opportunity to engage in forum shopping, that is, to choose a court venue strategically. Such opportunity arises even within a given jurisdiction because individual courts and judges retain considerable discretion regarding procedural choices that affect the speed, cost, and ultimately outcome of proceedings. Plaintiffs may choose patent-friendly venues which can lead to strong concentration of caseloads in a single or few venues. For example, until recently,⁹ the District Court in the Eastern District of Texas in the U.S. was a notoriously popular venue for patent infringement actions, favoring the assertion strategy pursued by NPEs (Love and Yoon, 2017; Cohen et al., 2017). There is also evidence for the existence of forum shopping in Germany where litigation is concentrated in three out of the 12 regional courts. The evidence suggests strategic behavior as a plaintiff's venue choice is affected by the expected duration of proceedings and geographical distance to the court (Gaessler and Lefouili, 2017).

2.4 Duration of proceedings

Proceedings differ significantly in speed across jurisdictions and even within jurisdictions across venues. For example, Cremers et al. (2016a) report that infringement actions take on average around 14 months to resolve in Germany but nearly 30 months in France during the 2000-2008 period. To some extent, the speedier resolution in Germany is explained by the bifurcated system in Germany which allows regional courts to focus on the issue of infringement.¹⁰ However, there are a number of other factors that also play a role such as active case management or the extent of pre-trial discovery and expert testimony permitted.¹¹

The duration of proceedings has direct economic effects. They affect direct and indirect costs in form of litigation expenses and uncertainty over the case outcome. This also creates incentives for parties to influence case duration strategically in an attempt to get the other party to settle or drop the case.

⁸ Patent infringement claims can also be brought before the International Trade Commission (ITC), but the ITC cannot award monetary damages.

⁹ In *TC Heartland LLC v. Kraft Food Brands Group LLC* decided in 2017, the U.S. Supreme Court restricted the plaintiff's ability to choose the venue for litigation.

¹⁰ The separate invalidity actions at the BPatG in Germany take on average 22 months.

¹¹ Fischmann (2015) suggests that fee shifting also affects case length. Specifically, an item-based fee shifting rule such as the one applied in the UK incentivizes parties to focus on the main issues in a case which reduces costs and speeds up the resolution of a case.

2.5 Costs and cost allocation

The costs associated with litigation vary significantly across jurisdictions. In Germany and France, for example, cost estimates for each party range between US\$ 90,000-250,000 and US\$ 60,000-250,000, respectively (Cremers et al., 2016). These costs are low compared to other jurisdictions, such as the UK or the U.S. where costs commonly are well above US\$ 1million (Helmets and McDonagh, 2013; AIPLA, 2017). Such large differences are explained by a number of factors, including the extent of pre-trial discovery, the role of expert witnesses, as well as the length and complexity of the trial.¹²

Systems also differ in terms of whether the losing party has to cover the litigation costs of the winning party. The economic literature distinguishes between two systems that are at the opposite ends of the spectrum: under the so-called American rule, each party pays its own litigation costs regardless of the case outcome; under the English rule in contrast, the losing party covers its own as well as the cost of the winning party. This is, however, a highly stylized depiction of reality. In reality, in the English system, costs are allocated on a per-item basis and as a result, the actual share of costs shifted between parties in patent cases is closer to one half to two thirds (Forsyth and Watts, 2011; Helmets and McDonagh, 2013a). In addition, the IPEC in the UK imposes a cap on recoverable costs, limiting the total amount than can be shifted between parties (Helmets et al., 2016). In the U.S. under the American system, in exceptional cases courts are allowed to shift fees from the losing to the winning party although the rarely do so (Cotter and Golden, 2018).¹³ In other jurisdictions, such as Germany, costs are also routinely shifted although this usually affects only a fraction of total costs due to cost scales applied by the courts (Fischmann, 2015).

The theoretical literature in economics suggests that the rules that govern the allocation of litigation costs between parties have important effects on litigation behavior.¹⁴ Empirically, there is little evidence on the impact of fee shifting specifically on patent litigation; the available evidence suggests that limiting a court's ability to award fees to the winning party results in more cases filed and a decrease in share of cases that settle out of court (Helmets et al., 2016). There is also some evidence to suggest that fee shifting deters litigation by NPEs (Helmets et al., 2014).

3. Examples of patent litigation systems

This section provides an overview of a number of patent litigation systems around the world. The main characteristics are summarized in Table 1.

¹² The 2017 AIPLA survey provides a breakdown by stage of proceedings, for example, median costs for initial case management are estimated around \$60,000 for a case with US\$1-10 million at risk. The median costs for discovery, motions, and claim construction are an estimated US\$ 550,000. Pre- and post-trial median costs are an estimated US\$ 1million.

¹³ The cases *Highmark Inc. v. Allcare Health Mgmt. Sys., Inc.* and *Octane Fitness, LLC v. ICON Health & Fitness, Inc* decided in 2014 by the U.S. Supreme Court made it in principle easier for the winning party to be awarded attorney fees from the losing party.

¹⁴ For an overview see Spier (2007).

3.1 United States

The U.S. is a common law system in which courts influence and change the law and legal procedures through judicial precedent. The U.S. has a unified litigation system, in first instance patent cases are heard by 94 federal district courts. District courts do not have divisions or judges specialized in patent matters and judges usually have no technical training although some judges build substantial expertise due to the concentration of patent cases in their dockets. Appeals are heard by the Court of Appeals for the Federal Circuit (CAFC) which has exclusive jurisdiction in patent matters since 1982. The Supreme Court hears appeals from the CAFC at its discretion.

Proceedings in the U.S. distinguish themselves in several ways from other jurisdictions which has a notable effect on case outcomes and costs involved in litigation. There are significant disclosure requirements during the pre-trial discovery phase of a case, which force parties to incur substantial expenses relatively early into a case (AIPLA, 2017). Most cases also include a pre-trial claim construction (“Markman”) hearing. Expert testimony in court also plays an important role which can prolong a trial and raise the costs involved significantly. In patent cases that involve monetary damages, parties have the right to a jury trial despite the often highly technical nature of the subject of a dispute.

Patent owners can also file a complaint with the International Trade Commission (ITC). The ITC can grant injunctive relief in form of an import ban. However, it cannot grant monetary damages to patent owners. The costs involved in a complaint before the ITC are slightly lower than at district courts but still substantial (AIPLA, 2017).

Patent validity is routinely raised as defense in court proceedings. However, there is also the possibility to challenge patents administratively. Ex parte re-examination allows anyone including the patentee to petition the patent office to re-examine the patent. The re-examination is conducted only between the patentee and the patent office without any input from third parties even including those that have petitioned the office to initiate re-examination. The AIA in 2011 introduced the IPR, the covered business method (CBM), and the post-grant review (PGR). PGR allows third parties to challenge validity within 9 months of issuance. After the 9-months period, patents can be challenged through an IPR or CBM. Patents in PGRs, CBMs, and IPRs are reviewed by the Patent Trial and Appeal Board (PTAB) in quasi-judicial proceedings rather than patent examiners in a re-examination process. PGRs, CBMs, and IPRs are subject to a fixed timeline.

IPRs are initially assessed on their merits to establish their likelihood of success. If there is a reasonable likelihood that a challenged claim is invalid based on lack of novelty or obviousness, the petition is instituted and reviewed. Institution has to occur within 6 months and upon institution, the PTAB has to hand down its decision within 12 months. While the PTAB has the right to proceed with a determination of validity of an instituted petition even if the parties settle, it has rarely done so in practice. If a patent is asserted in court for infringement, it can be challenged in an IPR if the petition is filed within 12 months of the start of the infringement suit.

In practice, if a patent is challenged in an IPR while infringement proceedings are pending, the defendant will petition the court to stay the infringement proceedings until the IPR is decided. If the asserted claims are held unpatentable by the PTAB, the infringement case is dismissed. If however the claims survive the IPR, the defendant is estopped from raising any of the grounds raised or could have reasonably raised in the IPR in a validity challenge in court.

IPR challenges have some advantages over invalidity challenges in court (Chien et al., 2018). In an IPR, the petitioner only has to meet the “preponderance of the evidence” threshold to show that a claim lacks novelty or is obvious. In contrast, the court applies a

presumption of validity and requires “clear and convincing evidence” as to the invalidity of a challenged claim.

3.2 Japan

Japan is a civil law jurisdiction without a rule of binding precedent.¹⁵ Since 2004, patent cases are heard in first instance by two district courts that have exclusive jurisdiction. These district courts in Tokyo and Osaka have special divisions that hear IP cases. Since 2005, appeals are heard by the IP High Court which is a specialist branch of the Tokyo High Court; similar to the CAFC in the U.S., it specializes in IP cases. In last instance, cases can be brought before the Supreme Court which accepts cases at its own discretion. Judges usually do not have any technical training, but can draw on the assistance from technical experts employed by the court as well as from outside experts.

An alleged infringer can raise invalidity and unenforceability as a defense in court. However, the court’s finding regarding validity is only *inter partes*. Only the Japanese Patent Office (JPO) has authority to invalidate a patent *erga omnes*. Validity can be challenged through an opposition within 6 months of grant or validity challenge once the opposition period has expired. District courts may stay proceedings while a validity challenge is pending at the JPO. This means that Japan has a bifurcated system that nevertheless allows defendants to raise invalidity as a defense in infringement proceedings. Similar to proceedings in the UK, the court in Japan first establishes whether infringement has occurred and then determines any damage award in a separate hearing. Applications for a preliminary injunction also require separate proceedings.

3.3 China

China is a civil law jurisdiction without a rule of binding precedent. It has a bifurcated system that separates infringement and patent validity. Moreover, in the Chinese system, patents can be enforced through the civil court system as well as the patent office which sets it apart from other patent litigation systems.

The civil court system is limited to handling infringement actions; validity cases are only heard on appeal to decisions by the Chinese Patent Office’s (CNIPA) Patent Review and Adjudication Board (PRAB).¹⁶ The court system in China consists of four instances: the Supreme People’s Court, the Higher People’s Court, the Intermediate People’s Court, and the Lower People’s Court. Patent infringement cases and appeals from administrative decisions must be filed with designated Intermediate People’s Courts. If claimed damages are sufficiently large, Higher People’s Courts have first instance. Judgments can be appealed; appeals are heard by the next higher instance.

Patent cases in China must be filed in the jurisdiction applicable to the defendant’s residence or where the infringing act occurred. If more than one court has jurisdiction, the plaintiff can pick the court. Since 2014, there are three specialist IP courts,¹⁷ and IP tribunals in several provinces, which have exclusive jurisdiction over IP. Since 1993 the Supreme Court has an IP chamber that hears appeals and drafts judicial interpretations on IP issues.

Civil courts have the power to grant a range of remedies including pre-trial and interim injunctions, the freezing of assets of the defendant, fees for pre-grant use, permanent injunctions, and monetary damages. In contrast to for example the U.S. system, Chinese

¹⁵ Hence courts are not bound by previous court rulings or the legal interpretation made by other courts including higher courts.

¹⁶ Appeals from PRAB are dealt with by the Beijing First Intermediate Court and can then go to the Beijing Higher People’s Court. Appeals from all other administrative decisions go to courts where the administrative body is located.

¹⁷ They are located in Beijing, Shanghai, and Guangzhou.

civil courts do not issue declarations of non-infringement.¹⁸ Chinese courts allow for only very limited discovery. Parties have no obligation to disclose information unless the court takes evidence preservation measures and the burden of proof remains with the plaintiff (Clark, 2011). In comparison with most European jurisdictions, proceedings in China are relatively fast, infringement suits take only between 6 and 18 months in first instance and the decision on infringement and damages is made in the same court ruling.¹⁹ Litigation costs are relatively low in China and court fees are computed as a percentage of damages claimed, which are generally low.

Decisions on patent validity are the sole responsibility of the PRAB, an administrative body established under CNIPO. Since 2001, there are no opposition proceedings,²⁰ so that the only way to clear patent rights is to file a claim to invalidate a patent. Infringement claims can also be filed with CNIPO.²¹ CNIPO can order the accused party to cease infringement and mediate financial compensation. Due to the bifurcated system, if an alleged infringer files an application to invalidate the patent, CNIPO can stay the action. According to Clark (2011), the administrative route to enforce a patent right has a number of advantages relative to the civil court route: (a) it is much quicker and less expensive, (b) the burden of proof appears to be lower (less evidence is required for CNIPO to act and it may also accept evidence that would not be admissible in court), (c) CNIPO has the power to collect evidence that a patentee may not be able to collect (such evidence can also be used in a court action in case mediation of financial compensation fails or the alleged infringer appeals against CNIPO's decision). This route to enforcement also has a number of important drawbacks: (a) CNIPO cannot award monetary damages, which require a court ruling, (b) CNIPO has discretion on whether to accept a case, and (c) the alleged infringer can appeal to a litigation court, which then stays the enforcement of the CNIPO decision while the court case is pending.

3.4 Korea

Korea is a civil law jurisdiction that has a bifurcated litigation system. Infringement cases are heard by five district courts²² while the Korean Intellectual Property Office (KIPO) has exclusive jurisdiction to hear validity challenges.²³ Only the district court in Seoul has specialized IP judges. At KIPO, the IP Trial and Appeal Board (IPTAB) which is comprised of technically trained judges decides on validity. Since 2017, there is also post-grant cancellation available to invalidate a patent within six months from grant. Appeals from both the district courts and IPTAB are heard by the Patent Court which is an appeals court specialized in IP. In final instance, cases are heard by the Supreme Court. As in the case of the ITC in the U.S., the Korea Trade Commission can also enforce patents by blocking imports and exports of infringing products but not award any damages.

¹⁸ Although the 2010 Supreme Court Judicial Interpretation allows for declaratory action under certain restrictions.

¹⁹ As in Germany, validity proceedings are usually slower than infringement proceedings, which can result in situations where infringement is found for a patent that is eventually invalidated.

²⁰ Any interested party is entitled to file an opinion to CNIPO about whether a given patent application is in conformity with the Patent Law. But CNIPO has no obligation to consider the opinion or to provide an official response to it (Clark, 2011).

²¹ Apart from CNIPO, the General Administration of Customs (GAC) can also enforce patent rights by seizing imports and exports of infringing products.

²² The district courts are located in Seoul, Daejeon, Daegu, Busan, and Gwangju.

²³ The defendant can still raise invalidity as a defense based on the argument that enforcement is an abuse of right.

3.5 Europe

In Europe, patent enforcement occurs at the national level both for national patents and for patents granted by the European Patent Office (EPO) that have taken effect in several of the member states of the European Patent Convention (EPC). Patents granted by the EPO can be validated in any of the member states of the EPC, but once they enter into effect, they become de facto national rights. This implies that infringement as well as validity is dealt with in each country separately. This system can lead to outcomes where a patent whose validity is challenged is invalidated by the courts in one jurisdiction but not in another (see Cremers et al., 2016a). It is also possible that when the same parties litigate in several European jurisdictions, a patent is found infringed in one jurisdiction but not in another.²⁴

3.5.1 EPO

The EPO offers an administrative post-grant procedure to challenge the validity of patents through opposition. If an opposition is successful, the patent is invalidated and cannot enter into effect in any of the signatories to the EPC. This is a distinct advantage of opposition over in-court invalidation because once an EPO patent has been validated in several EPC member states, the patent has to be invalidated in each member state separately. Opposition procedures before the EPO differ in several ways from U.S. IPRs (Chien et al., 2018): there is no institution stage (but the EPO provides a preliminary opinion), if several parties file an opposition, they are automatically consolidated into a single proceeding at the end of the 9-month opposition period and heard jointly, and the patent owner can amend the opposed patent. The proceedings end with an oral hearing at the end of which the outcome of the opposition is communicated to the parties. On average, oppositions take around 24 months and cost around US\$ 45,000 (Chien et al., 2018).

3.5.2 Germany

There are 12 regional courts (*Landgerichte* - LG) that are competent to hear patent infringement cases.²⁵ Decisions by LGs can be appealed at higher regional courts (*Oberlandesgericht*) and in final instance at the Federal Court of Justice (*Bundesgerichtshof* - BGH).

Invalidity cannot be challenged in court proceedings neither as a defense in infringement proceedings nor offensively in a declaratory action. There are two ways to challenge validity in Germany: administratively through opposition procedures before the patent office that granted the patent or court proceedings before the BPatG. If the patent was granted by the EPO, the patent can be challenged in an opposition during the first 9 months following the grant of the patent. If the patent was granted by the German Patent Office (DPMA), the patent can be challenged in opposition proceedings before the DPMA. In fact, if the opposition window is still open, invalidity can only be challenged administratively at the patent office. Once the window has closed, a patent can only be challenged at the BPatG. Decisions by the BPatG can be appealed before the BGH, which is the only court in Germany that is competent to hear appeals of infringement and invalidity claims.

²⁴ For specific examples see Mejer and van Pottelsberghe de la Potterie (2012).

²⁵ The courts are located in Berlin, Braunschweig, Düsseldorf, Erfurt, Frankfurt, Hamburg, Leipzig, Magdeburg, Mannheim, Munich, Nuremberg-Fürth and Saarbrücken.

Because of the bifurcated system, decisions on infringement and invalidity are taken separately and independently. Since LGs are relatively faster to decide infringement claims than opposition or invalidity procedures, it is possible that LGs establish infringement before validity has been confirmed. This can lead to “invalid but infringed” outcomes, i.e. a patent is found infringed that is later invalidated (Cremers et al., 2016b). To minimize this risk, LGs can stay infringement proceedings while invalidity challenges are pending. In practice, however, only a small share of infringement cases is stayed, only about 10-15% of cases (Herr and Grunwald, 2012).

3.5.3 UK (England and Wales)

The UK consists of separate legal systems for England and Wales, Scotland, and Northern Ireland. Here we focus only England and Wales which hears by far the largest number of patent cases.

Two courts are competent to hear patent cases in England and Wales. The Patents County Court (PCC), which underwent substantial reform between 2010 and 2013 and was re-constituted as the Intellectual Property Enterprise Court (IPEC) in 2013, hears less complex claims of lower value. The other venue is the Patents Court (PHC), which is a specialist court of the Chancery Division of the High Court of Justice. Both courts, the IPEC and the PHC, hear both infringement and invalidity claims. Validity challenges can be raised as a counterclaim to an infringement claim or pro-actively in form of a declaratory action. As in the U.S. system, in England and Wales infringement and validity are decided simultaneously which means that the invalidation of a patent leads to the dismissal of the infringement claim. Appeals from both venues, the IPEC and PHC, are heard by the Court of Appeals. Decisions by the Court of

Appeals can be challenged before the Supreme Court at its discretion. Patents granted by the EPO and validated in the UK can also be challenged in opposition proceedings during the 9-months opposition window. Although the UK Intellectual Property Office does not offer opposition proceedings for national patents, it nevertheless allows for administrative validity challenges through its patent opinion service. In contrast to Germany, validity challenges can be brought in court regardless of whether an opposition at the EPO is still possible or pending. However, to avoid divergent outcomes of the “invalid but infringed” type, courts can stay proceedings while the opposition at the EPO is pending.

3.5.4 France

Since 2009, only the court in Paris (*Tribunal de Grande Instance* - TGI) is competent to hear patent actions. Before 2009, 10 courts heard patent cases (only the courts in Paris and Lyon had specialist patent judges). Decisions by the TGI Paris can be appealed at the Court of Appeal (*Cour d'Appel*) in Paris. The Supreme Court (*Cour de Cassation*) hears appeals of decisions by the Court of Appeal.

The TGI hears both patent infringement and invalidity actions. There is no opposition procedure available for patents granted by the French patent office (INPI). However, patents granted by the EPO that are in force in France can also be invalidated through opposition procedures at the EPO. The TGI can stay infringement proceedings pending the outcome of the EPO opposition. Damages are usually determined in separate proceedings after infringement has been determined.

A feature of the French system is that there is no disclosure stage and instead a search and seizure order (*saisie-contrefaçon*) is commonly used for discovery.

3.5.5 The Netherlands

The court in The Hague has exclusive jurisdiction in patent matters. The patent chamber of the district court (*Rechtbank*) hears actions in first instance which can be appealed at the court of appeal (*Gerechtshof*) without the need for permission to appeal. The appeals court also has specialized IP judges. The Supreme Court (*Hoge Raad*) hears appeals from the *Gerechtshof*. In the past, the Netherlands has often applied foreign patent law and granted cross-border injunctions.²⁶

The court in The Hague hears infringement and invalidity actions. As in the case of France, there is no opposition procedure for patents granted by the Dutch patent office. Patents granted by the EPO and validated in the Netherlands can also be opposed at the EPO. While the district court usually does not stay infringement proceedings, it does commonly stay invalidity proceedings pending the outcome of opposition proceedings at the EPO.

²⁶ This occurs less frequently since the European Court of Justice decisions in Cases *C-4/03 GAT v LuK* and *C-539/03 Primus v Roche*. However, in case *C-616/10 Solvay v Honeywell* the European Court of Justice confirmed the court's ability to grant interim injunctions for infringement of EPO patents across European countries.

Table 1: Overview of main characteristics of major patent litigation systems

Characteristics	Jurisdiction							
	United States	Japan	China	Korea	Germany	UK	France	Netherlands
Bifurcated	No	Yes	Yes	Yes	Yes	No	No	No
Administrative post-grant review	Yes	Yes	No	Yes	Yes (EPO, DPMA)	Yes (EPO)	Yes (EPO)	Yes (EPO)
Jury trial	Yes	No	No	No	No	No	No	No
Preliminary injunction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Criminal liability	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Average duration in 1st instance (months)	18-42	12-15	6-18	10-18	14	24-36	18-24	12
Damages amount	High	Low	Low	Low	Average	High	Average	Low
Punitive damages	Yes	No	No	No	No	No	No	No
Fee shifting	Limited	Limited	Limited	Limited	Limited	Full (item-based)	Limited	Full
Average costs in 1st instance ('000 US\$)	1000-6000*	300-500	20-150	150-400	90-250	1000-2000	60-250	70-250
Number of courts 1st instance	94	2	18 specialized + regular courts	5	12 (+1 validity)	2	1	1
Specialized court/judges 1st instance	No	Yes	Partly	Partly	Yes	Yes	Yes	Yes
Specialized court of appeal	Yes	Yes	Yes	Yes	No	No	No	No
Separate trial for damages	No	Yes	No	No	Yes	Yes	No	No
Utility models	No	Yes	Yes	Yes	Yes	No	No	No
Design patents	Yes	No	Yes	No	No	No	No	No

* Median reported; sources: AIPLA Economic Survey 2017; Clark (2011); Cremers et al. (2016a); Graham and van Zeebroeck (2014), Thomson Reuters Practical Law.

4. Empirical challenges: data and analysis

Patent litigation is considered one of the most complex forms of civil litigation. This complexity poses a number of challenges for the quantitative analysis of patent litigation. Another basic problem is the observability of information. Some information is essentially unobservable, private information exchanged between parties such as direct communication between parties is not revealed to the court or even if revealed, it is not recorded. Other information is in principle observable and has been recorded, but the data is for some reason not available. For example, terms of settlement are often kept confidential and corresponding records are sealed or redacted. Third, even when information has been recorded and is in principle available, the information is missing in the available data. For example, in some jurisdictions only final verdicts are made available while records of pre-trial motions are not available. Moreover, as discussed in the previous two sections, there are also substantial differences across jurisdictions which affect the interpretation of observed litigation data and make any direct comparison of litigation across jurisdictions challenging.

4.1 Data coverage

In most jurisdictions no official aggregate statistics of patent litigation activity are available. This means that it is difficult to verify the completeness of any case-level dataset unless the data were collected directly from court records. This creates the possibility that analysis is conducted based on a non-random subset of court cases. More discussion on data availability is provided below.

4.2 Case counts

There is enormous heterogeneity in court cases as well as administrative post-grant reviews even within the same jurisdiction. Cases differ for example by the type of complaint filed by the plaintiff. Courts usually hear also claims other than infringement or validity. For example, the claim might be for a declaration of non-infringement. Another source of heterogeneity is the response by the defendant. A defendant may simply respond with a defense of non-infringement or challenge the allegedly infringed patent's validity. Depending on the jurisdiction, such a validity challenge might take place at the patent office or a different court and is therefore not directly observable in the court records (unless a motion for a stay is filed or the outcome of the validity challenge has any direct effect on the court action).

This creates challenges when constructing case counts and comparing those counts across jurisdictions. For example, in a bifurcated jurisdiction, court cases will be predominantly infringement claims. Invalidity challenges are recorded as separate cases even when the validity challenge occurred as a direct response to an infringement action. In a unified system, an infringement action with an invalidity defense would show up only as a single case. One way to account for such heterogeneity is to count cases by type of claim.

Another source of heterogeneity is the number of asserted patents. Plaintiffs may assert claims of only a single or multiple patents in a case and courts may decide to either split a case that involves many patents into separate actions or consolidate separate actions into a single proceeding. A similar problem also arises in post-grant reviews. Multiple third parties can file a post-grant administrative validity challenge on the same patent. At the EPO, for example, if several parties oppose a given patent, these multiple oppositions are consolidated into a single

proceeding at the end of the 9-months opposition period. In the U.S., in contrast, multiple challenges in form of an IPR at the PTAB start off as separate petitions that may be joined at some point in the process. This means that a simple count of IPR petitions and a direct comparison with EPO oppositions might be misleading.

Also the number of defendants may vary across cases and jurisdictions. Depending on the jurisdiction, a plaintiff may sue several unrelated parties in a single proceeding or have to sue each party individually in separate proceedings.²⁷ If separate proceedings are filed, courts can subsequently consolidate them into a single proceeding. Taking the number of defendants as well as case consolidations into account can substantially affect aggregate case counts. Finally, court cases may involve different patent types.²⁸ For example, court cases in Germany, China, or Korea may involve utility models; in the U.S. or China they may involve design patents. For purposes of comparability across time, courts, and jurisdictions, it is important to distinguish cases according to the type of patent involved.

4.3 Litigation rates

Raw patent case counts are often not particularly informative, especially when compared over time or across jurisdictions. To facilitate comparison, often litigation rates are constructed. The main challenge in their construction is the denominator, that is, the measure that is used to weigh the litigation case count. Cremers et al. (2016a) for example use (a) annual patent filings in a given jurisdiction, (b) the total number of patents in force in a given jurisdiction, (c) gross domestic product in a given jurisdiction, and (d) gross domestic R&D spending in a given jurisdiction. The motivation underlying measure (a) is that the number of patent filings and the number of patents that could potentially be enforced are positively correlated. That said, this correlation is weak at best as only a tiny fraction of patents filed is enforced and most patents are relatively old at the time they are enforced. Filings are used instead of granted patents to avoid problems associated with the grant lag which might differ across countries although the choice between filings and grants is ultimately not consequential. Measure (b) is motivated by an attempt to come up with a better measure of the pool of patents at risk of being litigated. However, it is surprisingly difficult to establish the set of patents in force at a given moment in time. This would require detailed information on patents' legal status that is difficult to assemble at large scale. Measure (c) sidesteps these issues and simply weighs case counts with an aggregate measure of the size of the economy. Instead of using the overall size of an economy, measure (d) captures to some degree how innovative an economy is by focusing on total expenditure on R&D which is a common measure of innovation input. A problem common to these different ways of constructing litigation rates is that their interpretation is unclear. If a rate is low, does it mean that there are fewer underlying disputes or does it mean that a smaller share of disputes makes it to court either because they are settled before reaching a court or because patent owners decide not to enforce? Ultimately the usefulness of such aggregate measures of litigation activity is limited for policy purposes.

²⁷ In the U.S. for example, the AIA changed the relevant provisions in September 2011 limiting a plaintiff's ability to sue several unrelated defendants in a single law suit.

²⁸ They may also involve other forms of IP, such as trademarks. This may be relevant if the assertion of multiple forms of IP affects litigation behavior.

4.4 Outcomes

There is a common (mis)perception in the economic literature that the outcome of a court case can be simply categorized as win or loss. This ignores the complexity of patent cases. In a validity challenge, often only a subset of claims is challenged and invalidated. Depending on the jurisdiction, it may also be possible for the patent owner to amend the claims of the patent during the proceedings and thereby keep the patent alive albeit with a narrower scope. In infringement proceedings, it is equally possible that infringement is found only with respect to a subset of asserted claims. This means that often the outcome of a case is not as clear-cut as required for a binary coding of the outcome. This is further complicated by appeals. Depending on the jurisdiction, appeals are relatively frequent and the decision to appeal depends on case-, patent-, and litigant-characteristics, resulting in selection into appeals and hence the set of first instance decisions that are potentially overturned. Moreover, first instance decisions may only be partly overturned adding to the complexity of the overall case outcome.

A related problem occurs when there are multiple unrelated defendants because case outcomes may differ across defendants. For example, default judgment may be entered against one defendant, while another defendant settles and a third litigates through to a verdict. This type of within-case heterogeneity adds to the difficulty of defining the overall outcome of a case as a win or loss. Depending on the purpose of litigation, it may be useful to break down the case outcome by patent or even claim and party.

Another issue concerns settlements. There is no single definition of settlement in the literature and the definition applied usually depends on the available data. Often any case that does not end with a verdict is simply considered to have settled. However, this ignores the possibility that some cases could have been dropped by the plaintiff, dismissed by the court for some reason, or decided by a default judgement for example in case the defendant does not respond. Often cases settle only after the court has reached some decision, for example a case settles after the court has decided on infringement but before it sets damages. This can create difficulties when coding the outcome of a case. Also, frequently the terms of settlement agreements are not publicly available, which means that settlements are often difficult to interpret.

Another problem regarding case outcomes is the time lag between the filing of an action and its observed outcome. Depending on the jurisdiction, proceedings in 1st instance can take several years to reach a decision. Additional hearings may occur after a verdict has been handed down to determine damages or cost allocation. If the decision is appealed, another year or two will pass before the final outcome of the case is known. This creates substantial lag time in the analysis of court cases. Ignoring such lag time will produce the impression in the data that settlement rates increase in more recent years, although this is mechanistically due to missing outcome data for cases that do not settle. Since the decision to settle is obviously a choice, the lag time between filing of a case and its outcome creates a selection problem in the data.

4.5 Analysis

Selection is more generally a central problem in the analysis of litigation data since the data that are observed are the outcome of many endogenous choices. To start with, only court cases are observed. That is, only the filing of a complaint triggers a record of the case. Any disputes that are resolved or dropped before the plaintiff files the complaint with a court remain unobservable.²⁹ This is a challenge in empirical work since it is practically impossible to account for this type of selection since no information on the underlying set of all patent disputes is available.

Some cases are dropped or settled following directly the filing of the complaint. For these disputes, often the only information available in the case docket is the information provided in the complaint as well as the fact that the case did not proceed. If the case is pursued further, more documents will be recorded, for example in form of a motion. Parties have the opportunity to settle at any point. That means the amount of information available about a specific case depends on whether and when parties settled a case.

In principle, parties will inform the court about a settlement, which generates a record that allows determining whether a case has settled and the date of the settlement as opposed to whether the case was simply dropped by the plaintiff.³⁰ In most cases no additional information will be revealed by the parties about the terms of the settlement including potential payments or licensing agreements. This usually makes it difficult to interpret the simple observation that a case has settled.

Only if a case proceeds far enough that a summary judgment is available or the judge or jury hands down a verdict, an actual outcome of the case is observed. It is important to emphasize that the set of cases that are decided by a court is a highly selected subset of cases and not representative of all the patent disputes filed with the court, and even less so of all patent disputes that never reach a court. Cases that are decided on appeal are an even more highly selected subset of patent cases and clearly not representative of patent disputes more generally.

4.6 Legal changes

Especially in common law jurisdictions, the analysis of litigation data is also challenging due to frequent changes in the law and its application. The U.S., for example, has seen a number of landmark Supreme Court decisions in the last few years that have had a significant impact on litigation behavior.³¹ Also institutional changes, such as the introduction of opposition procedures in Japan and Korea in 2015 and 2017 respectively or the comprehensive reform of the Patents County Court and its reconstitution as IPEC in the UK between 2010 and 2013 are likely to have impacted litigation behavior. The same is true for sweeping legislative changes, such as the one brought about by the AIA in the U.S. in 2011. From a policy perspective, studying the effect of such changes on litigation behavior and outcomes is worthwhile in its own right. However, it also means that any analysis of litigation data will have to take their impact on litigation behavior into account. This is a particular concern with regard to court decisions and institutional changes that at first glance may not affect litigation directly, such as changes to post-grant review systems.

²⁹ Lemely et al. (2017) estimate based on survey results for the U.S. that around 70% of patent infringement claims are resolved outside of court.

³⁰ If the court is not informed about a settlement, it may be difficult to determine the termination date of a case.

³¹ For an overview see <https://writtendescription.blogspot.com/p/patents-scotus.html>.

4.7 Information on litigating parties and patents

If names of litigating parties are available, they can be merged with firm-level databases to obtain detailed information on the company. There are several databases that have been used in the past, such as Compustat or various databases offered by Bureau van Dijk including Orbis and Amadeus. The firm-level data also allow researchers to take into account business groups when analyzing litigation behavior (e.g. to construct a measure of the size of the litigant or understand strategic enforcement behavior). One concern in this context is that sometimes only the name of the first plaintiff and/or defendant may be available in the data. If co-plaintiffs or co-defendants are part of the same business group, this does not entail an important loss of information since the relevant information (e.g. about company size) can be recovered from the firm-level database. However, if independent firms appear as co-defendants for example, this may be an issue for empirical analysis.

When patent numbers are available, detailed bibliographic information on patents can be sourced from EPO's Patstat database. This information has been widely used in research on the association between patent characteristics and litigation (for an overview see Weatherall and Webster, 2014).

5. Data access and availability

The main challenge in the analysis of patent litigation consists in the availability of case-level information from the courts. However, even when detailed records are available, transforming these records into quantitative data is challenging. Data on administrative post-grant validity challenges is more easily accessible and to some degree less complex since only validity is at issue.

5.1 United States

The U.S. system provides by far the most comprehensive access to case-level data. This is explained by the availability of all court documents in electronic format in a publicly searchable database. This not only provides direct access to all relevant court records, it has also helped a large number of commercial data providers to make these data available in more user-friendly formats and to combine it with other relevant information.

5.1.1 Publicly available data

In the U.S., court data are made available by the Administrative Office of the Courts on the Public Access to Court Electronic Records (PACER) system to any registered user.³² PACER offers access to all cases heard by district courts, the CAFC, as well as the Supreme Court. The data provided through PACER are considered to provide complete coverage of all patent cases in the U.S. from the mid-2000s onward (Schwartz and Sichelman, 2018). However, PACER is not designed to generate data that lends itself easily to statistical analysis.³³ The USPTO has recently made the PACER data available for download (Marco et al., 2017). The USPTO Patent Litigation Docket Reports Data cover the period 1963-2015, although the coverage of the pre-2000 data is probably incomplete as not all records are available in

³² <https://www.pacer.gov/>

³³ There is also a US\$0.1 fee charged per page downloaded. However, the RECAP archive, which is accessible through a browser extension, provides free access to a large number of documents.

electronic format. However, the usefulness of the data is limited because it does not include the patent numbers of litigated patents.

Data on PTAB proceedings are also publicly available from the USPTO website.³⁴ While all documents can be downloaded for free, the data are not made available for download in a format that facilitates statistical analysis. Unified Patents also offers free access to the data in a more user-friendly format, but there is no bulk download functionality.³⁵

5.1.2 Commercial data providers

There are a large number of commercial data providers that offer access to the PACER data to registered users in a more user-friendly format such as PACERPro, DocketAlarm, Docketbird, Lexis Courtlink, Thomson Reuter's Court Express, or Bloomberg Law. IP specific data providers include Docket Navigator,³⁶ Lex Machina,³⁷ MaxVal,³⁸ Clarivate Analytics' Derwent LitAlert, and RPX.³⁹ The principal clients of these databases are practitioners that have very different data needs than researchers that want to conduct statistical analysis. This can create problems when bulk downloads are necessary to conduct statistical analysis.

5.1.3 Other databases

There are also a number of ancillary databases available that can be combined with the litigation and PTAB data. There are several databases that identify NPEs in the litigation data. RPX, Patent Freedom, and the Stanford NPE Litigation Dataset, offer information that allows to identify litigation that involves NPEs. The Stanford dataset is also available for bulk download.⁴⁰ There are also several databases that identify litigated patents that have been declared standard essential such as the Searle Center Database⁴¹ and the Disclosed Standard Essential Patents (dSEP) database (Bekkers et al., 2012).

5.2 Europe

In Europe, court-level data are far less accessible. Existing analysis has used data obtained from several sources.

5.2.1 Publicly available data

In Germany, case-level data are available from official court websites.⁴² However, there are a number of problems associated with these publicly available data. There is no court diary or case index that allows to verify that all cases filed with a given court are recorded. Moreover, case documents may be redacted, for example patent numbers or the names of litigating parties

³⁴ <https://ptab.uspto.gov>

³⁵ <https://portal.unifiedpatents.com>

³⁶ <http://brochure.docketnavigator.com>

³⁷ <https://lexmachina.com>

³⁸ www.maxval.com

³⁹ <https://www.rpxcorp.com>

⁴⁰ <https://law.stanford.edu/projects/stanford-npe-litigation-dataset/>

⁴¹ <http://www.law.northwestern.edu/research-faculty/searlecenter/innovationeconomics/data/technologystandards/>

⁴² Cases can be found online for example for Germany, LG Dusseldorf <https://www.justiz.nrw.de> or the BPatG <http://juris.bundespatentgericht.de>.

are missing from the publicly available documents. Still, publicly available data for Germany have been used in research (e.g. Elsner and Zingg, 2018).⁴³

In the UK, basic information on cases listed for a hearing is available from the official court diary.⁴⁴ The diary lists all cases where the claim form has been filed by the plaintiff and the court has scheduled some type of hearing or application. The diary contains some basic information on the case, including the case number, the names of the plaintiff and defendant, and the date of the hearing. The diary may also include information on the status of a case, for example if it has been discontinued due to a settlement. The website of the British and Irish Legal Information Institute (BAILII) contains court records, including published judgements, where court documents for cases listed in the court diary can be found.⁴⁵ Alternative online resources are Lexis Nexis and Thomson Reuter's Westlaw database. In the UK, These documents usually contain unredacted information on court cases. However, often only a single document on a case is available online which may not provide all of the relevant information for a given case. The fact that usually not all court records for a given case are observed when the data are assembled from publicly accessible online sources means that the analysis will be limited. For example, it may not be possible to look at whether specific motions (e.g. for a stay or summary judgement) were filed during proceedings, especially when they were not successful. Such motions may have impacted the parties' litigation behavior,⁴⁶ which is however unobservable in the data. Moreover, BAILII does not publish all court records; decisions that are deemed more important are more likely to be posted online, which creates selection bias in any dataset constructed based solely on records available on BAILII. Helmers and McDonagh (2013b) have used these publicly available sources to construct a database for the PHC for the period 2000-2008.

Data on EPO oppositions is available in EPO's Patent Register which is available as a dataset designed for purposes of statistical analysis.⁴⁷ The readily available data has led to a relatively large amount of research on EPO oppositions (e.g. Harhoff and Reitzig, 2004; Hall and Harhoff, 2004)

5.2.2 Data collection from the courts

There have been a number of efforts where academic researchers collected data directly from the courts. For example, Cremers et al. (2016a) collected data directly from the three most important German LGs for the period 2000-2008. For France, Dumont (2015) collected data from the first instance court in Paris for the period 2008-2013, although her dataset is limited to cases that ended with a judgment on the merits. Helmers et al. (2016) collected case-level data from the two courts competent to hear IP cases in the UK, the IPEC and the PHC, for the 2007-2013 period. The advantage of collecting data directly from the courts is that all the relevant information is observed. However, such efforts depend on access granted by the relevant courts. They are also very resource intensive since paper dockets have to be processed and transformed into digital information that can be used for quantitative analysis.

⁴³ Elsner and Zingg (2018) gather 468 cases at the LG Dusseldorf for the 5-year period 2008-2012. A quick comparison with the data collected by Cremers et al. (2016a) directly from the LG Dusseldorf suggests that the dataset constructed using only publicly available records most likely misses more than 50% of infringement cases.

⁴⁴ HM Courts and Tribunals Service, Patents Court Diary: <http://www.justice.gov.uk/courts/court-lists/list-patents-court-diary>.

⁴⁵ <http://www.bailii.org/>

⁴⁶ For an example of analysis using such detailed information for the U.S. see Ashtor (2016).

⁴⁷ <https://www.epo.org/searching-for-patents/legal/register.html#tab-1>

5.2.3 Commercial data providers

Although there are a number of commercial data providers that offer access to litigation data in Europe, such as Westlaw and Lexis Nexis, the data coverage is far less complete than in the U.S. since the data has to be sourced from the publicly accessible sources described above (Section 5.2.1).

One commercial data provider, Darts-ip, is collecting its own data directly from the courts in various European countries (as well as a number of other jurisdictions around the world). These data have been used in a number of academic studies that analyze patent litigation in various European countries (Graham and van Zeebroeck, 2014; Cremers et al., 2016a; Elsner and Zingg, 2018). Darts-ip has also produced its own analysis using its database; for example it recently published a report on litigation associated with NPEs in Europe (Darts-ip, 2018). One issue with the Darts-ip data for statistical analysis concerns the lack of information on the coverage of the database for a given jurisdiction. Darts-ip offers its own classification of the quality of its data coverage which is not particularly informative however.⁴⁸ This creates potential selection problems (see Section 4 above) and makes it difficult to correct for such selection or even account for it in the interpretation of the data since users are not alerted to the presence of such problem or its source.

5.3 Japan

5.3.1 Publicly available data

The IP High Court offers an online database that provides court decisions for all courts competent to hear patent cases.⁴⁹

5.3.2 Commercial data providers

Darts-ip also provides data for Japan. We are not aware of any other commercial data providers.

5.4 China

5.4.1 Publicly available data

Since 2014, all decisions by courts in China are made publicly available on the China Judgements Online website.⁵⁰ In practice, coverage is still well below 100%.⁵¹ Moreover, the data only cover infringement decisions since invalidity challenges are exclusively decided by CNIPO. Bian (2017) has used the data for 2014 to study patent litigation in China.

⁴⁸ It distinguishes between “optimal”, “high”, and “building” coverage. Since “optimal” coverage is defined as “complete or best coverage available” it is unclear what the actual coverage is since “best coverage available” is not well defined and differs across jurisdictions. See <https://www.darts-ip.com/how-we-do-it/>.

⁴⁹ http://www.ip.courts.go.jp/app/hanrei_en/search

⁵⁰ <https://wenshu.court.gov.cn/>

⁵¹ For more discussion and an analysis of the data see Bian (2017).

5.4.2 Commercial data providers

There are a number of commercial data providers and law firms that offer data on patent litigation in China. The China IP Litigation Analysis database (CIELA) offers access to court decisions since 2006.⁵² It was created and is maintained by the IP consulting firm Rouse. However, the online database only offers aggregate information and does not allow extracting detailed information on individual cases or bulk data for statistical analysis. Nevertheless, Rouse has made the underlying case-level data available in the past for research purposes (see Love et al., 2016). Other commercial data providers are IPHouse⁵³ and Darts-ip.

5.5 Korea

Access to court records is difficult. The Patent Court makes decisions on appeal publicly available,⁵⁴ and the Supreme Court also publishes its decisions.⁵⁵ However, there is no comprehensive database of 1st instance decisions. We are not aware of any commercial providers of a patent litigation database.

6. Data

We use court data for the U.S. and the UK. We also use data on oppositions at the EPO and IPRs at the PTAB. The data for the U.S. was assembled using district court litigation data from MaxVal and Docket Navigator. The data on PTAB proceedings come from Unified Patents. We have data on district court proceedings for the period 2010-2016 but have updated case outcomes using information from July 2018 (see Ganglmair et al., 2018). We have information on all IPR proceedings since the proceedings were implemented in 2012 up to 2016. For the UK, we use the data collected directly from the IPEC and PHC for 2007-2013 (see Helmers et al., 2016). The EPO opposition data come from the EPO Patent Register.

7. Analysis

In this section we provide a number of statistics of administrative post-grant reviews at the USPTO and the EPO and in-court litigation in U.S. district courts and IP courts in the UK.

7.1. Administrative post-grant reviews

Figure 1 shows the total number of IPR petitions by quarter since its start in September 2012 through the end of 2016.⁵⁶ As explained in Section 3.1 above, there is an institution stage and only instituted petitions are decided by the board. The figure shows that the share of instituted petitions initially tracked the total number of petitions closely. Starting in the 3rd quarter of 2014, the share of instituted petitions drops and continued to hover around 55% for the rest of the period. The figure also shows that the large majority of instituted petitions is decided by the PTAB, on average slightly over 75% between 2012 and 2015. The drop towards the end of the period is due to data truncation and does not represent an actual drop in the instituted petitions that are decided by the board.

⁵² <https://www.ciela.cn/en/>

⁵³ <http://www.iphouse.cn/>

⁵⁴ <https://patent.scourt.go.kr/>

⁵⁵ <http://eng.scourt.go.kr/eng/supreme/decisions/NewDecisionsList.work?mode=5>

⁵⁶ For the purposes of the analysis presented here, we aggregated the claim-level data at the petition-level.

Figure 1: Total number of IPR petitions by quarter

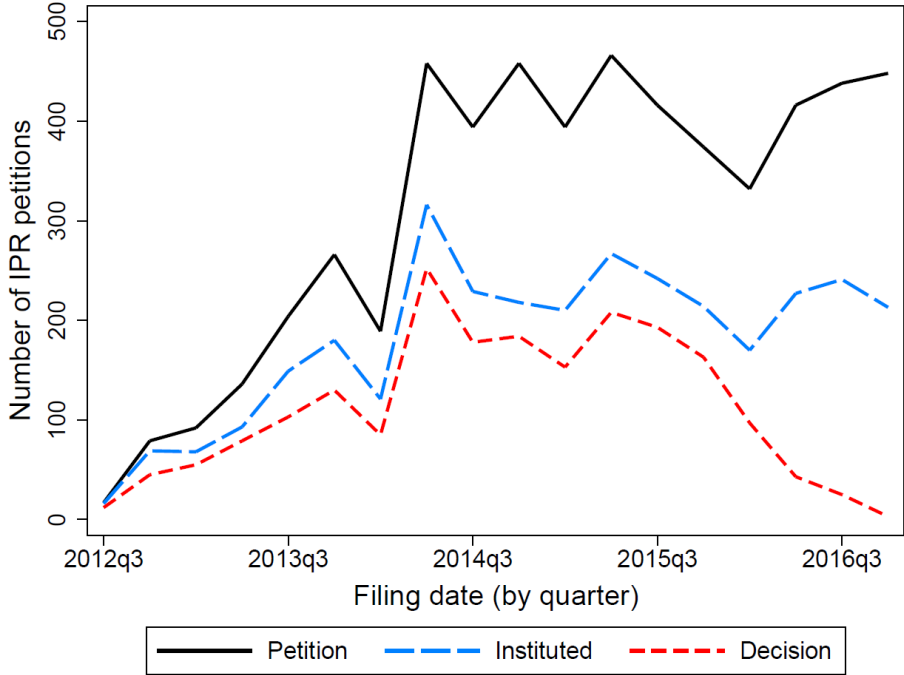


Figure 2 shows the timing of institution decisions. The figure distinguishes between instituted petitions and petitions denied institution. It is clear from this figure that the IPR operates under a stringent timeline. Although there may occur minor delays, the majority of institution decisions is made within approximately 180 days of filing.

Figure 2: Time lag in days between IPR petition and institution decision

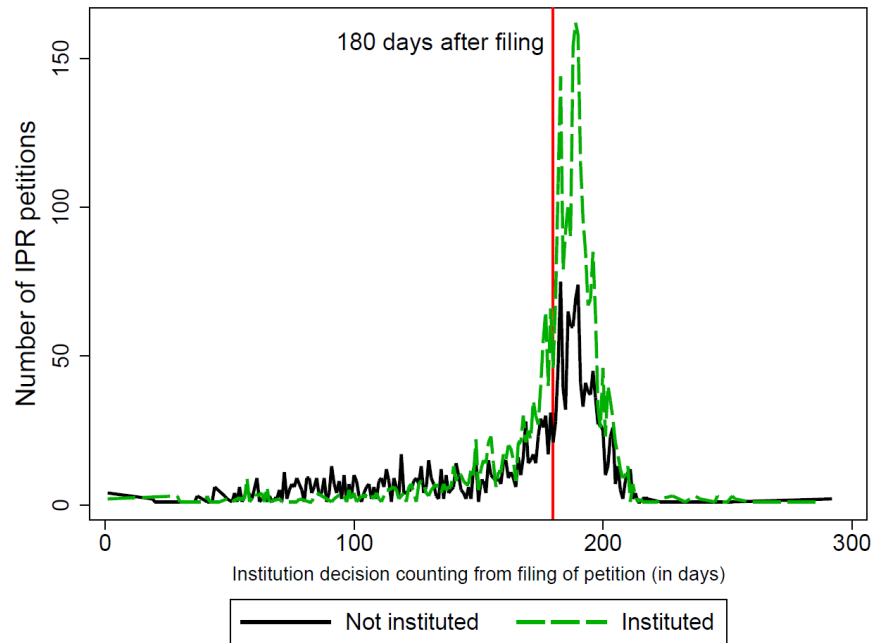
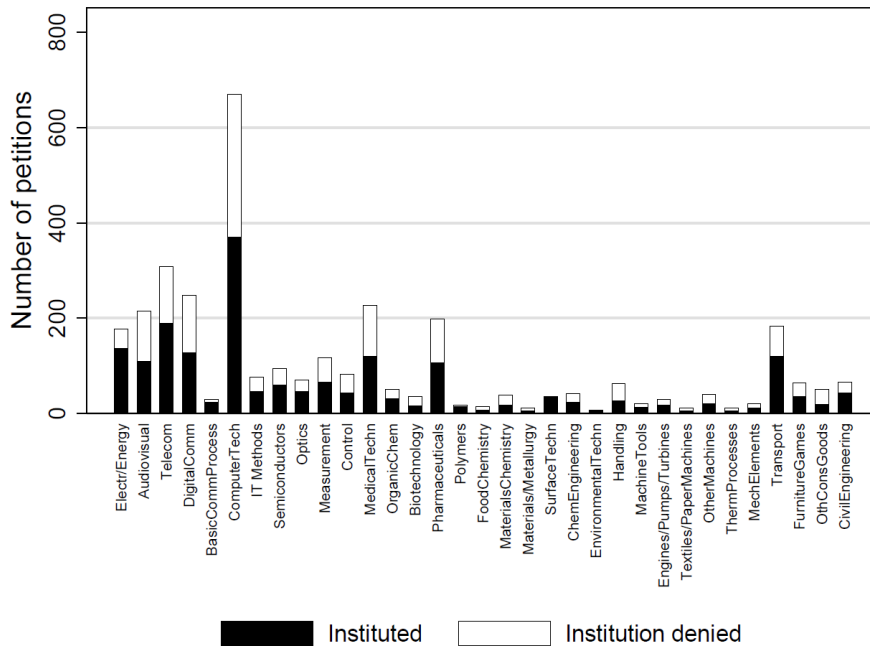


Figure 3 shows a breakdown of petitions and institution decisions by technology area.⁵⁷ By far the largest number of petitions is in “computer technology”,⁵⁸ followed by “telecommunication”,⁵⁹ and “digital data communication.”⁶⁰ Institution rates vary substantially across technology areas, but for areas with few petitions these numbers are difficult to interpret. If we focus on areas with more than 200 petitions, telecommunication has the highest institution rate (62%), followed by computer technology (55%), and medical technology (53%).⁶¹

Figure 3: IPR institution decision by technology area 2012-2016



⁵⁷ The classification follows Schmoch (2008).

⁵⁸ Defined as IPC G06 (excl. G06Q), G11C, and G10L.

⁵⁹ Defined as IPC G08C, H01P, H01Q, H04B, H04H, H04J, H04K, H04M, H04N1, H04N7, H04N11, H04Q, and H04W.

⁶⁰ Defined as IPC H04L.

⁶¹ Defined as IPC A61B, A61C, A61D, A61F, A61G, A61H, A61J, A61L, A61M, A61N, and H05G.

Figure 4 tracks IPRs from filing to termination. The figure distinguishes between petitions that are settled, denied institution, and decided by the board. The figure underscores the strict timeline of IPRs. Petitions that are not instituted are overwhelmingly terminated within 180 days and instituted petitions reach a final decision within one year from institution. There are relatively few settlements and they appear to occur earlier on in the process, mostly before and around the institution decision.

Figure 4: Time lag in days between filing of IPR and termination date

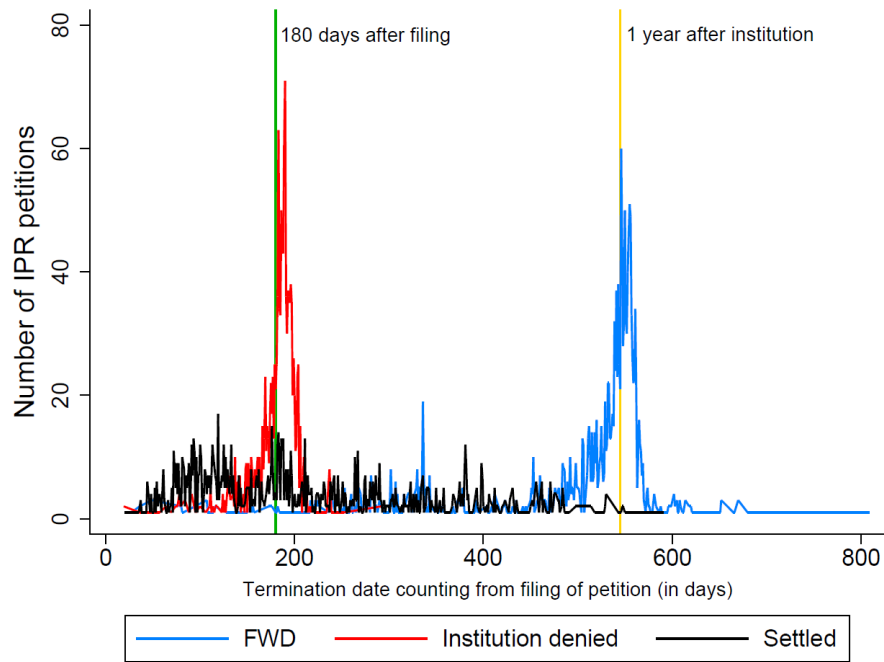
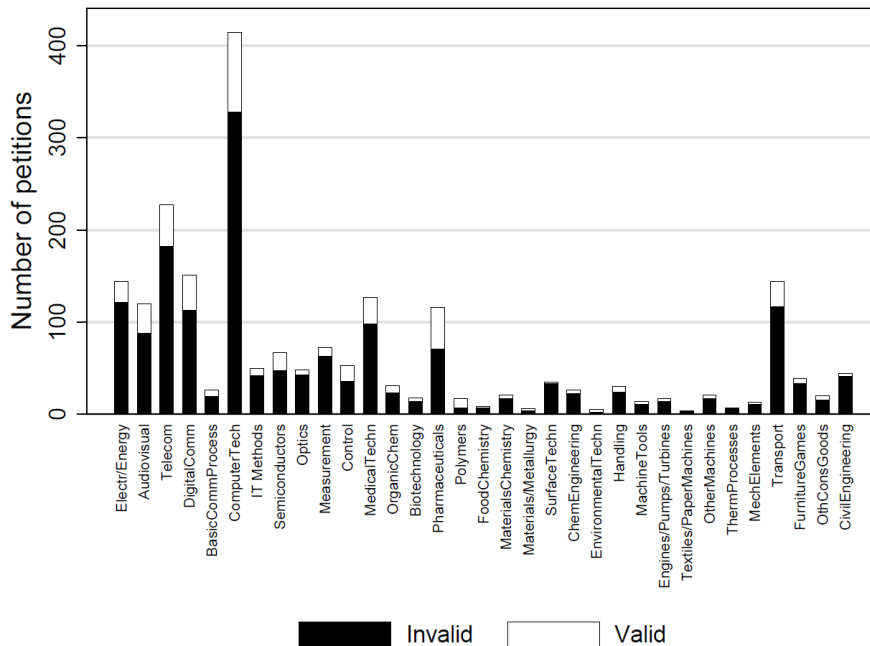


Figure 5 shows outcomes of decided IPR petitions by technology area. Again, among decided petitions, computer technology stands out with by far the largest number of decided petitions, followed by telecommunication and digital communication. Across all technologies, the majority of decided petitions lead to the invalidation of at least one or several challenged claims. On average, across all technology areas, in 77% of petitions at least one challenged claim is invalidated by the board. Computer technology and telecom had invalidation rates of around 80%. Notably, pharmaceuticals also had a high invalidation rate of slightly over 60%.⁶²

Figure 5: IPR institution decision by technology area 2012-2016



Next we look at oppositions at the EPO. As explained in Section 3.5.1 above, oppositions can be filed within 9 months of the European grant date. All oppositions that are filed during that time period are combined at the end of the 9 month period before oppositions proceedings begin. This means that the number of oppositions is not directly comparable to IPRs because separate petitions for IPR for the same patent can be filed but are not necessarily combined into a single proceeding. Figure 6 shows that the number of oppositions is relatively steady at slightly over 700 per quarter between 2012 and mid-2015. The numbers drop in 2016 due to truncation of the available data.

⁶² Defined as A61K (excl. A61K8) and A61P.

Figure 6: Total number of EPO oppositions by quarter

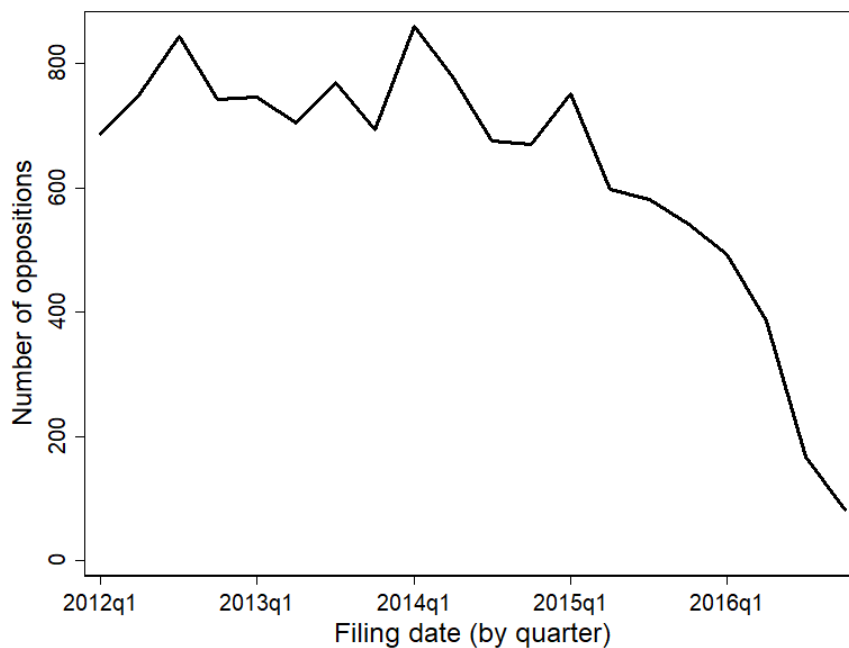


Figure 7 shows the time lag between the beginning of opposition procedures (as defined by the closing of the 9-month opposition window after grant) and the first-instance decision by the EPO Opposition Division. The bulk of oppositions are decided within around two years counting from the start of the opposition proceedings. However, there are a number of oppositions that take significantly longer.

Figure 7: Time lag in days between filing of Opposition and termination date (2012-2016)

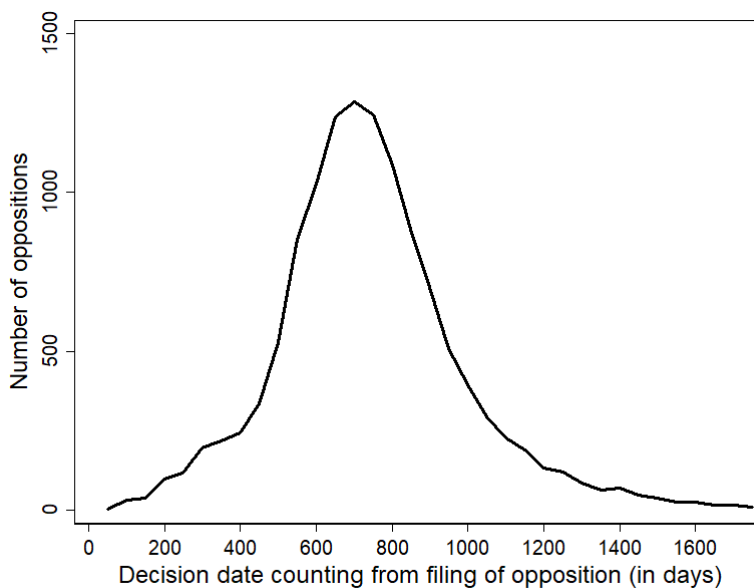
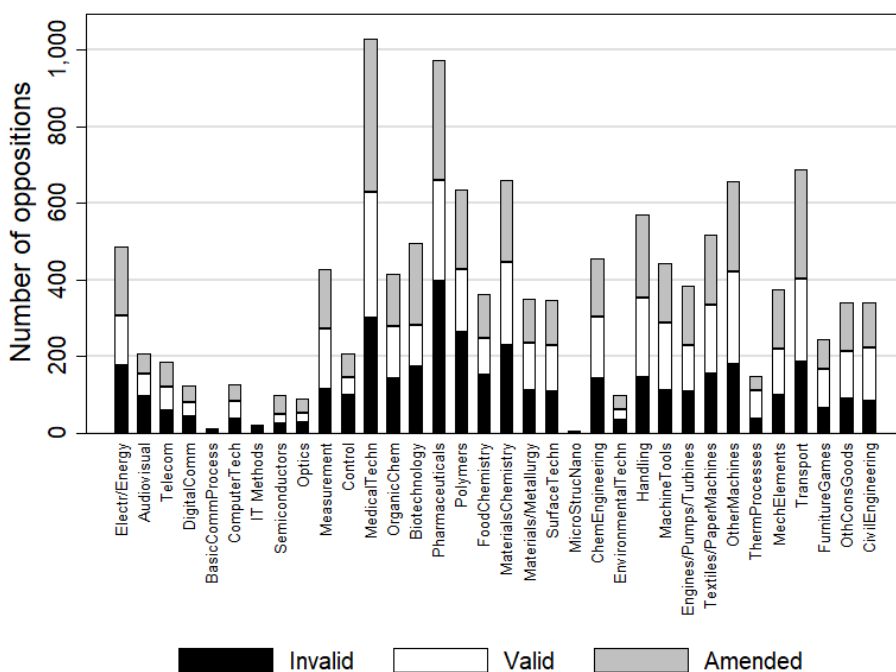


Figure 8 looks at the number of opposition proceedings across technology areas and breaks the data down by outcome of the opposition proceedings. There are 3 possible outcomes: a patent is invalidated, maintained in its current form, or maintained in amended form. Especially the latter outcome allows patentees to maintain their patent in force although the amendment is generally seen as a victory for the opposing party as it leads to a narrowing of the scope of a challenged patent. Figure 8 shows that the technology distribution of EPO oppositions is different from that of IPRs shown in Figures 3 and 5 above. Oppositions are far less concentrated in a single technology area and instead widely distributed across areas. That said, most oppositions occur in medical technology and pharmaceuticals. In contrast, there are relatively few oppositions in computer technology, telecommunication and digital communication which is most likely explained by differences in granting practice of software-related patents between the USPTO and the EPO. The distribution of outcomes is fairly even across technology areas, on average around 32% of opposed patents are invalidated, 32% upheld, and 36% upheld in amended form.

Figure 8: Opposition outcome by technology area 2012-2016



7.2. Litigation in court

Next we turn to the data on in-court litigation. We have data for both the UK and the U.S. For the UK, the data were directly collected from the courts and cover all patent litigation between 2007 and 2013 at the Patents Court as well as the IPEC. For the U.S., we have data on patent litigation at all district courts for the period 2010-2016.

Figure 2 shows the total case count for both jurisdictions for the available time periods. It is clear that there is a large difference in scale between the two jurisdictions. The average case count for the period 2010-2013 for which we have data for both jurisdictions is almost 4,700 in the U.S. and only 76 in the UK. Figure 2 also shows an increase in patent litigation between 2010 and 2012 in both jurisdictions which coincides with the height of the so-called global patent wars which may have contributed to the increase in litigation in both jurisdictions. However, as we will see further below, in the U.S. the increase was also to a large extent driven by an increase in litigation associated with PAEs. There was no comparable increase in PAE litigation in the UK.

Figure 9: Total case counts for the U.S. (2010-2016) and UK (2007-2013)

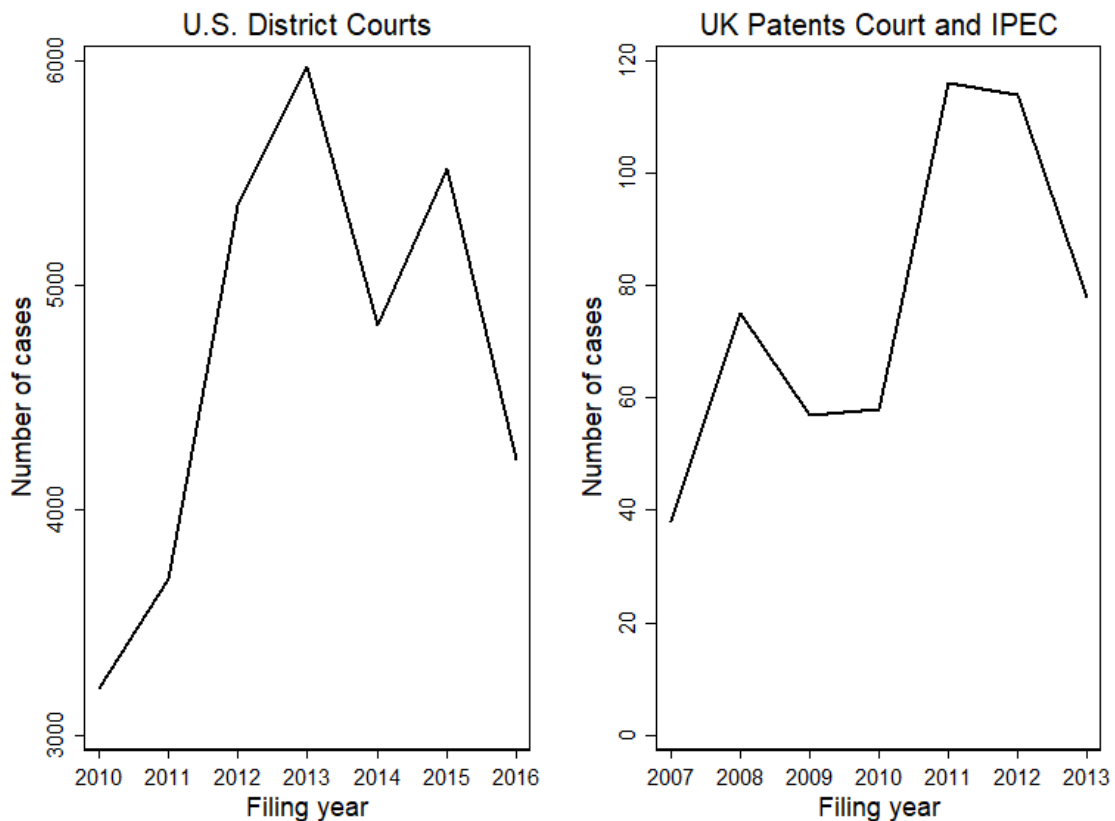


Figure 10 breaks the data down by type of complaint. We distinguish between infringement, invalidity, and “other” where the other category contains a range of other patent-related claims such as disputes regarding inventor- or ownership, false patent marking, licensing contracts etc. The figure also distinguishes between cases that ended with a decision by the court or a settlement/dismissal. In both jurisdictions, the share of decided cases is very small, in the U.S. only slightly less than 10% of cases are decided by the courts, in the UK the share is significantly higher at 26%, although this still means that only around a quarter of cases are decided. Figure 10 points to another important difference in litigation behavior between the two jurisdictions. Complaints in the U.S. are almost all alleging infringement of a patent. While there are a number of complaints alleging invalidity and usually also non-infringement, they account only for a small share of the total caseload. In The UK instead, 30% of cases start with a

validity challenge. The share of cases decided by the courts is in fact larger for validity challenges than infringement claims with 32% and 20% decided cases, respectively.

Figure 10: Claims and outcome for the U.S. (2010-2016) and UK (2007-2013)

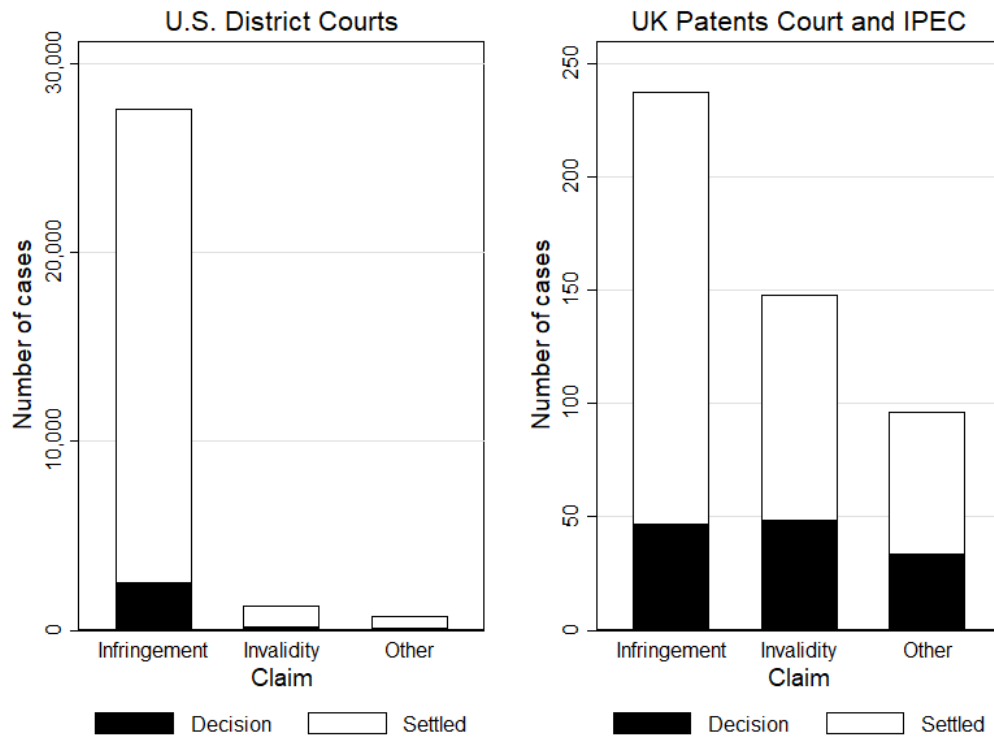


Figure 11 zooms into the set of cases decided by the courts. Figure 10 has shown that this is a highly selected, small sub-set of cases. Figure 11 looks at the specific case outcomes distinguishing between infringement, invalidation, and other outcomes. Other outcomes contain a large range of decisions including those where for example a plaintiff alleges infringement and the court finds no infringement but does not invalidate the patent (either because invalidity was not raised as a counterclaim or the court found the patent to be valid). This explains the relatively large share of cases that fall into the other outcome category. The most striking insight from Figure 11 is the share of decided cases that ends with the invalidation of asserted patents even when the initial complaint alleged infringement. In the UK the share of invalidated patents in cases where the claim challenged validity is even higher with 71% compared to 59% for infringement claims. This suggests that in both jurisdictions a finding of infringement is the least frequent outcome within the set of decided cases.

Figure 11: Claims and outcome for the U.S. (2010-2016) and UK (2007-2013)

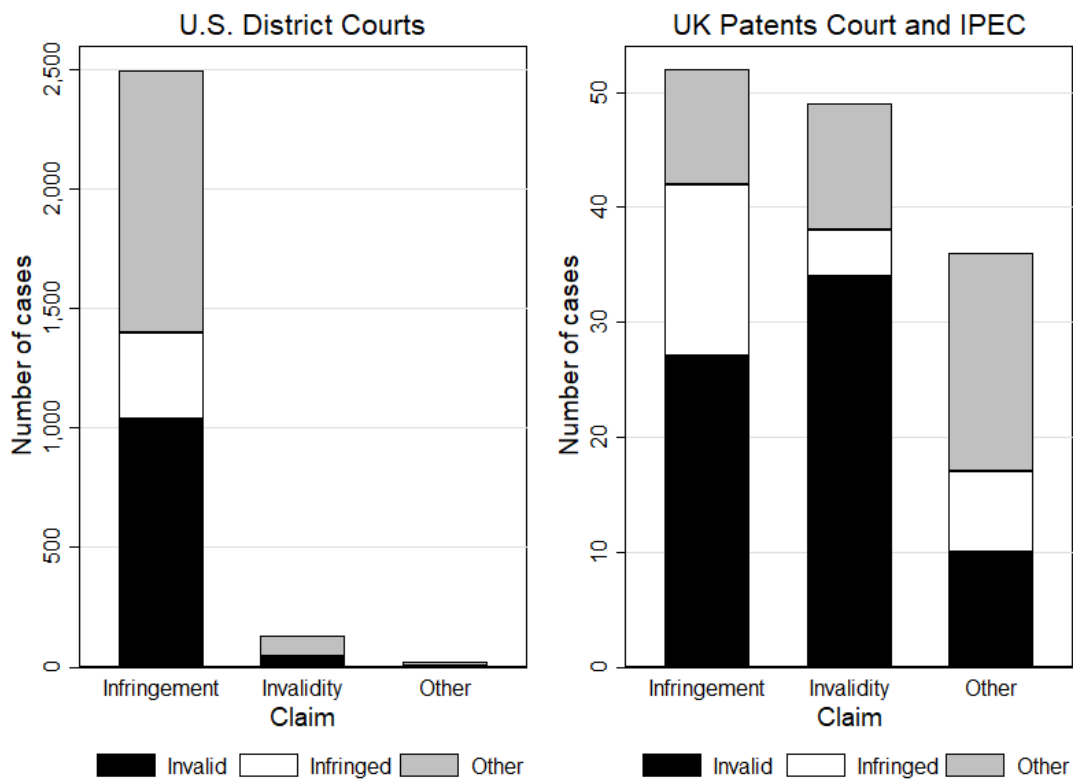


Figure 12 plots the duration of court cases in the U.S. and the UK. The distribution of cases in the U.S. is a lot smoother due to the much larger number of court cases, but overall the distributions look similar. However, court cases in the U.S. take on average only about 11.5 months to resolve (median 7.5 months) while they take significantly longer -- on average 15 months (median 14 months) -- in the UK. This difference is however largely explained by the larger share of settlements in the U.S. data.

Figure 12: Duration of cases in the U.S. (2010-2016) and UK (2007-2013)

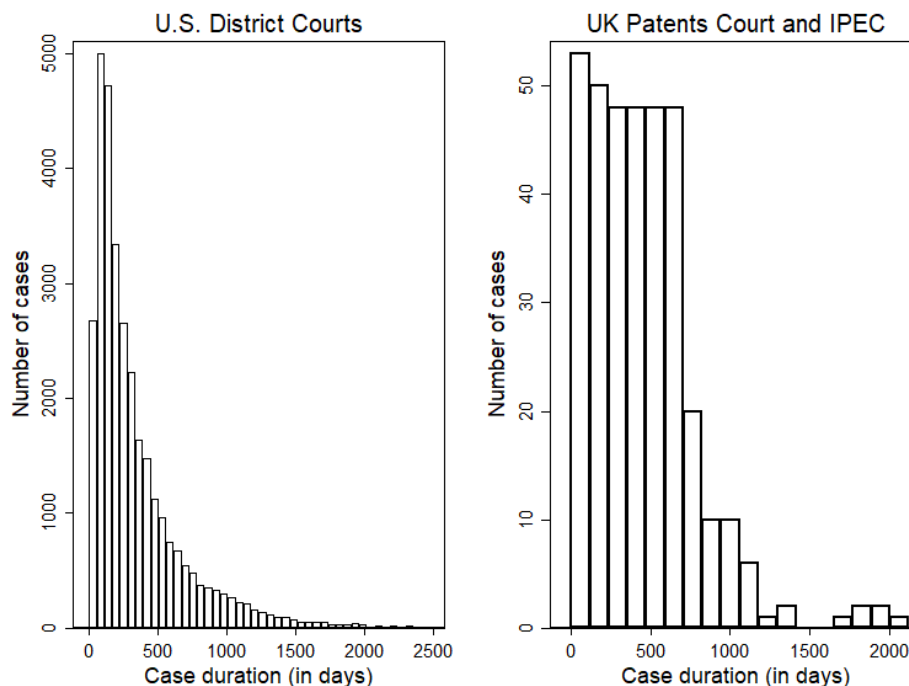


Figure 13 looks at the interaction between litigation in court and administrative post-grant reviews. As discussed in Section 3, interaction occurs when a patent that is litigated in court is challenged through an IPR in the U.S. or an opposition at the EPO. We identify such parallel litigation in the data⁶³ and plot in Figure 13 the number of court cases that have a parallel administrative validity challenge. We distinguish in the data the type of complaint as well as outcome of the administrative validity challenge. In the U.S., parallel IPRs have been filed mainly in infringement cases by the defendant in an attempt to invalidate the patent administratively and thereby achieve a dismissal of the infringement case in court. In the UK, a relatively larger number of cases that challenge a patent’s validity in court also challenge the patent’s validity administratively at the EPO. Because courts in the UK often do not stay proceedings if an opposition is pending at the EPO, this strategy allows the plaintiffs to use all available venues to invalidate a patent.

⁶³ In the UK, we define parallel litigation by identifying (a) patents litigated in court and challenged at the EPO where the court case was (b) initiated within 9 months of the grant date of the European patent, (c) the defendant in the court case is the opposing party in the EPO opposition, and (d) the plaintiff in the court case is the patentee in the EPO opposition. For the U.S., we define parallel litigation by identifying (a) patents litigated in court and challenged at the PTAB in form of an IPR where the IPR was (b) initiated within 12 months of the start of the filing of the complaint, and (c) the defendant in the court case is the petitioner in the IPR if the claim in the district court is for infringement or vice versa if the claim in court is for invalidity/non-infringement.

Figure 13: Parallel IPRs (U.S. 2012-2016) and EPO oppositions (UK 2007-2013)

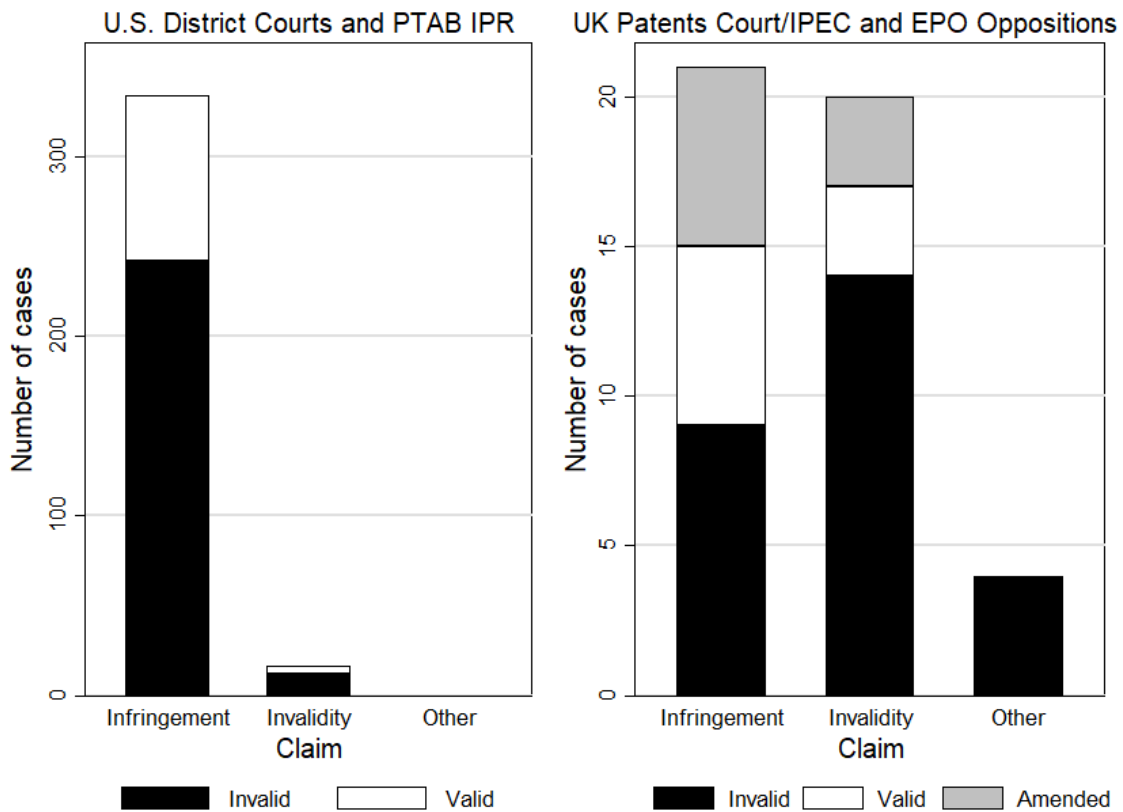
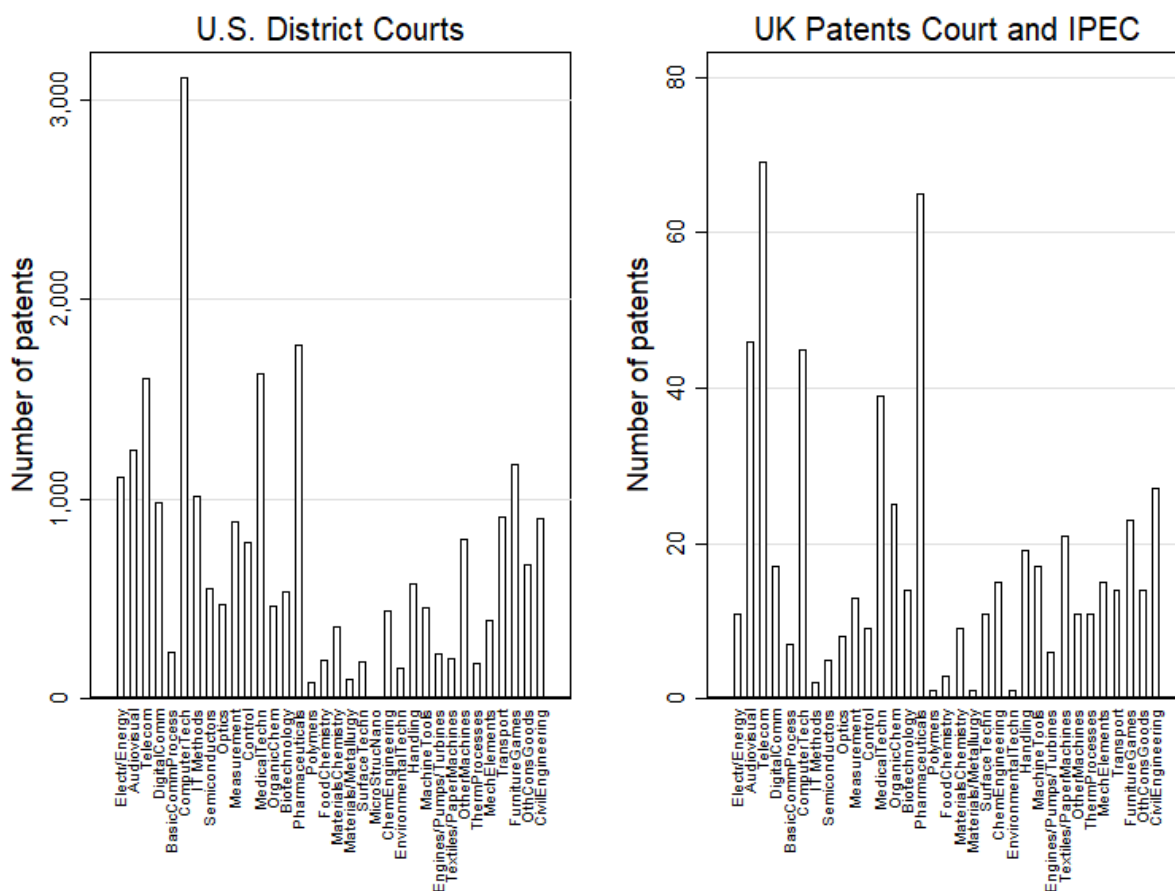


Figure 14 looks at all litigated patents across technology areas. In the U.S., the largest number of litigated patents is in computer technology followed by pharmaceuticals. In the UK, most litigated patents are in telecommunication and pharmaceuticals. The relatively large number of litigated patents in telecommunication in the UK is a more recent phenomenon and reflects the surge in litigation associated with the global patent wars between smartphone manufacturers.

Figure 14: Court cases by technology area in the U.S. (2010-2016) and UK (2007-2013)

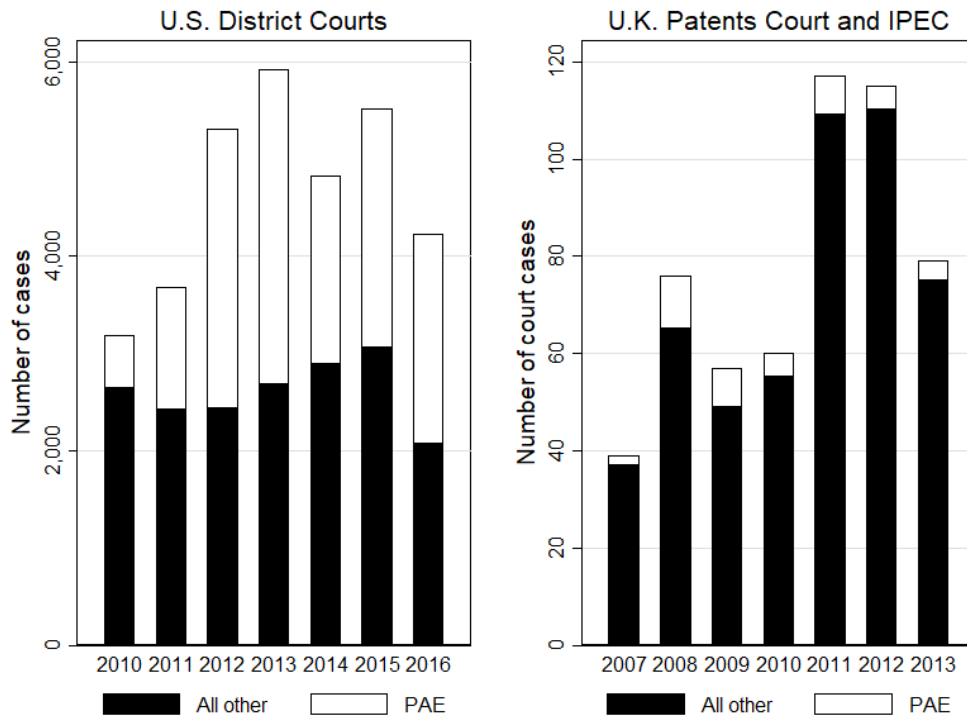


Finally, we identify litigation associated with PAEs and show in Figure 15 the annual total case count in both jurisdictions distinguishing between cases that involve PAEs as plaintiff or defendant and all other litigants.⁶⁴ Figure 15 shows that PAEs account for a large share of total court cases; in fact their share increased to 54% in 2012 i.e. PAEs accounted for more than half of all court cases.⁶⁵ The share dropped in 2014 to 40%, but increased again in 2016 to over 50%. Litigation associated with PAEs is much less frequent in the UK. The share varies between 4% in 2012 and 14% in 2008 and 2009.

⁶⁴ We define PAEs as entities that exclusively enforce patents i.e. IP licensing companies (this excludes start-ups, universities, IP subsidiaries of producing companies). For more discussion on the definition of PAEs see Love et al. (2017). We identify PAEs in the U.S. through the Stanford NPE Litigation Dataset and its extension for 2016 by Ganglmair et al. (2018). For the UK we rely on the classification by Love et al. (2017).

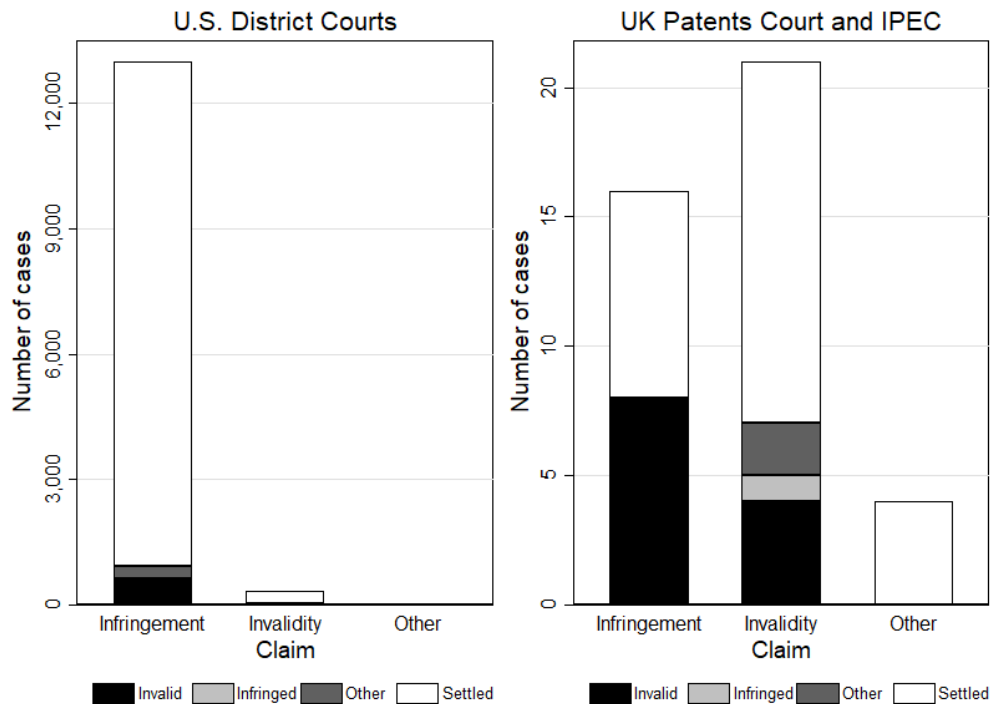
⁶⁵ The increase in 2012 is in part due to the change brought about by the AIA regarding a plaintiff's ability to sue several independent defendants in a single case.

Figure 15: PAE court cases in the U.S. (2010-2016) and UK (2007-2013)



When we look at the outcome of cases associated with PAEs in Figure 16, we see that in the U.S. the vast majority of cases settle (93%). Among those that are decided, slightly less than 60% of cases end with the invalidation of the patent in suit. Few cases end with a finding of infringement in favor of the asserting PAE (around 7%). The data for the UK look similar: 63% of PAE cases are settled, among those that are decided, in 80% of cases the patents-in-suit are invalidated and only in a single case infringement was found. This confirms that the business model of PAEs is to obtain settlement payments. If a case is indeed litigated through to judgment, PAEs tend to fare poorly; in most cases they lose the asserted patent.

Figure 16: Outcome of PAE court cases in the U.S. (2010-2016) and UK (2007-2013)



8. Looking ahead

The patent litigation landscape is continuously undergoing changes. These changes occur for a number of reasons, due to technological or institutional changes, policy, and legal decisions with precedential effect. Here we discuss only a few factors that are likely to affect litigation in Europe and the U.S. in the near future.

The European Patent with Unitary Effect (unitary patent) is predicted to be issued in 2019. The unitary patent is a European Patent granted by the EPO for which an applicant may request unitary effect. Once this unitary effect is registered in the register for unitary patent protection, the unitary patent will be enforceable in the EU member states in which the Unified Patent Court Agreement (UPCA) has taken effect at the time of the date of the registration of unitary effect by the EPO.⁶⁶

The unitary patent also represents a major change in the European patent enforcement system because the reforms led to the establishment of the UPC. The UPC has exclusive jurisdiction to hear cases that involve unitary patents but also European patents granted by the EPO which have not been opted out of the system.⁶⁷ Owners of European patents have a transitional

⁶⁶ All EU member states except for Spain and Croatia. Poland is part of the enhanced cooperation for a unitary patent but did not sign the UPCA. Unitary patents will therefore not have effect in Poland.

On the territorial scope of a unitary patent: https://www.epo.org/law-practice/legal-texts/html/upg/e/uppg_a_ii_4.html

⁶⁷ On the competence of the UPC: <https://www.unified-patent-court.org/fag/competence-upc-0>

period of 7 years to opt their patents out of the jurisdiction of the UPC.⁶⁸ The transitional period may be extended for an additional period of seven years. During the transitional period, European patents that have not opted-out may still be litigated before national courts. National courts and the UPC will therefore share competence on European patents during this period. The UPC decisions have effect in all member states participating in the system. The UPC will have only two instances, a court of first instance and a court of appeal.⁶⁹ Questions of EU law may be referred to the European Court of Justice.⁷⁰ The court of first instance has local and regional divisions as well as a central division. In principle, infringement and validity are heard by the same court, but there is the possibility of bifurcation at local and regional divisions. There is also a possibility of forum shopping, which has triggered concerns over increased attraction for NPE litigation. Since the system will co-exist with the existing European and national patents and national courts, there is also the possibility for some overlap between the systems. In any case, the UPC represents a major change in the European patent litigation landscape.

In the U.S. the post-grant review system has been under intense scrutiny and calls for reforms have been louder. The constitutionality of the PTAB was confirmed in 2018 by the Supreme Court in *Oil States Energy Services, LLC v Green's Energy Group, LLC*. Congress is nevertheless considering new legislation, the Support Technology & Research for Our Nation's Growth and Economic Resilience (STRONGER) Patents Act that would impose restrictions on the filing of post-grant reviews with the PTAB, increase the standards for invalidating patents, and make it easier to obtain injunctive relief. Most recently, in October 2018, the USPTO replaced the broader claim construction applied in PTAB proceedings so far with the same claim construction standard used in federal district courts.⁷¹ Whatever the outcome of this debate, any further changes to PTAB post-grant validity challenges are likely to impact litigation in the courts.

Conclusions

Courts play a central role in the functioning of the patent system. Enforceability confers patents their value. At the same time, this also means that courts may offer opportunities to use patents for rent-seeking. The debate in the U.S. on the patent system over the last two decades reflects this ambivalent role of patent litigation in enabling the patent system and ultimately in providing incentives for innovation. In Europe, patent litigation has been largely seen as uncontroversial, except perhaps in situations where national courts came up with divergent decisions on the same patent granted by the EPO. However, recent debates about NPEs, SEPs, and especially the design of the UPC may indicate a significant change in attitudes. In China, which has experienced a steep increase in patent filings over the last two decades, the patent enforcement system is gaining importance and as a result is receiving an increased amount of attention from the public and policy makers. Its functioning will have a strong impact on the role that the patent system will play in China's innovative activity in the near future.

⁶⁸ On opt-out: <https://www.unified-patent-court.org/faq/opt-out>

⁶⁹ On the location of the different divisions and the Court of Appeal: <https://www.unified-patent-court.org/faq/upc-and-its-judges>

⁷⁰ Art. 21 UPCA – “Requests for preliminary rulings”. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A42013A0620%2801%29>

⁷¹ <https://www.federalregister.gov/documents/2018/10/11/2018-22006/changes-to-the-claim-construction-standard-for-interpreting-claims-in-trial-proceedings-before-the>

Although there is an increased awareness of the importance of statistical analysis of litigation data and a substantial amount of information is made publicly available by courts, data availability and access remain a major obstacle to the analysis of patent litigation. The example of the U.S. shows how courts can make data available to the public. The U.S. experience also shows that the availability of raw data will enable an ecosystem that processes these data and makes it available in more user-friendly ways that enable analysis. There is reason to assume that we will soon see similar data infrastructure in China now that the litigation data is made available online. The European experience in contrast shows how the absence of data released by the courts offers opportunities for commercial data providers to assemble and offer information on litigation at the case-level. However, there are a number of problems associated with the European experience: in the absence of official data, it is difficult to check and verify the coverage of data provided by commercial companies. It also creates concerns over access, especially for purposes of policy making. Availability of empirical evidence for the purposes of policy making is likely to be affected by costly access and the absence of any readily available substitute. The solution would be for courts to maintain an electronic register of court cases and all associated records. Depending on the legal framework in place, this information could be made available to the public through a centralized platform and enable statistical research on patent litigation.

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