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Invalid but Infringed? An Analysis of Germany's Bifurcated Patent Litigation System*

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ABSTRACT

We analyze the impact of the probabilistic nature of patents on the functioning of Germany's bifurcated patent litigation system where infringement and validity of a patent are decided independently by different courts. We show that bifurcation creates situations in which a patent is held infringed that is subsequently invalidated. Our conservative estimates indicate that 12% of infringement cases in which the patent's validity is challenged produce such 'invalid but infringed' decisions. We also show that having to challenge a patent's validity in separate court proceedings means that more resource-constrained alleged infringers are less likely to do so. We find evidence that 'invalid but infringed' decisions create uncertainty which firms that were found to infringe an invalid patent attempt to reduce by filing more oppositions against newly granted patents immediately afterwards.

KEYWORDS: Litigation, innovation, patents, bifurcation, Germany

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1 Introduction

Patents are probabilistic property rights: there is inherent uncertainty regarding a patent's validity and scope (Lemley and Shapiro, 2005). Although patents are granted by patent offices only after substantive examination, there is no guarantee that a granted patent is in fact valid.¹ In most legal systems, such as the U.S. or UK, infringement and invalidity of a patent are decided simultaneously where infringement is only possible if the patent is upheld in the same proceeding.² In a bifurcated patent litigation system such as in Germany, in contrast, separate courts decide on infringement and validity independently of each other. In practice, the decision on infringement is often made and enforced before validity has been determined under the presumption that granted patents are indeed valid. This means that a bifurcated enforcement system prioritizes resolving uncertainty regarding infringement. This has advantages, perhaps most importantly it leads to fast decisions on patent infringement. But because patents are probabilistic rights, this can lead to situations in which a patent is held infringed that is subsequently invalidated. Our objective is to quantify empirically the extent to which bifurcation creates such 'invalid but infringed' decisions and explore potential implications of the uncertainty that they create. As such, our analysis explores implications of the probabilistic nature of patents for the optimal design of patent enforcement systems.

In Germany, jurisdiction for patent infringement lies with twelve regional courts, while patent validity is decided solely by the patent offices (European Patent Office – EPO – or German Patent and Trademark Office – DPMA) during the opposition phase and by the German Federal Patent Court (BPatG) afterwards. Commonly, claims for invalidity are filed in response to the alleged infringement of a patent, that is, the invalidity action at the BPatG usually follows the infringement action. Deciding on the issue of infringement, German courts presume validity of a patent and in most cases proceed with a decision on infringement regardless of a pending validity challenge.³ This means a patent may be found infringed and hence an injunction granted – that is often preliminary, yet fully enforceable – before the validity of the patent has been determined. The duration of this so-called 'injunction gap' can be considerable. This can produce a paradoxical situation in which a patent can be legally enforced although it is subsequently invalidated.

Table 1 lists a number of cases that have received attention in the media as the patents in dispute were held infringed but later invalidated.⁴ A patent dispute between HTC and ICom provides an example of a patent (EP1186189) that was found infringed in first instance, but subsequently invalidated by the BPatG. ICom was granted a preliminary injunction against HTC in early 2009, which would have forced HTC to stop selling its 3G mobile phones in Germany. HTC appealed against the injunction and in late 2010, the BPatG invalidated ICom's patent. Another recent example of a decision on infringement while the decision on validity was still pending is the injunction forcing Apple to de-activate

¹Mann and Underweiser (2012) for example show that the U.S. Federal Circuit has held nearly 60% of patents considered since 2003 invalid.

²This assumes that the alleged infringer raises invalidity as a defense, which is common practice in these legal systems (see Cremers et al. (2013) for evidence on the UK).

³German courts stay infringement proceedings pending an invalidity proceeding only if there is strong reason to believe the validity challenge will be successful (see Section 2).

⁴Table A-4 in the Appendix provides more examples drawn from our data.

its email push service in its iOS handhelds in Germany (EP0847654).⁵ These cases are not confined to disputes between large players in the much-cited ‘smartphone patent wars.’ For example, there is the case between Dr. Johannes Heidenhain GmbH and iC-Haus GmbH, a medium-sized German company, at the Regional Court Düsseldorf. Disregarding a pending opposition of a European patent (EP1168120) at the EPO, the court found the patent infringed in December 2007 and ordered iC-Haus GmbH to disclose sensitive business and financial information. The EPO invalidated the patent in March 2013.

Our empirical analysis confirms the anecdotal evidence – bifurcation creates ‘invalid but infringed’ situations in which a court finds infringement of a patent that is subsequently invalidated. We collect detailed case-level data from German courts to construct a comprehensive, novel dataset on infringement and invalidity proceedings for 2000 to 2008. Using these data, we find that 12% of infringement cases with parallel invalidity proceedings produce such divergent decisions. In a total of 142 cases, patents were held infringed that were (partially) invalidated. Our analysis also shows that the length of the potential injunction gap is substantial. In cases where validity was challenged before the BPatG, the infringement decision was on average enforceable for more than a year before the patent was invalidated in first instance. In cases in which validity was challenged before the DPMA/EPO, the length of the injunction gap is almost three times as large. This offers clear evidence that the injunction gap is a reality that offers scope for patent holders to temporarily enforce invalid patents.

We also show that bifurcation reduces the likelihood that an alleged infringer challenges a patent’s validity. Because challenging the validity of a patent requires a separate action at a different court, the alleged infringer may refrain from doing so despite the potential invalidity of a patent. We find evidence that in particular smaller firms are less likely to file an invalidity action at the BPatG when they are sued for infringement. The effect is robust to controlling for various time varying and invariant patent-, litigant-, and case-level characteristics. This suggests that more resource-constrained firms are less likely to challenge a patent’s validity. The implications of this ‘screening effect’ are twofold: on the one hand the share of cases where an infringed patent is invalidated is downward biased, on the other the strong presumption of validity that is built into the bifurcated litigation system becomes self-reinforcing.

The possibility of infringing an invalid patent and a lower likelihood of facing a counterclaim for invalidation favor disproportionately the patent holder suing for infringement. If patents serve as an incentive mechanism to encourage investments in innovation, strong rights to enforce a patent against alleged infringers may be even socially desirable. However, bifurcation can also create uncertainty. The main argument is that the likelihood to be found to infringe an invalid patent is higher in a bifurcated system than in a system where validity and infringement are assessed in the same proceedings. While the time lag between the decisions on infringement and validity in itself creates uncertainty for the litigants, more fundamentally, the increased likelihood of being found to infringe an invalid patent creates additional uncertainty for firms when navigating the patent landscape. Potentially, this could have important effects on the innovative activity as well as patenting behavior of firms and their performance. For example, firms that have fallen into the injunction gap might adapt their assessment of the likelihood of facing an injunction despite the

⁵On appeal, however, the Higher Regional Court Karlsruhe decided to stay the proceeding until a decision in the parallel invalidity proceeding became available.

Table 1: 'Invalid but Infringed' – anecdotal evidence

| # | Infringement Date | Patent holder Court | Alleged infringer | Patent | Technology | Invalidation Date | Court |
|---|-------------------|------------------------------------|------------------------------|------------|---------------------|-------------------|-------|
| 1 | 30-Apr-02 | LG DU Elmag SpA | Hymmen-Hackemack GmbH | DE19700636 | Process engineering | 25-Apr-02 | BPatG |
| 2 | 13-Feb-07 | LG DU Datalogic S.p.A. | Sick AG | EP0851376 | Barcode | 13-Mar-08 | BPatG |
| 3 | 10-Jul-07 | LG DU Dürrkopp Adler AG | AMF Reece CR, s.r.o. | DE69019972 | Electronics | 21-Jan-10 | BPatG |
| 4 | 31-Jul-07 | LG DU VistaPrint Technologies Ltd. | unitedprint.com AG | EP0852359 | Web-to-print | 13-Nov-08 | BPatG |
| 5 | 27-Feb-09 | LG MA IPCOM GmbH & Co. KG | HTC Corp. | EP1186189 | Telecommunication | 1-Dec-10 | BPatG |
| 6 | 11-May-10 | LG DU austriamicrosystems | Melexis GmbH | EP0916074 | Electronics | 9-Dec-10 | BPatG |
| 7 | 13-Feb-07 | LG DU Pilz GmbH & Co. KG | Sick AG | EP1362269 | Electronics | 21-Jan-08 | EPO |
| 8 | 11-Dec-07 | LG DU Dr. Johannes Heidenhain GmbH | iC-Haus GmbH, Hengstler GmbH | EP1168120 | Electronics | 14-Sep-10 | EPO |

Notes: LG DU: Regional court Düsseldorf; LG MA: Regional court Mannheim; BPatG: German Federal Patent Court; EPO: European Patent Office.

invalidity of allegedly infringed patents. Such changes in perceptions remain unobservable to us.⁶ However, we can test whether they manifest themselves in changes in opposition behavior of alleged infringers. That is, we test whether firms subject to a divergent decision oppose more patents immediately following this experience. Our results shows that alleged infringers are indeed more likely to file oppositions after they have experienced a divergent decision. We interpret this as evidence that firms attempt to preempt similar situations in the future by eliminating potentially threatening patents early on. This finding is consistent with the fact that German firms are overall responsible for a disproportionately large share of oppositions at the EPO, and suggests that this partly reflects the uncertainty created by the bifurcated litigation system.

Our research contributes to the existing literature on the design and functioning of patent enforcement systems by offering for the first time quantitative evidence on the implications of bifurcation. This is not only of direct relevance to Germany, where by far the largest number of patent cases in Europe are litigated,⁷ but also plays an important role in the current heated discussion about the design of the Unified Patent Court (UPC) in Europe. For example, a group of large firms across industries, including Adidas, Apple, Deutsche Post DHL, Google, and Samsung,⁸ issued a [joint statement](#) in February 2014 voicing concerns that “[...] the potential exists for a court to order an injunction prohibiting the importation and sale of goods even though the patent may ultimately be found invalid. This result unduly reduces competition, can increase the cost of products in the market and reduce product choices, all negatively impacting consumers.”

Apart from its relevance for Germany and the European UPC, our research may provide important lessons also for countries that rely on similar bifurcated litigation systems, including some of the world’s top patenting countries, such as China, Japan, and Korea. It also informs jurisdictions that currently do not separate infringement and validity decisions. In the U.S., for example, the validity of [roughly a third](#) of litigated patents in 2013 was challenged through an Inter Partes Review (IPR) before the U.S. Patent and Trademark Office.⁹ Because an IPR has to be concluded within one year whereas infringement cases usually drag on a lot longer, one could argue that this has pushed *de facto* the U.S. system towards bifurcation, albeit bifurcation in which validity is decided first.¹⁰ Instituting bifurcation where validity is decided first may in fact produce potential benefits of separating invalidity and infringement decisions (see Section 3) while avoiding the problems associated with the German type of bifurcation.

⁶There is, however, anecdotal evidence. For example, in April 2012, Microsoft announced the relocation of its European logistics center from Germany to the Netherlands citing the threat of a possible injunction due to the alleged infringement of a Motorola patent (various news sources including [Reuters](#), the [Wall Street Journal](#), and the [Financial Times](#), 2 April 2012.) Microsoft appeared to consider the risk of facing an injunction to be considerably higher in Germany than in the Netherlands, presumably because of the bifurcated litigation system.

⁷Cremers et al. (2013) show that depending on how cases are counted (e.g. counting infringement and invalidity cases as separate cases or not) the total number of patent cases in Germany is between 12 and 29 times larger than in the UK.

⁸The complete list is: Adidas, AFDEL, Apple, ARM, BlackBerry, Broadcom, Bull, Cisco Systems, Dell, Deutsche Post DHL, ESIA, Google, HP, Huawei, Microsoft, Samsung, SFIB, Telecom Italia, and Vodafone.

⁹IPR was introduced by the America Invents Act (AIA) in September 2012 as a way of challenging validity administratively post-grant.

¹⁰A party that has challenged a patent’s validity through IPR cannot raise the same objections subsequently in court. This creates significant barriers to challenging validity again in court if a patent survives IPR.

Taking a broader perspective, our evidence underscores the probabilistic nature of patents. We show that patents that a court presumes valid when deciding on infringement often turn out to be invalid upon closer scrutiny. Patents involved in court disputes are only the tip of the patent iceberg and clearly a non-random selection. Regardless, our evidence supports the general view that legal rights in form of patents are inherently associated with enormous uncertainty. We also show that bifurcation compounds the undersupply of validity challenges in court that has been shown to exist in non-bifurcated systems (Farrell and Merges, 2004). This means that the strong presumption of validity of a probabilistic right, which is built into the bifurcated litigation system, plays out to the patent holder's advantage. This offers empirical evidence directly relevant for the long-standing, largely theoretical debate on the optimal design of patent (enforcement) systems (Aoki and Hu, 1999; Ayres and Klemperer, 1999; Crampes and Langinier, 2002; Boyce and Hollis, 2007; Eckert and Langinier, 2013).

The remainder of this paper is organized as follows: the next section provides a detailed description of the German patent litigation system with particular focus on the interplay of infringement and invalidity proceedings. Section 3 discusses the benefits of a system with a strong, built-in presumption of validity but also the legal discrepancies that it can create which may translate into increased uncertainty for firms. Section 4 describes the data used in our analysis. Section 5 presents our findings and Section 6 offers some concluding thoughts and suggestions for further research.

2 Germany's Bifurcated Patent Litigation System

This section explains the design of the German bifurcated patent litigation system with a focus on the legal framework that can lead to divergent decisions in infringement and invalidity proceedings.

2.1 Court System

Regional courts (*Landgerichte* – LG) have jurisdiction over patent infringement.¹¹ There are twelve regional courts that serve as first instance courts in infringement proceedings.¹² A panel of three judges decide on infringement. These judges are trained legal professionals that very rarely have any technical training (Ann, 2009). Decisions of the regional courts can be appealed before a higher regional court (*Oberlandesgericht* – OLG). In exceptional cases, a further appeal can be brought before the Patent Division of the German Federal Court of Justice (*Bundesgerichtshof* – BGH) in third instance.

The validity of a patent is challenged through opposition procedures at the patent office that has granted the patent right (European Patent Office – EPO – for EP patents or *Deutsches Patent- und Markenamt* – DPMA – for DE patents) and invalidity proceedings before the German Federal Patent Court (*Bundespatentgericht* – BPatG). The responsibilities

¹¹Infringement claims must be based on a patent granted by the DPMA (DE) or the EPO with effect for Germany (EP).

¹²Namely, the Regional Courts Berlin, Braunschweig, Düsseldorf, Erfurt, Frankfurt, Hamburg, Leipzig, Magdeburg, Mannheim, Munich, Nuremberg-Fürth and Saarbrücken. Each regional court has at least one chamber primarily designated to patent cases.

of the BPatG are twofold. It serves as the appeals court for decisions of the DPMA concerning DE patent applications, and it hears invalidity actions for DE and EP (with effect for Germany) patents. As a specialized court, the BPatG deploys legally as well as technically trained judges.¹³ Appeals to the decisions by the BPatG are directly brought before the Patent Division of the BGH that reviews infringement proceedings. The structure of the German court system is summarized in Figure A-1 in the Appendix.

Infringement

A patent holder initiates the infringement proceeding by filing an infringement action. The patent holder can seek different forms of legal relief; for example, a cease and desist order to halt the infringing act, the recall and destruction of infringing goods, rendering of account to identify distribution channels and calculate damages, or damages for losses suffered. The patent holder can also request a preliminary injunction against the alleged infringer. However in practice, preliminary injunctions are rare because they require clear-cut evidence regarding the infringing act, the validity of the patent, and urgency (Kühnen, 2012).¹⁴

The main oral hearing takes place roughly between five to twelve months after the action was filed. Main oral hearings rarely exceed one day and often last for only a few hours. In case of a parallel validity challenge, the judges may grant the request to stay the proceeding until a decision on the patent's validity is available (see Section 2.2 below). If the infringement action is not stayed, the judges hand down a written judgment usually four to ten weeks after the main oral hearing, which concludes the proceeding in first instance. Alternatively, the litigants may settle at any time during the proceeding. The 'winner' can demand the reimbursement of legal costs from the losing party.¹⁵

In the proceeding, the defendant may dispute the infringement allegations, but the possible invalidity of a patent does *not* constitute an admissible defense. The alleged infringer has to challenge the patent's validity through a separate opposition or invalidity action.

Invalidity

The alleged infringer may challenge a granted patent through opposition or, subsequently, an invalidity action. An opposition to an EP (DE) patent can be filed at the EPO (DPMA) within the first 9 months (3 months) after grant of the patent. After this period, the alleged infringer may still join an already pending opposition proceeding. It is noteworthy that the EPO and DPMA may continue the proceeding *ex officio* and decide on validity even if the opponent withdraws the opposition. If invalidated, the patent is deemed void counting from its grant date.¹⁶ Each litigant usually bears his own costs of the opposition proceeding.

¹³The panel consists of five judges: three technically trained judges as well as two legally trained judges.

¹⁴An injunction might be granted, for example, if the suspected infringer is about to start selling a product that clearly infringes a patent that is most likely valid and where selling the infringing product would result in substantial losses for the patent holder. That said, although there has been a recent increase in the number of preliminary injunctions (Müller-Stoy and Wahl, 2008), they are still a relatively rare occurrence in patent litigation (Böhler, 2011).

¹⁵Legal costs include court fees, attorney-at-law as well as patent attorney fees, and further expenses, such as travel or translation costs. Attorneys may charge their clients significantly higher fees than those eligible for reimbursement, thus legal costs are not always shifted entirely to the losing party.

¹⁶Note that for EP patents, the decision has effect in all states where the opposed patent is in force.

After the end of the opposition phase, or – in case of an opposition – after the end of the opposition proceeding, validity can be challenged only through an invalidity action at the BPatG. Although an invalidity action can be filed by any person or legal entity, almost all invalidity actions are filed in response to infringement actions.¹⁷

Unlike in opposition proceedings, the plaintiff has full discretion to withdraw his action at any time. As in the case of oppositions, if the BPatG invalidates a patent, it is invalid since its grant date. The winning party of the invalidity proceeding can demand the reimbursement of legal costs from the losing party.

2.2 Interaction of Infringement and Invalidity Proceedings

If a patent is invalidated, any pending infringement proceedings based on the patent will be dismissed.¹⁸ This still allows for situations where decisions on infringement can be (preliminarily) enforced based on an invalid patent if infringement is decided before invalidity is. The occurrence of such divergent decisions crucially depends on (a) the timing and (b) duration of infringement and invalidity proceedings:

- a) Mostly filed as a defensive reaction to an infringement action, validity challenges are usually filed after the corresponding infringement proceedings.¹⁹ Figure 3 shows the time lag between the filing of infringement and invalidity actions in our data. We find that more than 55% of parallel invalidity proceedings are initiated at least four months after the infringement proceeding.
- b) Invalidity proceedings take significantly longer than infringement proceedings in first instance (see Figure A-2), thus increasing the temporal spread between the decisions. Taking into account a possible appeal, litigants have to expect a maximum of five to seven years until a final judgment on an invalidity action is handed down. Opposition proceedings also take significantly longer than infringement proceedings. The litigants may request acceleration of the proceeding, still, an opposition takes on average 20 to 30 months.²⁰

In combination, a) and b) imply in practice that decisions on invalidity follow infringement decisions with a considerable lag.

The alleged infringer may request to stay the infringement proceeding until a decision on validity is available (see Figure 1). In their decision to grant a stay, the judges of the infringement courts attempt to strike a balance between the inherent conflict of interest between the litigants.²¹ On the one hand, the alleged infringer may suffer irrecoverable

¹⁷von Hees and Braitmayer (2010) estimate that this is the case for 90% of all invalidity actions.

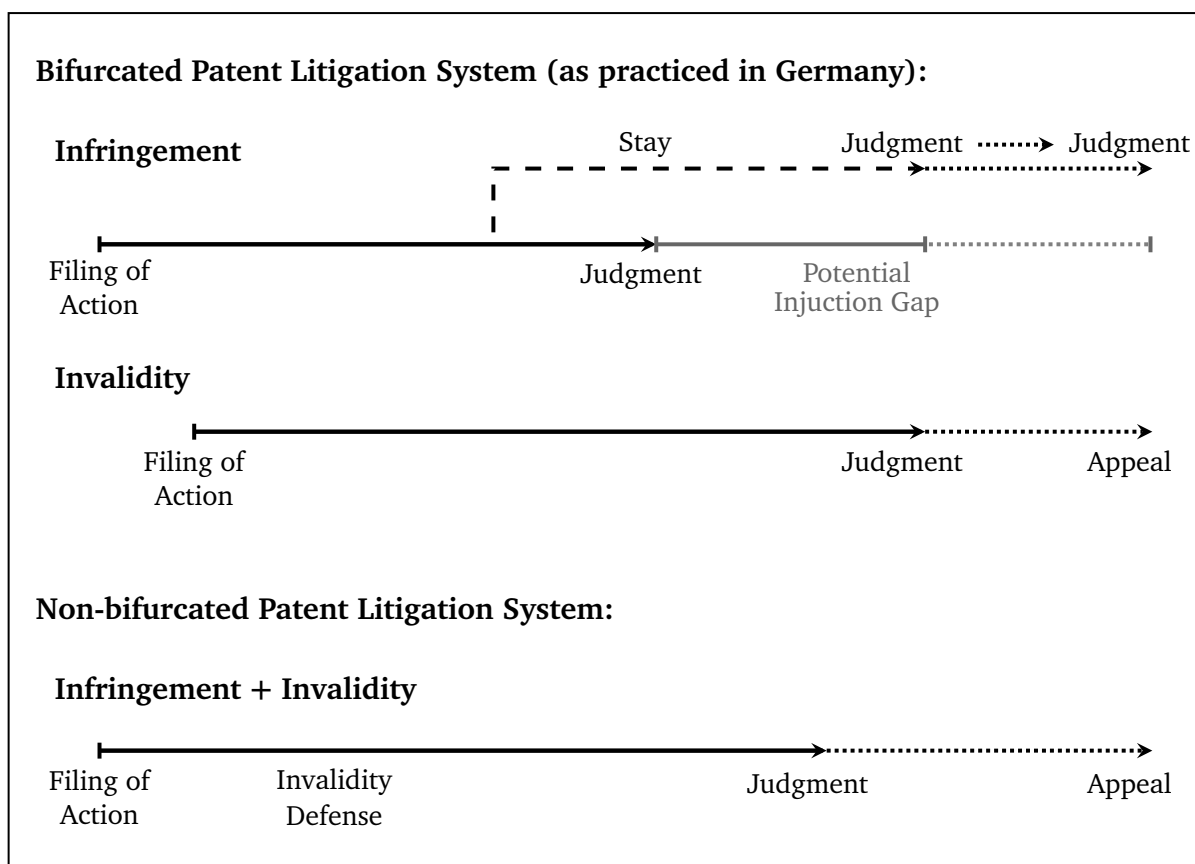
¹⁸If the patent is only partly invalid, the subject matter in pending infringement proceedings has to be reconsidered on the basis of the amended patent. However, if the infringement proceeding is no longer pending, the alleged infringer has to demand a reconsideration of the case on the basis of the amended patent by filing a separate restitution action.

¹⁹This is often due to the time required to prepare the case, in particular the search for prior art that can be used to challenge the patent's validity (Kühnen, 2013).

²⁰Harhoff et al. (2007) reports a median length of opposition proceedings at the EPO of about four years (including appeal).

²¹For example, judges take the expected length of a stay into consideration when deciding whether to stay infringement proceedings (Kaess, 2009). A stay is usually not granted if the prior art forwarded has already been considered in the patent examination or any prior invalidity proceedings. Further factors taken into consideration can be found in Harguth and Carlson (2011) and Kühnen (2012).

Figure 1: Timing of infringement and invalidity proceedings in bifurcated and non-bifurcated systems



damage if she is found to infringe an invalid patent. On the other hand, the delay of the judgment on infringement can be considerable if a stay is granted. In this case, the patent holder would be prevented from timely enforcement.

In practice, infringement courts rely by case law on a strong presumption of validity. That is, infringement proceedings are only stayed if there is an overwhelmingly large probability that the patent will not be upheld in its current form. So, even though the judges at the infringement courts do not consider the validity of the patent in their judgment on infringement, they have to form an opinion on the likelihood of invalidity to decide on a stay (Fock and Bartenbach, 2010). This poses a considerable challenge as infringement court judges are rarely technically trained and limited resources restrict a thorough investigation of the patent’s validity. Usually, the corresponding validity challenges are not yet at a stage where they could provide guidance on the likelihood of invalidity.²² Infringement court judges are therefore forced to stay at their own discretion.²³

²²With the Patent Law Revision Act introduced in 2009 the BPatG is now supposed to provide an interim assessment of the patent’s validity as soon as possible. The infringement court, however, is not bound by the assessment. Note that our data predate this revision of the law.

²³Note that independently of the actual timing of the infringement and invalidity proceedings, the mere jurisdictional separation creates an opportunity for litigants to construe patent claims differently. In this so-called ‘Angora Cat’ approach the patent holder tries to make a patent’s claims look as broad as possible when infringement is determined, the patent looks like a blow-dried, combed, fluffy cat; whereas when validity is

3 Effects of Bifurcation

Proponents of bifurcation argue that exclusive jurisdiction on patent validity offers the advantage of specialization. The court charged with validity cases can train and deploy technical judges and accumulate experience specifically in the assessment of patent validity. This should result in a coherent and well-founded claim construction and therefore increase legal certainty regarding the validity of patents. Another argument in favor of bifurcation is the ‘screening effect.’ Separate patent invalidity proceedings increase the costs and risks for the alleged infringer. If the alleged infringer expects a patent to be upheld, she will refrain from a validity challenge as defense to avoid further expenses. One might argue, therefore, a bifurcated system deters validity challenges with relatively low chances of success. Perhaps the most important argument is that a strong presumption of validity, which puts considerable faith in the pre-grant examination of patent offices, allows a fast assessment of infringement claims because validity is not assessed simultaneously. In combination, fast decisions on infringement, the screening of counterclaims for invalidity, as well as the specialized institutions that decide on the technical question of validity, promise to lead to fast, legally sound, and relatively cheap enforcement of patents (see e.g. Hilty and Lamping (2011)).²⁴

Opponents of bifurcation, however, argue that a system separating infringement and invalidity proceedings is prone to legal discrepancies. We discuss this and several other arguments below.

3.1 Divergent Decisions

Even though infringement and invalidity proceedings are heard and decided by different courts, the decision on the patent’s validity has consequences for the decision on infringement – provided infringement was found. Once a patent is invalidated, this decision erodes the legal basis for any claims for infringement. At the same time, because decisions on infringement are usually made faster than decisions on validity, a court may establish infringement although the patent is later invalidated. In fact, if infringement is found in first instance, any injunction resulting from this decision is enforceable regardless of an appeal or any pending validity challenge. This means the greater the temporal spread between

determined, he presents the claims as narrow as possible, the claims look like a wet, rolled-up cat. Patents may therefore be found valid based on a narrow claim construction, while infringement is found on a broad construction, which – if applied to validity – would have led to the invalidation of the patent. An analysis of the ‘Angora Cat’ approach requires detailed legal comparisons of the claim construction in infringement and invalidity proceedings, which is beyond the scope of our analysis.

²⁴Some proponents of the bifurcated system also argue the temporal spread between the decision on infringement and validity may benefit the alleged infringer if an action is stayed when it should not have been stayed. This could work to the alleged infringer’s advantage if the regional court had most likely found infringement, but the delay caused by a stay allows the alleged infringer to settle on favorable terms. The issue only arises in the case the regional court finds infringement, but mistakenly decides to stay the case assuming that the patent is likely to be invalidated. This is a Type II error, a court does not reject a request for a stay when it should do so. This effect works in the opposite direction of the Type I error, that is, the regional court does not grant a stay when it should do so. If, conditional on filing an invalidity case, the likelihood that the patent in question is invalid exceeds the likelihood of the patent being upheld, the likelihood of a Type I error exceeds that of a Type II error. This suggests that any potential benefits to infringers from a system that minimizes the Type II error are lower than that of minimizing the Type I error.

infringement and validity decisions, the longer a patent may be wrongfully enforced. Even if the patent is invalidated in first instance, the patent holder can continue to enforce the patent as long as the decision does not become binding. The injunction gap may, therefore, extend beyond the first instance invalidity decision. This again creates strong incentives to appeal the infringement decision while awaiting the outcome of the validity challenge. The result is considerable legal uncertainty over the outcome of the infringement dispute, potential delays in enforcement, increased litigation costs, and the possibility of an injunction gap (an enforceable decision on infringement of an invalid patent – area A in Table 2).

Table 2: Divergent decisions

| | | Invalidity | |
|--------------|-----|------------|-----|
| | | No | Yes |
| Infringement | No | | |
| | Yes | | A |

Notes: The figure shows the share of cases where infringement was either found (Yes) or not (No) and where the patent was either invalidated (Invalidity - Yes) or not (Invalidity - No). Area A shows the share of ‘invalid but infringed’ cases.

Two measures that counteract these factors are readily cited by the proponents of bifurcation (Pitz, 2011). First, the strict separation between infringement and validity can be weakened by staying infringement proceedings until the invalidity or opposition outcome becomes available. As mentioned above in Section 2.2, the problem with this mechanism is that the infringement court has to form an opinion on the likelihood of the validity challenge without proper assessment. This may work in cases where the question of validity is rather obvious, but it is doubtful that the infringement court judges’ educated guess correctly anticipates for what the technically trained judges at the BPatG (and DPMA/EPO) need an extensive investigation. Second, the alleged infringer subject to a divergent decision can obtain relief through appeal or a claim for restitution in case the patent holder has exercised an injunction on the basis of the finding for infringement (Kühnen, 2009). In this situation, the alleged infringer has also the right to demand compensation for accrued losses. Compensation may reduce the direct harm caused by an injunction but some injunctions such as rendering accounts to a competitor may cause irreparable damage (cf. Ann et al. (2011)). Moreover, the mere possibility to be found to infringe an invalid patent creates legal uncertainty among firms. A firm may decide for its own business dealings that a given patent is invalid but it may still face a harmful injunction for the time being because invalidity is not an admissible defense in infringement proceedings.

We assess the frequency of divergent decisions (i.e. the size of area A in Table 2) in the German bifurcated patent system empirically by analyzing the timing of parallel proceedings, the occurrence of divergent decisions and any observable trends over time, as well as the share of divergent decisions that became legally binding.

3.2 Screening

Proponents of bifurcation also argue that the separate filing of validity challenges act as a filter deterring challenges with low probability of success. However, it is easy to turn the argument on its head. There is a possibility that patents are not invalidated and held to be infringed that would have been invalidated if scrutinized through an invalidity or opposition proceeding. Hence, the failure to challenge validity may harm the alleged infringer directly but also has consequences beyond the dispute as the patent holder maintains the ability to sue other parties with the valid patent. The main question is, therefore, why an alleged infringer would refrain from challenging validity in a bifurcated system if chances of seeing the patent invalidated are relatively large. For bifurcation to pivot the decision to file a validity challenge, the additional cost involved in pursuing an essentially separate court action and the added length of the dispute with the associated uncertainty about the ultimate outcome may weigh heavier on certain types of firms than others. There is plenty of evidence that smaller firms are more resource-constrained (Carpenter and Petersen, 2002; Hall, 2002). This may imply that in particular smaller firms are less likely to challenge the validity of a patent independent of the patent's actual quality.

Figure 3 illustrates the consequence of such a screening mechanism. We see fewer patents challenged, which biases downward the number of cases for which the patent is found to be infringed although it would not be upheld if its validity was challenged. That is, the share of cases where infringement was found but where the patent was eventually invalidated (area *A*) is downward biased because area *B* is not subject to an invalidity proceeding.

Table 3: The screening effect of bifurcation

| | | Invalidity | |
|--------------|-----|------------|----------------|
| | | Challenged | Not challenged |
| Infringement | No | | |
| | Yes | A | B |

Notes: The figure shows the share of cases where infringement was either found (Yes) or not (No) and where validity was either challenged before the BPatG or the DPMA/EPO (Challenged) or not (Not Challenged) and where the patent was either invalidated (Invalidity - Yes) or not (Invalidity - No). Area *A* shows the share of 'invalid but infringed' cases whereas area *B* shows the share of cases that would fall into the 'invalid but infringed' category but validity is not challenged because of the screening mechanism described in Section 3.2.

We investigate the existence of screening by estimating how the propensity to challenge validity before the BPatG depends on the size of the allegedly infringing firm. We assume that smaller firms are more resource-constrained than larger firms. Hence, finding smaller firms to be less likely to challenge the validity of an allegedly infringed patent while controlling for time varying observable and time invariant unobservable patent-, case-, and litigant-characteristics, offers evidence for the existence of a screening effect of bifurcation.

3.3 Uncertainty and Changes in Opposition Behavior

Since we find that the ‘invalid but infringed’ situation arises in a substantial number of cases (see Section 5.1), the question is whether the occurrence of an injunction gap affects firms beyond the immediate consequences of facing an injunction on an invalid patent.

A possible effect could be a change in the firms’ opposition behavior. While oppositions can be a reaction to the allegation of infringement, they are also considered common precautionary means against newly granted patents of competitors. Compared to invalidity proceedings, oppositions are cheap and for EP patents centralized at the EPO (Mejer and van Pottelsberghe de la Potterie, 2012). However, the main rationale is that firms can curb uncertainty in the patent landscape prior to their own investments to commercialize a technology. In this way, firms can prevent future infringement allegations that may lead to unfavorable outcomes due to bifurcation.

We therefore test whether the opposition behavior of firms changes immediately after they experience an injunction gap. We have data on the entire opposition history of firms at the EPO and check if firms’ filing activities change within a one-year window following the decision on validity (i.e. once they learn that they have been subject to an injunction based on an invalid patent). To account for any general tendency to change opposition filings following litigation, we match a control group of firms that was also involved in both infringement and invalidity proceedings, but where proceedings did not yield divergent decisions. This allows us to obtain difference-in-difference estimates of any effect of the injunction gap on opposition filings. This offers evidence on any uncertainty created by ‘invalid but infringed’ decisions by testing whether firms change their efforts to restrict such uncertainty immediately following an injunction gap.

4 Data

We use data on patent infringement and invalidity proceedings filed at German courts between 2000 and 2008. We also use data on opposition proceedings at the EPO and DPMA for the same time period. We combine the case-level information with patent- and litigant-level data.

4.1 Data Sources

Regional Courts – Infringement

We collected data on infringement actions directly from the three regional courts that deal with the majority of patent infringement cases in Germany: the Regional Courts of Düsseldorf, Mannheim, and Munich I. We obtained detailed information on proceedings filed during the time period 2000 to 2008. This provides us with a nine-year window but also minimizes the number of cases that were still pending during the data collection.²⁵

²⁵Data collection started in Mannheim in spring 2010, in Munich in December 2010 and in Düsseldorf in December 2011. On average seven junior lawyers (*Referendare*) were employed as research assistants at each court to record the data directly from the dockets. Most research assistants had already passed the qualifying examination that authorizes them to practice law in Germany. They also received specific training for the data collection. Because case files are stored at the courts only in paper format, our research assistants had

The information extracted for each case concerns procedural aspects, the identity of the litigants and their legal representatives, and the patents at issue. Regarding procedural aspects, we have data on the dates of filing, oral hearing, and judgment. We also obtained information on how the proceedings in each instance ended, that is, by judgment, settlement or withdrawal. We also have information on the claims made by the plaintiff and the litigation value set by the court. Furthermore, the data include information on the names and addresses of the plaintiffs and defendants, which allowed us to match corporate litigants to firm-level databases, including Bureau van Dijk's ORBIS, Compustat and THOMSON One. This provides us with data on firm characteristics, including the number of employees, total assets, turnover and industry.²⁶ We also collected information on the legal representatives of litigants. We used this information to create a binary variable that indicates whether a litigant was represented in court by a 'top' law firm.²⁷

With the patent application (or publication) numbers referenced in the case files, we retrieved detailed information on the litigated patents from EPO's Patstat.²⁸ Patstat provides us with information on application and publication dates, IPC classes,²⁹ applicants and inventors, family size,³⁰ as well as forward and backward citations. On basis of the patent numbers we constructed the respective patent families to obtain other European national as well as EP equivalents in order to identify cases where a particular patent dispute spreads across multiple national jurisdictions.³¹

Federal Patent Court – Invalidity

We also have information on invalidity proceedings before the BPatG and its appeal court, the BGH. Both courts publish all decisions on validity since 2000 on their websites. We also obtained information on the filing date as well as withdrawn actions in both instances from the register of the German Patent and Trademark Office. This allowed us to construct the course of the invalidity proceedings without having to access the case files at the courts. That said, we do not have any information on the party challenging the patent because the published decisions are anonymized. Therefore, we link infringement and invalidity proceedings based on the patents involved. Earlier studies (cf. Stauder (1983)) and interviews with practitioners support our assumption that generally, the alleged infringer files the invalidity action as a counterclaim to an infringement allegation.

To account for invalidity proceedings that are parallel to the infringement proceedings, but which were filed either before or after the infringement claim was filed, our data on invalidity proceedings cover the entire 1983 to 2012 period.

to digitize the relevant information directly at the regional courts. To retrieve all information in a systematic manner, we created a common data template.

²⁶The data also allow us to distinguish between natural and legal persons, such as firms, research institutions, universities, and so on.

²⁷We identified top law firms in patent litigation according to a ranking of leading law firms published in 2009 (Top 50 law firms in patent litigation & patent applications in Germany) by the legal professional journal *JUVE Rechtsmarkt*.

²⁸We use the Patstat version October 2012.

²⁹The International Patent Classification (IPC) is a hierarchical system of symbols for the classification of patents according to different technology areas.

³⁰The family size of a patent is computed as the number of jurisdictions in which patent protection was sought for the same invention.

³¹Details on the identification of multi-jurisdictional patent disputes can be found in Cremers et al. (2013).

EPO and DPMA – Opposition

We have data on any prior or parallel opposition of the patents involved in an infringement action. For DE patents we have information on the opposition proceeding, i.e. the opposition's filing and end dates as well as outcome, from the register of the DPMA. We constructed data on oppositions at the EPO based on legal status information from Patstat covering 1981 to 2012. In contrast to the data from the DPMA, the data for oppositions at the EPO have information on the identity of the opponent, that is, the party filing the opposition.

We linked the opposition data in the following ways with the litigation dataset. First, we added information on any opposition to the patents involved in an infringement proceeding to identify parallel invalidity proceedings in form of oppositions and to construct each patent's history of validity challenges. Second, we manually identified the litigants from the infringement proceedings among all opponents of EP patents to capture the opposition behavior of the alleged infringers over time. We also matched the opponents with firm-level data from Bureau van Dijk's ORBIS.

4.2 Sample Description

The patent litigation actions collected at the Regional Courts of Mannheim, Düsseldorf, and Munich cover around 80% of all patent infringement cases during the period 2000 to 2008.³² In total, we have data for 5,121 litigation cases. We identify and drop cases from our dataset that involve a patent, but that are not directly concerned with infringement.³³ We also drop cases involving utility models because the bifurcation principle only applies to invention patents. Furthermore, to avoid misinterpretation of case outcomes, we also remove a small number of negative declaratory actions and cases where the court decides only on issues regarding the enforcement of a previous judgment (e.g. the amount of damages granted). The resulting sample contains 3,375 patent infringement cases. As some actions are filed on the basis of more than one patent, our sample contains 3,711 patent-case observations.

For the time period 2000 to 2008 our data count 1,822 invalidity actions filed at the Federal Patent Court.³⁴ We also have recent data on all oppositions filed at the EPO between 1981 and 2012. These data cover oppositions to the grant of 68,259 EP patents.³⁵

Figure 2 shows the number of infringement and invalidity actions as well as oppositions by year. There has been an increase in case numbers over time.³⁶ The figure also shows that the majority of parallel validity challenges are invalidity actions filed before the BPatG. Only 31.6% of validity challenges are oppositions. The share of infringement cases with

³²We estimate that roughly half of the remaining 20% of cases are spread over the other nine regional courts. However, these courts are of minor importance and reputation.

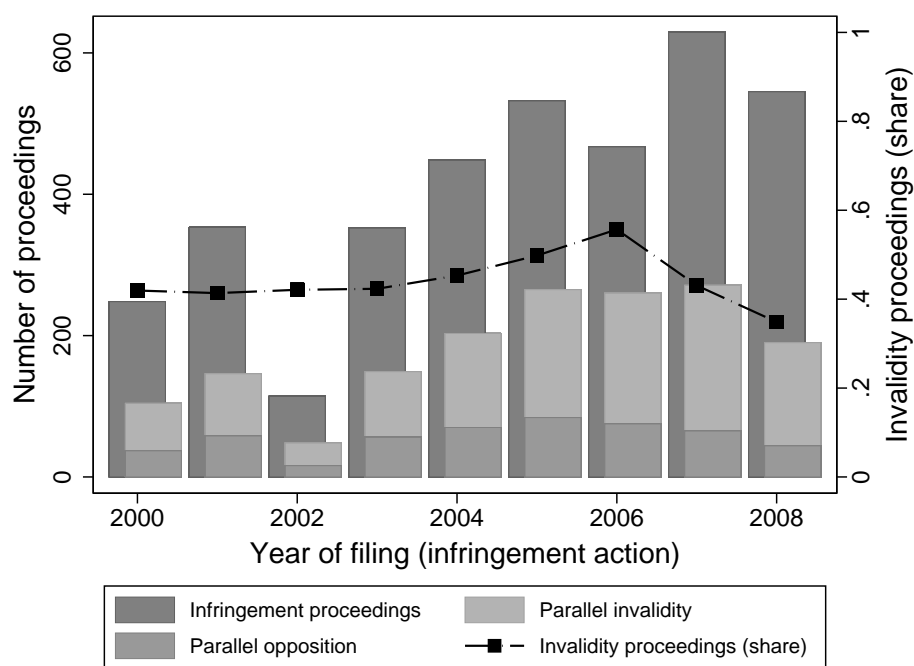
³³This includes employee invention disputes, licensing and patent transfer disputes, as well as patent arrogations and false marking.

³⁴As parallel invalidity proceedings may be filed either before or after this time frame, we identified all invalidity actions filed against patents involved in an infringement proceeding and added these to our data. For more details and a breakdown of court cases by court see Cremers et al. (2013).

³⁵For oppositions to the grant of DE patents, we obtained only data for our sample of patents that are involved in infringement actions.

³⁶The dip in 2002 is due to an internal decision at the regional court in Düsseldorf to remove and destroy files and only store decisions in the court archive. Fortunately, this decision affected only our data for 2002.

Figure 2: Incidence of infringement and parallel invalidity proceedings



Source: own data and calculation

parallel invalidity proceedings or oppositions is around 44.3% over the entire 2000 to 2008 period.

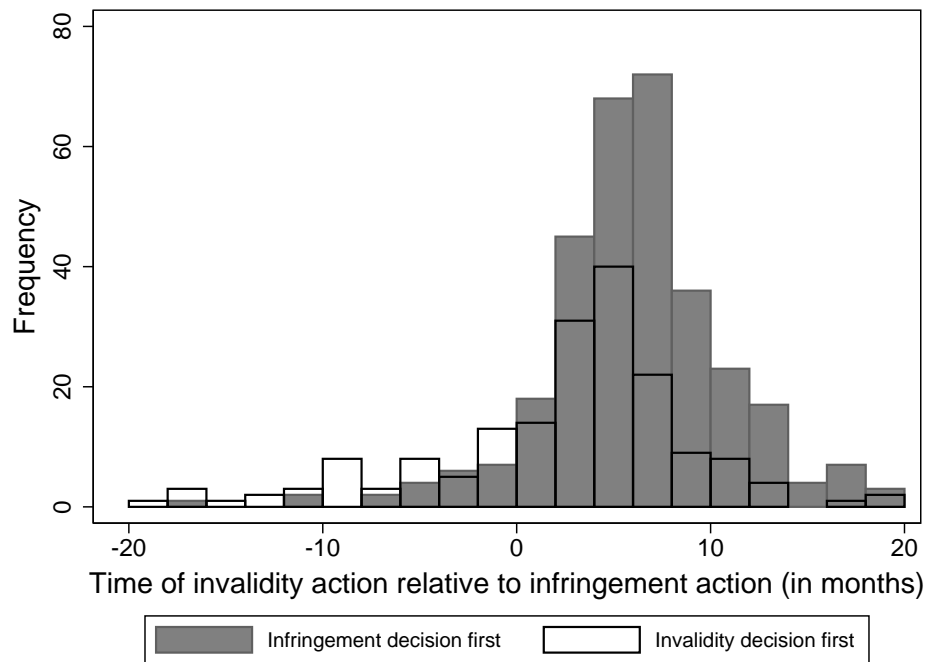
5 Results

5.1 Divergent decisions

As a first step, we assess the frequency of cases where a patent was ‘invalid but infringed.’ One of the factors mentioned in Section 2 above that contributes to the occurrence of divergent decisions is the temporal spread between infringement and validity challenges. Figure 3 shows the distribution of gaps between the filing of infringement and invalidity actions. The figure shows that in most cases the invalidity action followed its corresponding infringement action. As invalidity proceedings take on average longer, too (see Figure A-2 in the Appendix), the infringement decision is usually handed down first, despite the possibility to have the infringement proceeding stayed. Figure A-3 in the Appendix shows the distribution of gaps between infringement actions and oppositions. Here, oppositions are largely initiated before the infringement action, suggesting that oppositions are used preemptively rather than reactively. Still, the (first instance) decision on validity is taken on average 6.7 months *after* the (first instance) decision on infringement. This shows that there is substantial scope for an injunction gap, that is, in case a patent is found to be infringed, the patent holder has on average 6.7 months to enforce the patent even if the patent is invalidated once the BPatG (invalidity) or DPMA and EPO (opposition) hand down their decision.

Table 4 cross-tabulates the (first instance) infringement and invalidity outcomes for all

Figure 3: Timing of infringement and invalidity actions in parallel proceedings



Source: own data and calculation

1,154 parallel cases where the decision on infringement was handed down first.³⁷ The gray-shaded cells in Table 4 show that there is a sizeable number of cases where the patent was first found to be infringed and later invalidated by the BPatG or the DPMA/EPO. If we also consider cases where the patent was partly invalidated or infringed, there is a total of 142 cases. For comparison, in only 75 cases patents that were found to be (partly) infringed were upheld in the invalidity proceeding. This means that slightly more than 12.3% of cases (including cases that settled) produce divergent decisions – the patent is first found to be infringed but later invalidated.³⁸ We also observe 167 cases where the patent was found (partly) infringed and the parallel invalidity proceeding subsequently ended with a withdrawal of the action.³⁹

Figure 4 shows the length of the injunction gap for the 142 cases with divergent decisions. The figure distinguishes between invalidity decisions through the opposition divisions of the DPMA/EPO and the BPatG. The median injunction gap for cases in which the infringed patent was eventually invalidated by the BPatG is about 13.5 months. Hence, parties that have won the infringement case have little over a year to enforce a patent that should not have been granted in the first place.⁴⁰ The length of the injunction gap is significantly longer for cases in which the patent was invalidated through opposition procedures. The median is 33.5 months. As shown in Figure 4, the main reason for this is that there

³⁷Table A-1 in the Appendix shows the cases where invalidity was decided first.

³⁸Figure A-4 in the Appendix shows the occurrence of divergent decisions over time.

³⁹Figure A-5 in the Appendix shows that the majority of these cases ended in a settlement shortly after the infringement decision.

⁴⁰Considering that appellate invalidity proceedings take several years, the actual injunction gap until the decision on the patent's invalidity is binding may be considerably longer.

Table 4: Comparing outcomes of infringement and invalidity proceedings where infringement was decided first

| Outcome LG | Outcome parallel invalidity proceeding | | | | Total |
|------------------|----------------------------------------|----------------|---------------|---------------|----------------|
| | valid | partly invalid | invalid | withdrawn | |
| infringed | 55 42.6% | 50 24.0% | 53 25.2% | 120 19.8% | 278 24.1% |
| partly infringed | 20 15.5% | 21 10.1% | 18 8.6% | 47 7.7% | 106 9.2% |
| not infringed | 23 17.8% | 45 21.6% | 55 26.2% | 70 11.5% | 193 16.7% |
| settlement | 31 24.0% | 92 44.2% | 84 40.0% | 370 61.0% | 577 50.0% |
| Total | 129 100.0% | 208 100.0% | 210 100.0% | 607 100.0% | 1154 100.0% |

Notes: Dark gray-shaded area shows clear divergent decisions. Light gray-shaded area shows presumed divergent decisions. The sample consists of all infringement proceedings with a parallel invalidity proceeding and where the first instance infringement outcome is first. In case of multiple invalidity decisions, the fastest decision is chosen. The unit of observation is the patent in the infringement proceedings.

are a considerable number of opposition proceedings that take a lot longer to reach a final decision than invalidity proceedings at the BPatG.

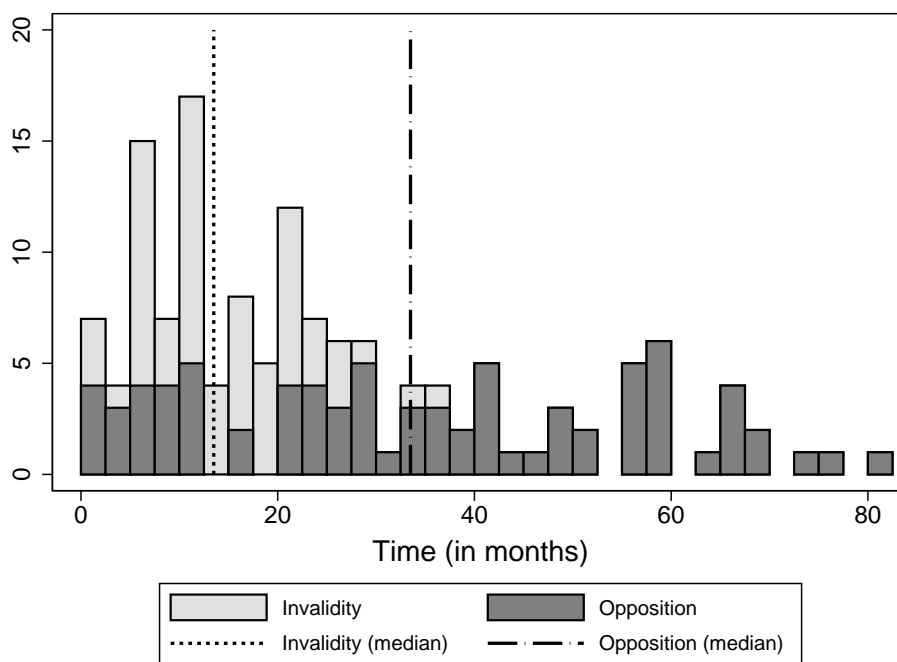
As explained in Section 2, the judgment by the infringement court is (preliminary) enforceable despite a pending decision on validity. The only way to prevent an injunction from taking binding effect is to appeal the judgment. In fact, we observe an appeal rate of 54.0% for cases with a parallel invalidity proceeding compared to 26.2% for cases with no parallel invalidity proceeding (see Table A-2 in the Appendix).⁴¹ Table 5 takes a look at the final outcomes of cases with divergent decisions (Figure A-6 in the Appendix shows a more detailed breakdown). The table shows that in 43.7% of cases with divergent decisions in first instance, the divergent decision is upheld upon appeal. In 13 cases, the court upheld the patent on appeal, which means the defendant in the infringement proceeding is indeed infringing a (partly) valid patent.⁴² It bears mentioning that a substantial number of cases is settled during appeal. It is difficult to interpret these numbers, but the fact that the share of settled infringement cases (37.3%) is three times as large as the share of settled invalidity cases (12.0%) suggests that firms that have been found to infringe a patent are likely to settle (presumably on terms favorable to the patent holder).

Table 6 shows a comparison of case-, litigant-, and patent-level characteristics between defendants in infringement cases that were subject to divergent decisions and all other cases with ‘non-divergent’ outcomes. The litigation value does not differ significantly between

⁴¹This hints at the possibility that the appeal rate is higher in a bifurcated system than in a non-bifurcated system. An appeal to an infringement decision may be useful – regardless of its prospects of success – in order to delay an injunction while the decision on validity is still pending.

⁴²We have only incomplete information on the timing of the infringement decision in second instance relative to the invalidity decision. It may be the case that the appeals court did not wait until the decision on validity was available, although infringement proceedings are more likely to be stayed in second instance.

Figure 4: Length of injunction gap for divergent decisions



Source: own data and calculation

Notes: The figure shows all divergent decisions regardless of whether parties have (preliminarily) enforced the infringement judgment.

Table 5: Final outcome to divergent decisions

| Infringement outcome | Invalidity outcome | | | Total |
|----------------------|--------------------|-------------|--------------|---------------|
| | reversed | settled | binding | |
| reversed | 2 1.4% | 0 0.0% | 6 4.2% | 8 5.6% |
| settled | 8 5.6% | 11 7.8% | 34 23.9% | 53 37.3% |
| binding | 13 9.1% | 6 4.2% | 62 43.7% | 81 57.0% |
| Total | 23 16.2% | 17 12.0% | 102 71.8% | 142 100.0% |

Notes: Sample: The sample consists of all infringement proceedings with a divergent decision. The unit of observation is the patent in each infringement proceeding. The observable outcome of oppositions is by definition binding. Settlements are broadly defined and include withdrawn appeals.

White area: divergent decisions eventually reversed by the respective appeals court.

Light gray-shaded area: divergent decisions where at least one appeal proceeding ended with a settlement.

Dark gray-shaded area: divergent decisions that remained unaltered due to lack of appeal or an affirmative decision by the appeals court.

divergent and non-divergent decisions, that is, there is no evidence for disproportionately many low-value cases ending up in an injunction gap. That said, we find that validity challenges in cases with divergent decisions are filed on average three months later than in cases with non-divergent decisions. This can be interpreted in different ways. The infringement court may reject requests for a stay more often if the validity challenge has been filed with considerable delay or that a longer preparation of a validity challenge may increase chances of success. In any case it shows that the temporal separation of infringement and invalidity proceedings contributes to divergent outcomes. When we look at the size of the defendants in the infringement cases in the two groups, there appears to be slightly more small firms in the divergent decision group on the one hand and more large firms in the non-divergent decision group on the other. We also see a larger share of patents on ‘instruments’ in the group of divergent decisions. Most of these cases involve patents on medical device technology. At the same time, there are a lot fewer cases in ‘electrical engineering’.⁴³ Interestingly, we do not observe a significant difference in the representation of top law firms before court.

5.2 Screening

Figure 2 shows that slightly less than a third of infringement cases (counted at the patent-level) are associated with an invalidity action or opposition. This figure is low compared to litigation systems where infringement and invalidity are decided simultaneously in the same proceeding. In non-bifurcated litigation systems, a counterclaim for invalidity is a standard defense to alleged infringement. Therefore, the low figure in our German data hints at self-selection among litigants.

As discussed in Section 3.2 above, proponents of bifurcation argue that the added costs and complexity of filing a claim for invalidity with the BPatG provides a mechanism that deters validity challenges that have a low probability of success and hence helps a speedy resolution of the infringement case.⁴⁴ Alternatively, one could argue that the added costs and complexity impede firms that are more resource-constrained from contesting validity despite reasonable chances of seeing the patent invalidated. Moreover, the fact that the validity challenge loses some of its ‘effectiveness,’ as the invalidity decision is usually handed down after the infringement decision, may deter firms from filing an invalidity action in the first place.

We test this hypothesis by estimating the propensity that the alleged infringer files an invalidity action at the BPatG. That is, we predict the probability that the validity of a patent involved in an infringement case is also challenged at the BPatG. We include a number of patent-, case-, and litigant-characteristics among the regressors (for summary statistics see Table A-2 in the Appendix). The regressions also include year, patent technology class, and court dummies. Table 7 shows the results.

Our focus is on the size of the alleged infringers, which have to decide whether to challenge the validity of the allegedly infringed patents before the BPatG. We distinguish be-

⁴³Covering infringement actions filed between 2000 to 2008, our data do not contain the recent cases related to the smartphone patent wars cited in the Introduction.

⁴⁴If the infringement case is heard by a regional court other than the Regional Court in Munich, this also means that the alleged infringer has to litigate in two different geographical venues (the BPatG is in Munich).

Table 6: Comparison of alleged infringers by decision

| Variables | Decision type | | SE mean diff. | Signif. |
|--------------------------------------|---------------|-----------|---------------|---------|
| | Non-divergent | Divergent | | |
| | Mean | Mean | | |
| Alleged infringer | | | | |
| Micro | 0.11 | 0.13 | 0.029 | |
| Small | 0.14 | 0.25 | 0.032 | ** |
| Medium | 0.22 | 0.25 | 0.037 | |
| Large | 0.52 | 0.38 | 0.045 | ** |
| Germany | 0.85 | 0.88 | 0.031 | |
| Europe (excl. Germany) | 0.10 | 0.08 | 0.026 | |
| World (excl. Europe) | 0.05 | 0.04 | 0.019 | |
| Top legal representative | 0.55 | 0.63 | 0.044 | |
| Proceeding | | | | |
| Litigation value (in th €) | 1190.75 | 995.65 | 246.790 | |
| Lag of invalidity action (in months) | 3.76 | 6.46 | 0.907 | ** |
| Lag of opposition (in months) | -6.83 | -6.84 | 1.570 | |
| Technological area | | | | |
| Electrical engineering | 0.28 | 0.14 | 0.039 | *** |
| Instruments | 0.13 | 0.22 | 0.031 | ** |
| Chemistry | 0.15 | 0.20 | 0.033 | |
| Mechanical engineering | 0.29 | 0.29 | 0.041 | |
| Other | 0.15 | 0.15 | 0.032 | |
| Observations | 998 | 142 | | |

Notes: The sample consists of all infringement proceedings with parallel invalidity proceedings or oppositions regardless of the timing of the decisions. The unit of observation is the patent in each infringement proceeding. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7: Probit regression results: incidence of invalidity action

| | (1) | | (2) | | (3) | | (4) | |
|------------------------------------------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|
| | Action filed | | Action filed | | Action filed | | Action filed | |
| Alleged infringer | | | | | | | | |
| Small (d) | 0.117** | (0.04) | 0.111* | (0.04) | 0.096* | (0.04) | 0.086 | (0.04) |
| Medium (d) | 0.118** | (0.04) | 0.119** | (0.04) | 0.109** | (0.04) | 0.109** | (0.04) |
| Large (d) | 0.157*** | (0.03) | 0.186*** | (0.04) | 0.137*** | (0.04) | 0.127*** | (0.04) |
| Europe (excl. Germany) (d) | | | | | -0.103*** | (0.03) | -0.093** | (0.03) |
| World (excl. Europe) (d) | | | | | -0.168*** | (0.04) | -0.153*** | (0.04) |
| Top legal representative (d) | | | | | | | 0.122*** | (0.02) |
| Patent holder | | | | | | | | |
| Non-practicing entity (d) | | | -0.041 | (0.04) | -0.035 | (0.04) | -0.026 | (0.04) |
| Small (d) | | | -0.025 | (0.05) | -0.021 | (0.05) | -0.028 | (0.05) |
| Medium (d) | | | -0.034 | (0.04) | -0.033 | (0.04) | -0.039 | (0.04) |
| Large (d) | | | -0.014 | (0.04) | -0.027 | (0.04) | -0.031 | (0.04) |
| Europe (excl. Germany) (d) | | | | | 0.013 | (0.03) | -0.004 | (0.03) |
| World (excl. Europe) (d) | | | | | -0.120*** | (0.03) | -0.108** | (0.03) |
| Patent characteristics | | | | | | | | |
| Forward citations (in first 5 years) | 0.000 | (0.00) | 0.003 | (0.00) | -0.001 | (0.00) | -0.002 | (0.00) |
| EP (d) | | | | | -0.053 | (0.03) | -0.083** | (0.03) |
| Accelerated examination requested (d) | | | | | | | 0.093** | (0.03) |
| Grant lag (difference from mean in days) | | | | | | | -0.000** | (0.00) |
| Age of patent (in years) | | | -0.005* | (0.00) | 0.011 | (0.01) | 0.025 | (0.01) |
| Age of patent (in years, squared) | | | | | -0.001 | (0.00) | -0.001* | (0.00) |
| Invalidity history | | | | | | | | |
| Patent solidified through opp. proc. (d) | 0.085** | (0.03) | 0.075** | (0.03) | 0.066* | (0.03) | 0.049 | (0.03) |
| Patent challenged through inv. proc. (d) | -0.050 | (0.03) | 0.037 | (0.04) | 0.044 | (0.04) | 0.064 | (0.05) |
| Patent solidified through inv. proc. (d) | | | -0.221*** | (0.05) | -0.209*** | (0.05) | -0.230*** | (0.05) |
| Proceeding | | | | | | | | |
| Parallel opposition proceeding (d) | | | -0.192*** | (0.04) | -0.204*** | (0.04) | -0.223*** | (0.03) |
| Litigation value (in th €) | | | -0.000 | (0.00) | | | | |
| Litigation value (in th €, log) | | | | | 0.032** | (0.01) | 0.035*** | (0.01) |
| Multi-jurisdictional litigation (d) | | | | | | | 0.110 | (0.06) |
| Controls | | | | | | | | |
| Year effects | Yes | | No | | No | | Yes | |
| Technology effects | Yes | | Yes | | Yes | | Yes | |
| Court effects | No | | Yes | | Yes | | Yes | |
| Patent characteristics | Yes | | No | | Yes | | Yes | |
| Pseudo R^2 | 0.039 | | 0.036 | | 0.061 | | 0.091 | |
| Observations | 2316 | | 2303 | | 2302 | | 2299 | |

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The sample consists of all infringement proceedings with a duration of at least 120 days. The unit of observation is at the patent-case level, that is each patent in each infringement proceeding is treated as a separate case. Baseline patent holder size: micro. Baseline alleged infringer size: micro.

tween four size categories: micro, small, medium and large.⁴⁵ The results for our preferred specification in Column (4) show that medium-sized and large firms are about 12% more likely to file an invalidity action at the BPatG than micro-sized alleged infringers. This suggests that after accounting for time varying and invariant patent- and case-characteristics, smaller defendants in infringement proceedings are less likely to challenge the validity of the patent at issue. In contrast, there is no evidence that the size of the plaintiff in the infringement proceedings, that is the patent holder, plays any role in the decision to challenge the patent's validity. This supports the view that the decision *not* to file a parallel action at the BPatG is at least partly determined by resource constraints on the alleged infringer's side.

The results also show that firms that are not registered in Germany are less likely to challenge a patent's validity. Firms in a European country other than Germany are 9.3% less likely to file a parallel action and firms outside of Europe are 15.3% less likely than German firms to file an invalidity action. This may be explained by larger costs involved for parties outside of Germany in pursuing an additional action at the BPatG. For example, since the court action is conducted in German, translation costs accrue and in most cases representation has to be assigned to a German law firm. In line with this reasoning, we find that cases in which the alleged infringer is represented by a top law firm to be 12% more likely to have a parallel invalidity proceeding.

To explore this 'screening' effect of bifurcation further, we use propensity score matching. We estimate the propensity that a parallel invalidity action is pursued at the BPatG by a small or large defendant in an infringement case. In contrast to Table 7, for the propensity matching estimation, we collapse the data into two firm size categories: micro-small and medium-large. The results in Table 8 echo the probit results of Table 7.⁴⁶ Large and medium-sized firms have a higher likelihood of pursuing an invalidity action than micro and small firms, all else equal. This result holds regardless of the way we match treated and control units (propensity score or nearest neighbor) and the number of matched controls (1 or 5). The lower part of Table 8 also shows results when excluding non-European alleged infringers. The average treatment effects are slightly larger in magnitude but overall very similar to the results obtained for the full sample.

These results provide evidence in favor of a screening effect of bifurcation. More resource-constrained firms are less likely to file an invalidity action in response to an infringement claim. In line with our discussion in Section 3.2, this means that the 12.3% of 'invalid but infringed' cases shown in Section 5.1 are downward biased. Fewer patents are in fact invalidated than in the absence of the additional costs engendered by bifurcation. This also contributes to the strong presumption of validity in a self-enforcing way.

5.3 Uncertainty and the Effect of Divergent Decisions on Oppositions

Empirically it is difficult to gauge the effect that a divergent decision has on the alleged infringers. If the infringement decision is indeed enforced while the decision on invalidity is pending, it is reasonable to expect some direct negative effect. Apart from any direct effects of an injunction, firms may also adjust their expectations about facing an injunction despite

⁴⁵The size categories are defined according to the [EU definition](#), which relies on information on a firm's number of employees, turnover, and total assets.

⁴⁶Figure A-7 in the Appendix shows that treated and control units have common support.

Table 8: Estimation of average treatment effects

| | Propensity Score Matching | | Nearest Neighbor Matching | |
|----------------------------------------------|---------------------------|-------|---------------------------|-------|
| | nn=1 | nn=5 | nn=1 | nn=5 |
| Matches per observation | | | | |
| Full sample (N=2,193) | | | | |
| ATE action filed | 0.08 | 0.08 | 0.09 | 0.10 |
| Std. err. | 0.02 | 0.03 | 0.03 | 0.03 |
| P-value | 0.000 | 0.000 | 0.009 | 0.000 |
| Matches minimum | 1 | 5 | 1 | 5 |
| Matches maximum | 5 | 7 | 3 | 7 |
| European alleged infringers (N=2,069) | | | | |
| ATE action filed | 0.08 | 0.09 | 0.10 | 0.11 |
| Std. err. | 0.04 | 0.03 | 0.03 | 0.03 |
| P-value | 0.026 | 0.002 | 0.005 | 0.000 |
| Matches minimum | 1 | 5 | 1 | 5 |
| Matches maximum | 3 | 7 | 3 | 7 |

Notes: The sample consists of all infringement proceedings with a duration of at least 120 days. The unit of observation is at the patent-case level, that is each patent in each infringement proceeding is treated as a separate case. Cases with a patent belonging to a technological class with fewer than five patents in the entire sample are excluded. ATE: average treatment effect. Treatment model: logit. Distance metric: Mahalanobis.

the invalidity of a patent. Such uncertainty about the likelihood of infringing a patent right may affect a firm's behavior beyond the immediate direct effect of the injunction. Not unlike a burnt child dreading the fire, we analyze whether firms try to avoid repeated exposure to divergent decisions by adjusting their opposition behavior.

There is reason to believe that a bifurcated litigation system increases a firm's incentives to reduce uncertainty by attempting to eliminate patents early on through oppositions. Figure A-8 in the Appendix shows that German entities are in fact responsible for more than half of all opposition proceedings before the EPO between 1997 and 2013. This suggests that German firms oppose disproportionately more patents at the EPO than firms from other countries.

Oppositions are a relatively cheap and effective means to clearing potentially harmful patents early on. Once they are found to infringe an invalid patent, firms may file more oppositions against patents to preempt the risk of future infringement allegations. We test for an increase in opposition filings by conducting an event-study analysis: we regress the number of oppositions by a firm that has faced an injunction gap on a dummy variable that is equal to one once the decision on validity is handed down and it becomes apparent that the regional court had held an invalid patent infringed (diff-specification). We use a ± 6 months window to assess changes in opposition behavior. To account for any general tendency for firms to change their opposition behavior following an infringement dispute, we match the set of firms that were subject to divergent decisions to the set of firms that filed a validity challenge but were not subject to divergent decisions. The interaction term of the dummy variable indicating whether a firm was subject to a divergent decision and

the dummy variable indicating the timing of the decision provides therefore a differences-in-differences estimate of any effect on firms' opposition activity (diff-in-diff specification).

Table 9 shows the main results. We find a positive coefficient for the interaction term as well as for the 'post-invalidity decision' dummy. This suggests that firms that were accused of patent infringement generally increase their oppositions following the conclusion of the proceeding. This increase in oppositions is, however, stronger for firms that were found to have infringed an invalid patent. The results in Table 9 focus on a ± 6 month window; Table A-3 in the Appendix shows differences in means before and after a case is decided also for ± 2 and ± 12 month windows. The figures for the alternative event windows are consistent with the data shown for the ± 6 month window.

Table 9: Opposition behavior pre/post-invalidity decision

| | diff-specification | | diff-in-diff specification | |
|---------------------------------------|--------------------|--------------------|----------------------------|--------------------|
| | (1) Oppositions | (2) Oppositions | (3) Oppositions | (4) Oppositions |
| ± 6 months | | | | |
| Post-invalidity decision | 0.426*** (0.10) | 1.504*** (0.43) | 0.531*** (0.16) | 0.532*** (0.16) |
| Post-inval. x infringed | | | 1.047** (0.39) | 1.048** (0.39) |
| No. of filed patents | | | | -0.001 (0.00) |
| Opponent fixed effects | Yes | Yes | Yes | Yes |
| Time effects | No | No | Yes | Yes |
| Opponents with divergent decision | 20 | 20 | 20 | 20 |
| Opponents with non-divergent decision | 97 | 0 | 97 | 97 |
| Observations | 702 | 120 | 702 | 702 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Fixed effect negative binomial regression. Dependent variable number of oppositions filed by alleged infringer. Date of invalidity decision defined as publication of decision by the BPatG (for invalidity proceedings) and the DPMA/EPO (for oppositions). Alleged infringers with no oppositions after invalidity decision excluded.

These findings are in line with Adam and Spence (2001) who argue that the disproportionate share of oppositions at the EPO by German firms is due to the need to preempt infringement actions in the German bifurcated patent litigation system.⁴⁷ Our results, therefore, suggest that the relatively large number of oppositions by German firms is at least in part a manifestation of the uncertainty created by bifurcation.

⁴⁷There are two alternative, although not mutually exclusive explanations for the observed increase in opposition activity (Harhoff, 2005). First, oppositions may not only serve to preempt specific infringement allegations, but also to develop a reputation for toughness, i.e. to go the whole nine yards in challenging a patent's validity. Second, the alleged infringer may have obtained information (e.g. prior art) during the invalidity proceeding that can be used as evidence against other patents. Note that because in our data the alleged infringer does not file a disproportionate number of oppositions against the patent holder of the infringement proceeding, some form of retaliation is an unlikely reason for the increase in opposition activity.

6 Conclusion

Overall, our results suggest that the German bifurcated patent system favors strongly the patent holder in litigation. We show that the bifurcated system creates a substantial number of cases where an invalid patent is held infringed. We also provide evidence that fewer patents are challenged than what we would expect based on the consideration of litigation systems where infringement and validity are dealt with jointly. This means that the number of ‘invalid but infringed’ cases is presumably biased downwards due to self-selection. Our results also indicate that the possibility of facing an injunction for infringing an invalid patent creates legal uncertainty. We find evidence for such legal uncertainty by looking at changes in firms’ opposition behavior following directly a divergent decision. We find that alleged infringers that were subject to a divergent decision file more oppositions immediately following the court case.

Our results provide empirical support for the criticism that has been directed at bifurcation (Hilty and Lamping, 2011; Münster-Horstkotte, 2012). Given the probabilistic nature of patents, the strong presumption of validity that is at the core of Germany’s bifurcated enforcement system favors the patentee and creates uncertainty for potential infringers. That said, the problems revealed by our analysis should be compared to possible benefits of bifurcation – in particular, the impact of technically trained judges at the BPatG on validity decisions and the lower costs of litigation due to less need for technical expert witnesses. Indeed, the costs of litigation in Germany are remarkably low compared to for example the UK,⁴⁸ but technically trained judges could also be incorporated in a court system in which validity and infringement are decided jointly, as is the case in Switzerland (Ann, 2011). It is also possible that reforms that increased case loads at the BPatG and its appeal court, BGH, aggravated the problems during our period of analysis. Regardless, our results suggest that the current system is in danger of overly favoring patent holders. One way of addressing the problems highlighted by our analysis could be an acceleration of proceedings at the BPatG, thereby either avoiding the injunction gap altogether or trimming its length. This could allow attaining the benefits of bifurcation while avoiding the uncertainty created by ‘invalid but infringed’ decisions. Alternatively bifurcation could be abandoned altogether. While such a drastic step may look appealing to some observers, its impact would be uncertain. It might for example encourage forum shopping. If courts depend on the number of cases they hear for fee income, prestige, etc. patent holders might find themselves again at an advantage. In any case, we do not present a counterfactual analysis that would allow us to evaluate such a drastic step. Our analysis still suggests that bifurcation has considerable drawbacks, at least the way it is currently implemented in the German enforcement system.

⁴⁸That said, low litigation costs are also a characteristic of the French and the Dutch patent litigation systems which are not bifurcated (Cremers et al., 2013).

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A Appendix: Figures

Figure A-1: Court structure in Germany's patent litigation system (Cremers et al., 2013, amended)

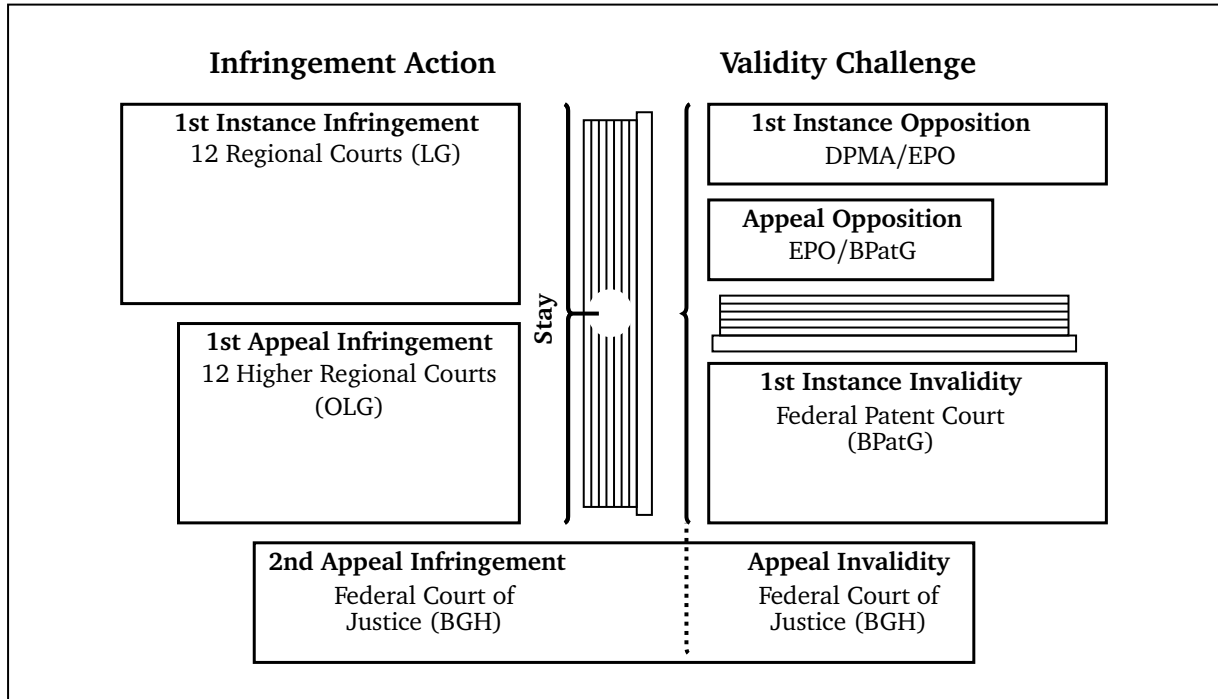


Figure A-2: Length of (first instance) infringement proceedings and invalidity proceedings by year

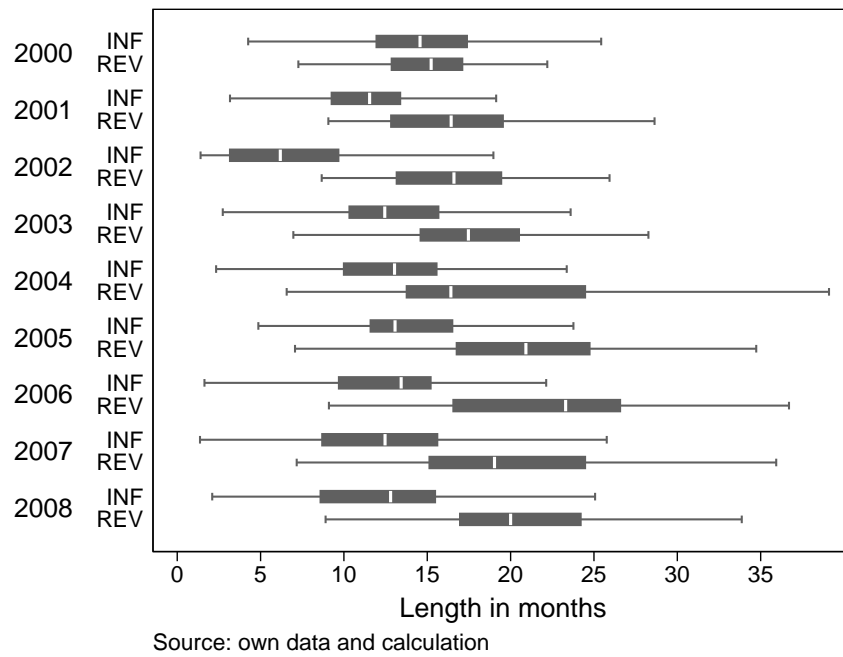


Figure A-3: Timing of infringement and oppositions in parallel proceedings

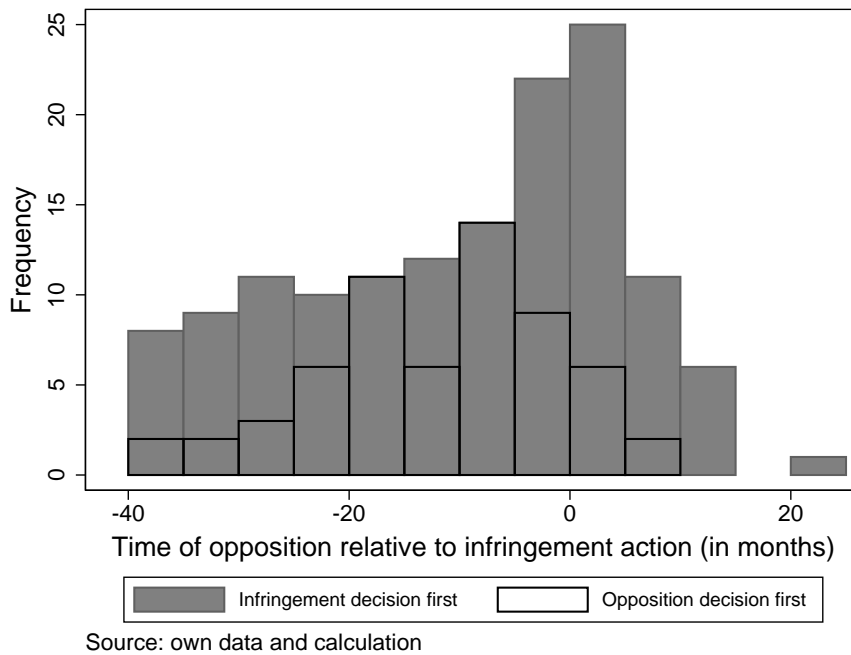
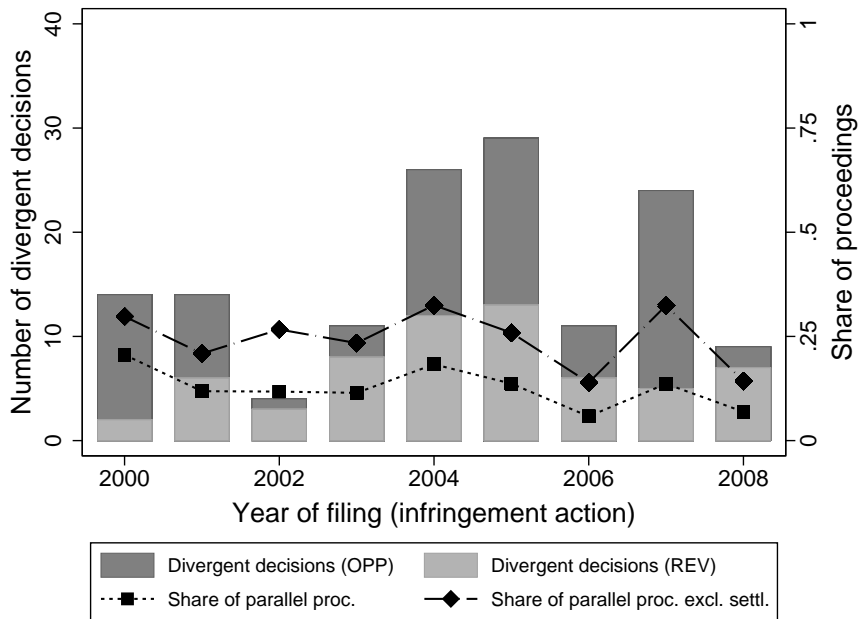


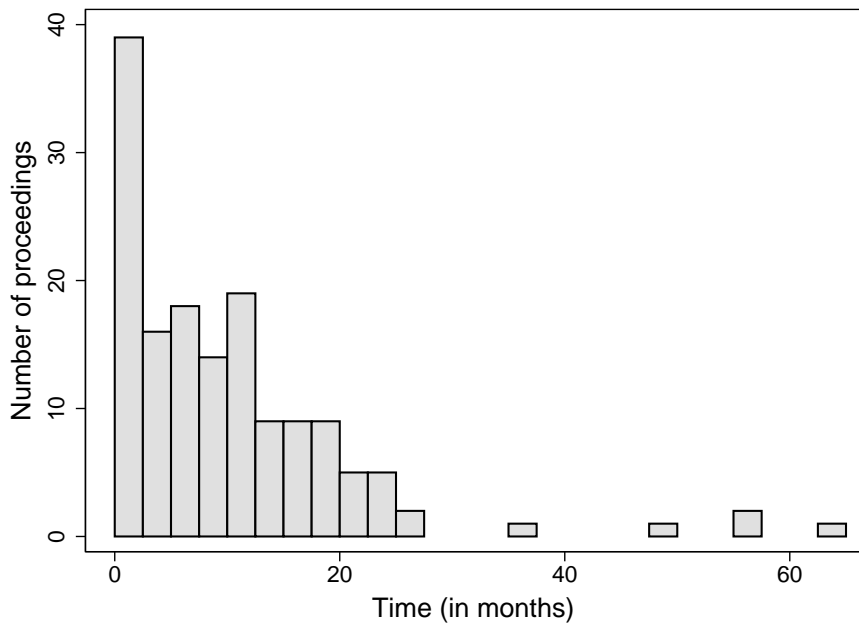
Figure A-4: Number and share of divergent decisions over time



Source: own data and calculation

Notes: Only parallel proceedings with outcome in infringement proceeding first. Share of parallel proceedings excluding settlements includes settlements in the infringement but not invalidity proceeding.

Figure A-5: Time between infringement decision (first instance) and settlement in parallel invalidity proceeding



Source: own data and calculation

Notes: Only parallel proceedings with outcome "infringed" or outcome "partly infringed".

Figure A-6: Appeals and settlements of divergent decision cases

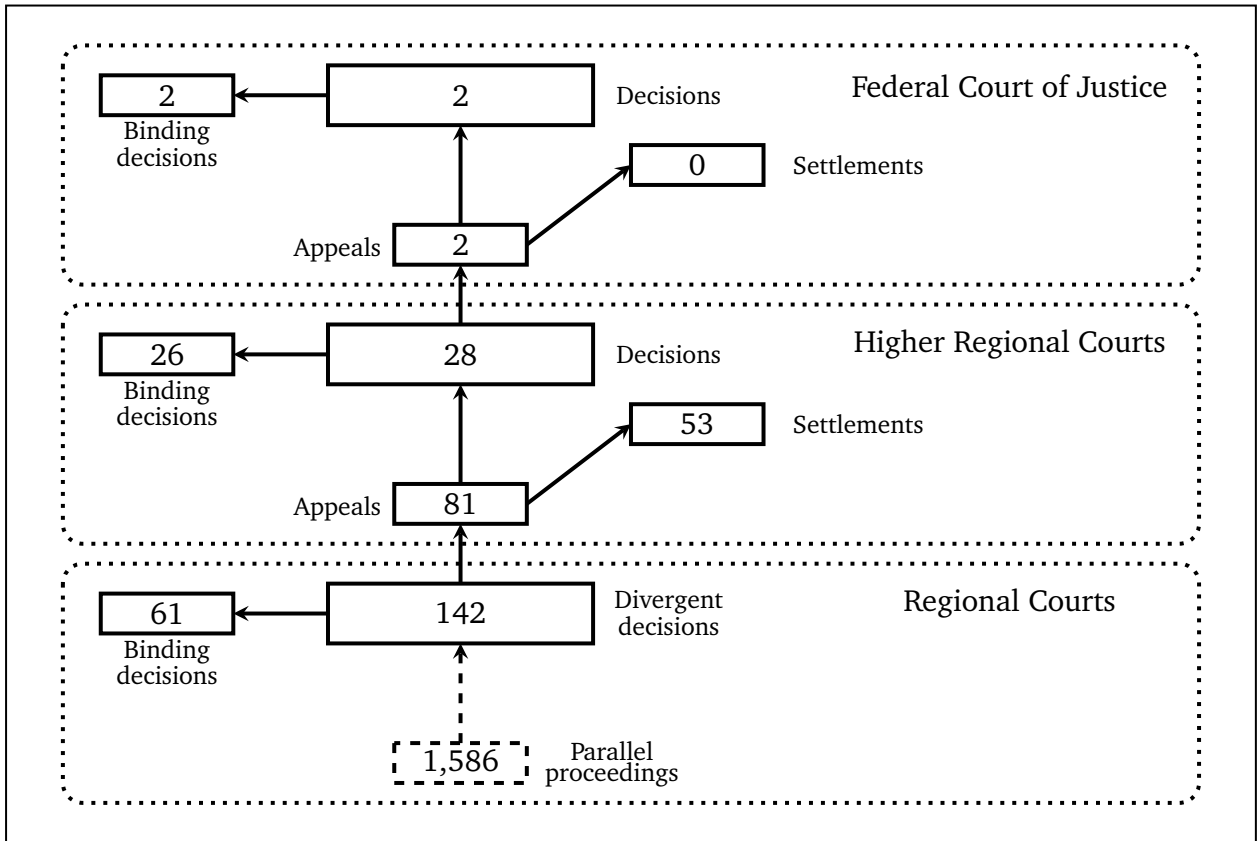


Figure A-7: Distribution of estimated propensity scores

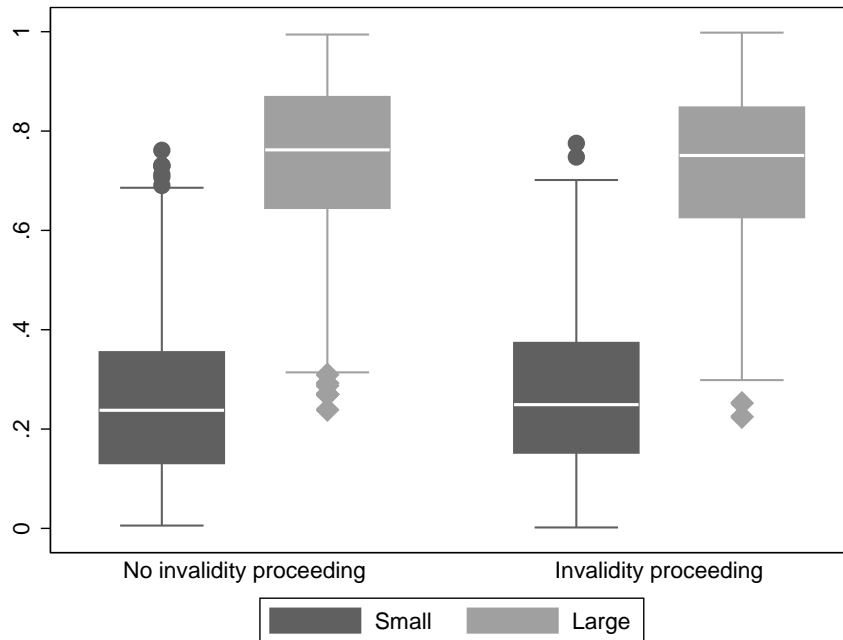
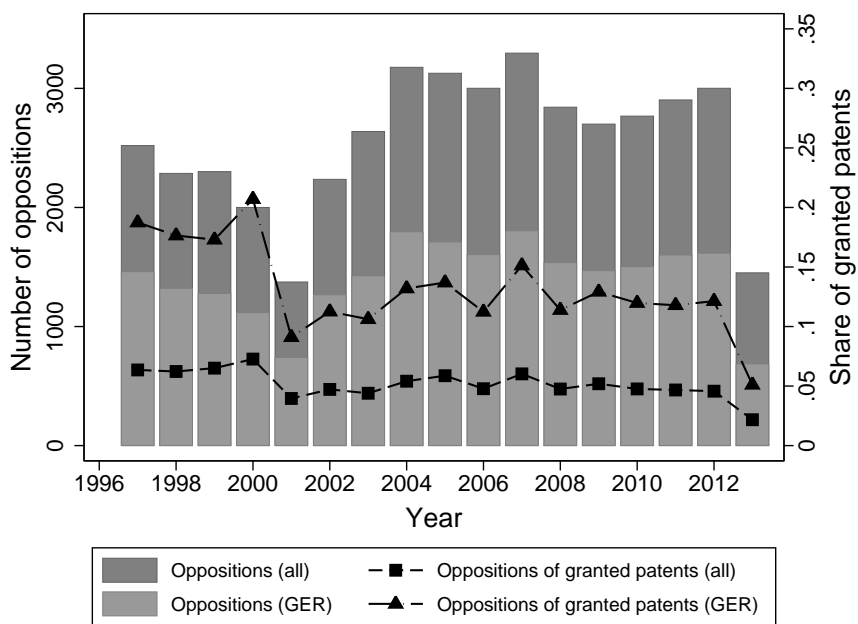


Figure A-8: Oppositions filed against EP patents 1997-2013



Source: own data and calculation

Notes: Figures on granted patents by country and year according to the annual reports of the EPO. GER represents the subsample of all granted patents (filed oppositions) with the first applicant (opponent) originating from Germany. Oppositions are counted on patent level. Data for oppositions filed in 2013 truncated.

B Appendix: Tables

Table A-1: Comparing outcomes of infringement and invalidity proceedings where invalidity was decided first

| Outcome LG | Outcome parallel invalidity proceeding | | | | Total |
|------------------|----------------------------------------|----------------|---------------|---------------|---------------|
| | valid | partly invalid | invalid | withdrawn | |
| infringed | 22 31.9% | 14 16.3% | 5 4.0% | 41 27.0% | 82 19.0% |
| partly infringed | 8 11.6% | 9 10.5% | 3 2.4% | 2 1.3% | 22 5.1% |
| not infringed | 9 13.0% | 19 22.1% | 29 23.2% | 8 5.3% | 65 15.0% |
| settlement | 30 43.5% | 44 51.2% | 88 70.4% | 101 66.4% | 263 60.9% |
| Total | 69 100.0% | 86 100.0% | 125 100.0% | 152 100.0% | 432 100.0% |

Notes: Gray-shaded areas show divergent decisions. The sample consists of all infringement proceedings with a parallel invalidity proceeding and where the first instance infringement outcome is first. In case of multiple invalidity decisions, the fastest decision is chosen. The unit of observation is the patent in the infringement proceedings. Occurrence of divergent decisions explained by multiple patents in same proceeding, appeal to invalidity decision, or missing defense by alleged infringer.

Table A-2: Summary statistics grouped by parallel invalidity proceeding

| Variables | No parallel invalidity proceeding | | | | Parallel invalidity proceeding | | | |
|------------------------------------------|-----------------------------------|-----------|-------|------|--------------------------------|-----------|-------|------|
| | Mean | Std. err. | Min | Max | Mean | Std. err. | Min | Max |
| Patent characteristics | | | | | | | | |
| No. of inventors | 1.87 | 1.35 | 0 | 9 | 1.89 | 1.40 | 0 | 19 |
| Backward citations | 4.74 | 2.89 | 0 | 27 | 5.42 | 3.44 | 0 | 32 |
| Forward citations (in first 5 years) | 3.30 | 4.93 | 0 | 44 | 5.32 | 6.18 | 0 | 51 |
| Non-patent literature | 0.83 | 1.97 | 0 | 21 | 1.65 | 2.47 | 0 | 18 |
| IPC subclass count | 2.24 | 1.90 | 1 | 9 | 3.32 | 2.94 | 1 | 9 |
| Family size (INPADOC) | 11.61 | 16.39 | 1 | 183 | 20.62 | 24.75 | 1 | 69 |
| Non-patent literature ratio | 0.12 | 0.23 | 0 | 1 | 0.17 | 0.23 | 0 | 1 |
| EP | 0.77 | 0.42 | 0 | 1 | 0.78 | 0.42 | 0 | 1 |
| PCT filing | 0.21 | 0.41 | 0 | 1 | 0.19 | 0.39 | 0 | 1 |
| Year of patent application/priority | 1992.50 | 4.88 | 1980 | 2004 | 1992.28 | 4.37 | 1979 | 2005 |
| Accelerated examination requested | 0.12 | 0.33 | 0 | 1 | 0.13 | 0.34 | 0 | 1 |
| Grant lag (difference from mean in days) | 69.56 | 726.10 | -1193 | 4641 | 21.06 | 601.81 | -1303 | 4004 |
| Age of patent (in years) | 12.18 | 4.78 | 1 | 25 | 12.54 | 4.49 | 1 | 23 |
| Technology area | | | | | | | | |
| Electrical engineering | 0.32 | 0.47 | 0 | 1 | 0.38 | 0.49 | 0 | 1 |
| Instruments | 0.10 | 0.30 | 0 | 1 | 0.12 | 0.33 | 0 | 1 |
| Chemistry | 0.12 | 0.32 | 0 | 1 | 0.13 | 0.33 | 0 | 1 |

Continued on next page

Table A-2 – continued from previous page

| Variables | No parallel invalidity proceeding | | | | Parallel invalidity proceeding | | | |
|--------------------------------------------|-----------------------------------|-----------|------|-------|--------------------------------|-----------|------|-------|
| | Mean | Std. err. | Min | Max | Mean | Std. err. | Min | Max |
| Mechanical engineering | 0.29 | 0.45 | 0 | 1 | 0.23 | 0.42 | 0 | 1 |
| Other | 0.17 | 0.38 | 0 | 1 | 0.14 | 0.35 | 0 | 1 |
| Invalidity history | | | | | | | | |
| Patent solidified through opposition proc. | 0.14 | 0.35 | 0 | 1 | 0.16 | 0.37 | 0 | 1 |
| Patent challenged through inv. proc. | 0.14 | 0.35 | 0 | 1 | 0.26 | 0.44 | 0 | 1 |
| Patent solidified through inv. proc. | 0.03 | 0.18 | 0 | 1 | 0.01 | 0.11 | 0 | 1 |
| Proceeding | | | | | | | | |
| Parallel opposition proceeding | 0.04 | 0.20 | 0 | 1 | 0.02 | 0.15 | 0 | 1 |
| Year of infringement action | 2004.77 | 2.53 | 2000 | 2008 | 2004.93 | 2.35 | 2000 | 2008 |
| Litigation value (in th €) | 1292.62 | 3021.39 | 0 | 38348 | 1082.32 | 2807.63 | 0 | 35000 |
| Length of proceeding (months) | 10.79 | 11.07 | 0 | 128 | 17.43 | 16.65 | 0 | 128 |
| Parallel opposition proceeding | 0.04 | 0.20 | 0 | 1 | 0.02 | 0.15 | 0 | 1 |
| Multi-jurisdictional litigation | 0.03 | 0.16 | 0 | 1 | 0.04 | 0.20 | 0 | 1 |
| LG Düsseldorf | 0.68 | 0.47 | 0 | 1 | 0.58 | 0.49 | 0 | 1 |
| LG Mannheim | 0.23 | 0.42 | 0 | 1 | 0.36 | 0.48 | 0 | 1 |
| LG Munich | 0.09 | 0.29 | 0 | 1 | 0.06 | 0.24 | 0 | 1 |
| LG judgment appealed | 0.26 | 0.44 | 0 | 1 | 0.54 | 0.50 | 0 | 1 |
| Alleged infringer | | | | | | | | |
| Micro | 0.16 | 0.37 | 0 | 1 | 0.17 | 0.38 | 0 | 1 |
| Small | 0.17 | 0.38 | 0 | 1 | 0.14 | 0.35 | 0 | 1 |
| Medium | 0.25 | 0.43 | 0 | 1 | 0.23 | 0.42 | 0 | 1 |
| Large | 0.41 | 0.49 | 0 | 1 | 0.46 | 0.50 | 0 | 1 |
| Germany | 0.72 | 0.45 | 0 | 1 | 0.83 | 0.38 | 0 | 1 |
| Europe (excl. Germany) | 0.18 | 0.38 | 0 | 1 | 0.11 | 0.31 | 0 | 1 |
| World (excl. Europe) | 0.10 | 0.30 | 0 | 1 | 0.07 | 0.25 | 0 | 1 |
| Top legal representative | 0.38 | 0.49 | 0 | 1 | 0.52 | 0.50 | 0 | 1 |
| Patent holder | | | | | | | | |
| Non-practicing entity | 0.19 | 0.39 | 0 | 1 | 0.29 | 0.45 | 0 | 1 |
| Micro | 0.13 | 0.34 | 0 | 1 | 0.11 | 0.31 | 0 | 1 |
| Small | 0.10 | 0.29 | 0 | 1 | 0.09 | 0.28 | 0 | 1 |
| Medium | 0.16 | 0.36 | 0 | 1 | 0.13 | 0.34 | 0 | 1 |
| Large | 0.61 | 0.49 | 0 | 1 | 0.67 | 0.47 | 0 | 1 |
| Germany | 0.69 | 0.46 | 0 | 1 | 0.63 | 0.48 | 0 | 1 |
| Europe (excl. Germany) | 0.19 | 0.39 | 0 | 1 | 0.31 | 0.46 | 0 | 1 |
| World (excl. Europe) | 0.12 | 0.33 | 0 | 1 | 0.06 | 0.24 | 0 | 1 |
| Top legal representative | 0.67 | 0.47 | 0 | 1 | 0.60 | 0.49 | 0 | 1 |

Table A-3: Comparison of oppositions by alleged infringers at the EPO

| | Before | After | SE mean diff. |
|-----------------------------------------------|--------|-------|------------------|
| Opponents with non-divergent decisions | | | |
| ±2 months | | | |
| Filed patents | 11.00 | 13.26 | 3.150 |
| Filed oppositions | 0.22 | 0.26 | 0.074 |
| ±6 months | | | |
| Filed patents | 34.60 | 36.99 | 8.970 |
| Filed oppositions | 0.75 | 0.81 | 0.241 |
| ±12 months | | | |
| Filed patents | 72.16 | 71.63 | 17.653 |
| Filed oppositions | 1.52 | 1.67 | 0.489 |
| Opponents with divergent decisions | | | |
| ±2 months | | | |
| Filed patents | 7.05 | 9.46 | 4.840 |
| Filed oppositions | 0.10 | 0.34 | 0.128 |
| ±6 months | | | |
| Filed patents | 19.07 | 22.56 | 11.638 |
| Filed oppositions | 0.27 | 0.85 | 0.238 |
| ±12 months | | | |
| Filed patents | 39.95 | 45.07 | 23.404 |
| Filed oppositions | 1.17 | 1.41 | 0.462 |

Notes: The sample consists of all alleged infringers that have filed at least one opposition against an EP patent twelve months before or after a decision in the parallel invalidity proceeding.

Table A-4: Invalid but Infringed – Example cases

| Proc. | First instance | | | | | Appeal | | | | | Patent | |
|------------|------------------------------------------|------------------------|------------------|---------------------------------|------------------------|----------------------------|---------------------------------------|------------------------|------------------|------------------|----------------------|--|
| | Case number | Filing date | Litigation value | Decision | Decision date | Case number | Outcome | Appeal date | Publication. No. | Application date | Technology | |
| INF REV | DU 4 O 219/00 2 Ni 42/00 (EU) et al. | 01-Apr-00 02-Nov-00 | 511,300 | infringed invalidated | 10-May-01 27-Feb-02 | 2 U 95/01 X ZR 156/02 | settlement aff: invalidated | 12-Apr-07 30-Jan-07 | EP0203206 | 02-May-85 | Chemical engineering | |
| INF REV | DU 4 O 248/01 3 Ni 51/01 (EU) | 19-Jul-01 05-Sep-01 | 76,693 | infringed partly invalidated | 28-May-02 21-Jan-03 | 2 U 84/02 | n/a | n/a | EP0912130 | 01-Apr-97 | Furniture and games | |
| INF REV | DU 4 O 356/01 2 Ni 63/04 (EU) et al. | 07-Jul-01 01-Dec-04 | 1,022,583 | infringed partly invalidated | 31-Mar-05 16-Mar-07 | | | | EP0101552 | 05-Jul-83 | Electrical machinery | |
| INF REV | DU 4A O 233/01 2 Ni 14/03 (EU) | 04-Jul-01 03-Feb-03 | 500,000 | infringed invalidated | 25-Mar-03 30-Sep-04 | 2 U 50/03 n/a | settlement withdrawn | n/a 14-Mar-05 | EP0692562 | 12-Jul-94 | Textile and paper | |
| INF REV | DU 4A O 234/01 4 Ni 28/01 (EU) | 05-Jul-01 07-Nov-01 | 511,292 | infringed invalidated | 10-Jan-02 12-Nov-02 | 2 U 27/02 X ZR 16/03 | settlement amd: partly invalidated | 5-Apr-07 25-Apr-06 | EP0646362 | 20-Sep-94 | Medical technology | |
| INF REV | DU 4A O 33/01 2 Ni 47/01 (EU) | 26-Dec-00 07-Dec-01 | 1,022,600 | partly infringed invalidated | 05-Feb-02 08-May-03 | 2 U 36/02 X ZR 115/03 | settlement amd: partly invalidated | 12-Jul-02 01-Apr-08 | EP0548475 | 26-Sep-92 | Other consumer goods | |
| INF REV | DU 4A O 453/01 2 Ni 26/02 | 17-Jan-02 16-Aug-02 | 1,500,000 | infringed partly invalidated | 14-Jan-03 20-Nov-03 | 2 U 25/03 n/a | settlement withdrawn | 2-Apr-04 08-Sep-04 | DE3639669 | 20-Nov-86 | Electrical machinery | |
| INF REV | DU 4A O 185/03 1 Ni 9/04 | 10-May-03 10-Mar-04 | 500,000 | partly infringed invalidated | 08-Jul-04 31-May-05 | n/a | withdrawn | 04-Oct-06 | DE3801617 | 21-Jan-88 | Civil engineering | |
| INF REV | DU 4A O 282/03 2 Ni 3/04 (EU) | 08-Jul-03 08-Jan-04 | 500,000 | infringed invalidated | 20-Jul-04 19-May-05 | I-2 U 81/04 X ZR 107/05 | settlement aff: invalidated | 23-Jan-06 30-Jun-09 | EP0947279 | 25-Feb-99 | Machine tools | |
| INF REV | DU 4A O 371/03 1 Ni 2/04 (EU) | 03-Sep-03 22-Dec-03 | 100,000 | partly infringed invalidated | 28-Sep-04 14-Mar-05 | I-2 U 100/04 | settlement | n/a | EP0654427 | 16-Nov-94 | Handling | |
| INF REV | DU 4B O 346/03 3 Ni 11/01 (EU) et al. | 01-Sep-03 22-Sep-04 | 350,000 | infringed invalidated | 14-Dec-04 07-Jun-05 | X ZR 154/05 | amd: partly invalidated | 05-Nov-08 | EP0291194 | 26-Apr-88 | Measurement | |
| INF REV | DU 4B O 458/03 1 Ni 14/04 (EU) | 28-Nov-03 07-May-04 | 500,000 | infringed invalidated | 14-Oct-04 07-Mar-06 | I-2 U 105/04 n/a | settlement withdrawn | n/a 22-Apr-10 | EP0781234 | 12-Sep-95 | Handling | |
| INF REV | DU 4A O 152/04 4 Ni 64/04 (EU) | 25-Mar-04 14-Dec-04 | 500,000 | infringed partly invalidated | 10-May-05 28-Mar-06 | I-2 U 99/05 | settlement | 24-Feb-10 | EP0706338 | 16-Jun-94 | Furniture and games | |

Continued on next page

Table A-4 – continued from previous page

| Proc. | Case number | First instance | | | | | Appeal | | | | Patent | |
|------------|------------------------------------------|------------------------|------------------|-----------------------------------------|------------------------|-----------------------------|-------------------------------------------|------------------------|------------|------------------|-------------------------|--|
| | | Filing date | Litigation value | Decision | Decision date | Case number | Outcome | Outcome date | Publn. No. | Application date | Technology | |
| INF REV | DU 4A O 453/04 3 Ni 48/07 (EU) et al. | 18-Nov-04 21-Feb-05 | 100,000 | infringed partly invalidated | 26-Jul-05 16-May-08 | I-2 U 101/05 X ZR 75/08 | settlement aff: partly invalidated | 27-Oct-11 12-Jul-11 | EP0753420 | 09-Jul-96 | Transport | |
| INF REV | DU 4B O 18/04 3 Ni 39/04 (EU) et al. | 04-Nov-03 22-Sep-04 | 500,000 | infringed invalidated | 14-Dec-04 07-Jun-05 | X ZR 154/05 | amd: partly invalidated | 05-Nov-08 | EP0291194 | 26-Apr-88 | Measurement | |
| INF REV | DU 4B O 435/04 1 Ni 4/04 (EU) | 06-Nov-04 22-Dec-03 | 2,000,000 | infringed invalidated | 21-Apr-05 22-Feb-06 | n/a X ZR 79/06 | settlement withdrawn | n/a 26-Aug-10 | EP0755348 | 07-Feb-95 | Handling | |
| INF REV | DU 4A O 122/05 2 Ni 38/05 (EU) | 10-Mar-05 02-Aug-05 | 500,000 | partly infringed invalidated | 09-Feb-06 29-Oct-07 | I-2 U 27/06 XA ZR 6/08 | not infringing amd: partly invalidated | 25-Mar-10 02-Apr-09 | EP0361155 | 06-Sep-89 | Civil engineering | |
| INF REV | DU 4A O 253/05 4 Ni 40/06 (EU) | 17-May-05 22-May-06 | 500,000 | infringed invalidated | 20-Jul-06 14-Oct-08 | I-2 U 90/06 n/a | settlement withdrawn | 29-Aug-11 29-Aug-11 | EP0591132 | 23-Jul-90 | Medical technology | |
| INF REV | DU 4A O 394/05 2 Ni 2/06 (EU) | 31-Aug-05 11-Jan-06 | 500,000 | infringed partly invalidated | 29-Aug-06 20-May-08 | I-2 U 115/06 | settlement | 18-Jul-08 | EP0280340 | 18-Jan-88 | Textile and paper | |
| INF REV | DU 4A O 452/05 2 Ni 1/06 (EU) | 11-Sep-05 05-Jan-06 | 500,000 | infringed invalidated | 21-Feb-06 14-Feb-08 | I-2 U 25/06 XA ZR 85/08 | not infringing amd: partly invalidated | 6-Sep-07 29-Jul-10 | EP0676763 | 04-Jul-95 | Audio-visual technology | |
| INF REV | DU 4A O 484/05 4 Ni 7/06 | 04-Nov-05 25-Jan-06 | 250,000 | infringed invalidated | 09-May-06 08-Jan-08 | I-2 U 60/06 X ZR 49/08 | infringed aff: invalidated | 27-Sep-06 17-Nov-09 | DEI9945719 | 23-Sep-99 | Other special machines | |
| INF REV | DU 4A O 552/05 2 Ni 25/06 (EU) | 23-Nov-05 22-Jun-06 | 500,000 | infringed invalidated | 13-Feb-07 10-Jun-08 | I-2 U 14/07 n/a | settlement withdrawn | 4-Nov-10 10-Nov-10 | EP0851376 | 30-Dec-96 | Computer technology | |
| INF REV | DU 4A O 62/05 4 Ni 45/05 (EU) | 15-Feb-05 03-Sep-05 | 1,000,000 | infringed partly invalidated | 09-Mar-06 02-May-07 | I-2 U 28/06 XA ZR 84/07 | settlement amd: partly invalidated | 31-Aug-12 25-Nov-10 | EP0821784 | 18-Apr-96 | Measurement | |
| INF REV | DU 4B O 128/05 4 Ni 52/05 (EU) | 12-Mar-05 10-Oct-05 | 500,000 | infringed invalidated | 14-Mar-06 26-Jun-07 | I-2 U 39/06 XA ZR 126/07 | settlement sent back to BPatG | 27-Aug-10 13-Jul-10 | EP0337612 | 17-Mar-89 | Medical technology | |
| INF REV | DU 4B O 76/05 1 Ni 8/06 (EU) | 03-Feb-05 27-Apr-06 | 1,000,000 | infringed invalidated | 16-May-06 20-Mar-07 | I-2 U 57/06 XA ZR 66/07 | settlement amd: partly invalidated | 4-Dec-07 14-Jan-10 | EP0350528 | 15-Jul-88 | Thermal processing | |
| INF REV | DU 4A O 263/06 3 Ni 48/06 (EU) | 22-Jul-06 30-Jun-06 | 200,000 | partly infringing partly invalidated | 14-Aug-07 29-Apr-08 | I-2 U 83/07 | settlement | 19-Aug-09 | EP1098706 | 08-Jul-99 | Chemical engineering | |

Table A-4 – continued from previous page

| Proc. | Case number | First instance | | | | | Appeal | | | | Patent | |
|------------|-----------------------------------|------------------------|------------------|----------------------------------------|------------------------|--------------------|-------------------------------|------------------------|----------------|------------------|------------------------|--|
| | | Filing date | Litigation value | Decision | Decision date | Case number | Outcome | Outcome date | Publn. No. | Application date | Technology | |
| INF REV | DU 4B O 160/06 3 Ni 77/06 | 09-May-06 07-Dec-06 | 500,000 | partly infringed invalidated | 22-Jul-08 13-Jan-09 | I-2 U 74/08 n/a | settlement withdrawn | 14-Oct-10 04-Oct-10 | DE4337743 | 05-Nov-93 | Civil engineering | |
| INF REV | DU 4B O 279/06 2 Ni 30/07 (EU) | 15-Jul-06 11-Jun-07 | 1,000,000 | infringed invalidated | 31-Jul-07 13-Nov-08 | X ZR 46/09 | aff. invalidated | 22-Mar-12 | EP0852359 | 20-Dec-96 | Computer technology | |
| INF REV | DU 4A O 136/07 4 Ni 65/07 (EU) | 22-May-07 29-Oct-07 | 500,000 | partly infringed invalidated | 05-Jun-08 01-Dec-09 | I-2 U 67/08 n/a | settlement withdrawn | 10-Nov-11 30-Nov-10 | EP0355391 | 18-Jul-89 | Medical technology | |
| INF REV | DU 4A O 158/07 4 Ni 14/08 (EU) | 14-Jul-07 07-Mar-08 | 400,000 | infringed partly invalidated | 29-Apr-08 13-Oct-09 | I-2 U 47/08 n/a | partly infringed withdrawn | 2-Jul-09 08-Jun-12 | EP0885676 | 13-May-98 | Machine tools | |
| INF REV | DU 4B O 284/07 10 Ni 6/08 (EU) | 27-Nov-07 08-Oct-08 | 1,000,000 | infringed partly invalidated | 27-Nov-08 17-Dec-09 | I-2 U 2/09 | settlement | 7-May-09 | EP0825350 | 07-Aug-97 | Mechanical elements | |
| INF REV | DU 4B O 310/07 4 Ni 80/08 (EU) | 13-Dec-07 01-Aug-08 | 500,000 | partly infringed invalidated | 05-Mar-09 28-Sep-10 | I-2 U 44/09 | settlement | 4-May-11 | EP0835737 | 08-Oct-97 | Other special machines | |
| INF REV | DU 4A O 152/08 3 Ni 62/08 (EU) | 29-Jan-08 16-Oct-08 | 750,000 | infringed partly invalidated | 07-May-09 05-May-10 | I-2 U 71/09 | infringed | n/a | EP0500590 | 10-Oct-90 | Surface technology | |
| INF REV | DU 4A O 270/08 5 Ni 123/09 | 01-Nov-08 06-May-09 | 250,000 | partly infringed partly invalidated | 22-Dec-09 03-Feb-11 | I-2 U 18/10 | settlement | 1-Sep-11 | DE19727527 | 30-Jun-97 | Measurement | |
| INF REV | DU 4B O 155/08 4 Ni 40/08 | 25-Jun-08 20-Mar-08 | 500,000 | infringed invalidated | 14-Jul-09 16-Mar-10 | I-2 U 97/09 n/a | settlement withdrawn | 16-Dec-10 10-Dec-10 | DE19500529 | 11-Jan-95 | Medical technology | |
| INF REV | DU 4B O 98/08 4 Ni 68/08 | 25-Mar-08 26-Jun-08 | 500,000 | infringed invalidated | 17-Jul-09 22-Jun-10 | I-2 U 101/09 | settlement | 31-Jan-12 | DE102005043978 | 15-Sep-05 | Electrical machinery | |