

Location Choice in Global Patent Litigation: Does the Landscape Matter?

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Abstract

Firms asserting their patents globally face a dilemma: a legal verdict is binding only in the country of litigation, and yet litigating country by country is prohibitively expensive. Thus, firms have to be strategic in deciding where to sue. In this paper, we argue that litigation is not only to win a case, but to send a signal to global competitors. Whereas country characteristics affect signal strength, how far the signal can travel depends on the landscape: i.e., the relationships across countries. Our analyses on litigation cases in 50 countries over 13 years show that firms tend to concentrate litigation in few countries when the relevant markets historically share similar litigation outcomes, so signals from one country can potentially deter competition in others.

Keywords: location choice, institutional landscape, intellectual property, patent litigation

INTRODUCTION

While legal enforcement of intellectual property (IP) rights remains national, the battleground for IP has become increasingly global, especially for multinational enterprises (MNEs) competing across countries (Beukel & Zhao, 2018; Elmer & Gramenopoulos, 2019). In the past two decades, non-U.S. patents filed by American inventors grew 2.5 times as fast as their filings for U.S. patents (Santacreu & Jesse LaBelle, 2021), and overseas inventors have taken out more than half of the patents granted by USPTO.¹ As the MNEs' annual spend on IP litigation continues to rise,² identifying where to sue on the world map is gaining strategic importance.³

Location choice for global litigation is fundamentally different from domestic forum shopping, the latter having been covered by a sizable literature in strategy, law and economics (e.g., Atkinson, Marco, & Turner, 2009; Somaya & McDaniel, 2012; Sytch & Kim, 2021). While a patentee winning a case in Eastern Texas can apply the verdict to the whole United States, a win in Germany does not lend the patentee much help in Finland or France, not to mention Chile or China. As long as patent enforcement is constrained by national borders,⁴ looking for the friendliest court—a common practice in domestic litigation—is inadequate in the absence of spillover effects across countries.

In this paper, we argue that location choice for global litigation is ultimately a resource allocation decision in corporate strategy: How should a firm allocate its limited legal budget to a selective number of countries in a multi-market competition? Since it is highly unlikely for a firm to sue in every market, the purpose of a litigation is not only to *win a case* in a country, but

¹ Science & Engineering Indicators | NSB-2022-4

² <https://media2.mofo.com/documents/benchmarking-ip-litigation-2019.pdf>

³ https://www.wiggin.com/wp-content/uploads/2019/09/38696_patent-litigation-mapping-a-global-strategy-7-521-8726-beautiful-version.pdf

⁴ Exceptions to this rule include the Dutch courts' attempt to set global licensing rate, the Chinese courts' anti-suit injunction, the (forthcoming) Unified Patent Court in Europe, and the Foreign-Country Money Judgements Recognition Act in the U.S., but they are either forthcoming or remain limited in scope.

also to *make a case* in front of its competitors, sending signals beyond the country of litigation. So far, studies on global litigation in law and economics (Graham & Van Zeebroeck, 2013; Cremers et al., 2017) tend to focus on the characteristics of individual countries, such as market size, technological expertise, legal heritage, and institutional efficiency. While acknowledging the importance of such characteristics in attracting patent litigation, this paper brings attention to a dimension less studied in the literature: the relationships across countries. After all, the effect of a litigation case on global competition depends on two factors: (1) whether litigation in a particular court can send a strong and credible signal about the merit of the case, and (2) whether the signal can travel far to all the relevant markets, the latter determined by the entire landscape.

Framing litigation as a signaling process allows us to explore a specific mechanism behind the location choice of global patent litigation. Specifically, as suing country by country is infeasible, results from a reputable court can send a strong signal to the opponents, effectively pressuring the defendants into global settlements and deterring potential imitators from infringement. As a result, courts with strong technological expertise, such as Dusseldorf (Germany) and Hague (the Netherlands), disproportionately attract global litigants even though these courts do not necessarily offer higher winning rate for patentees (Elmer & Gramenopoulos, 2019). Meanwhile, firm experience with the focal court increases the efficiency of litigation in the country.

Furthermore, we expect the signals to travel further when all the relevant markets have homogeneous institutions. If Germany and France historically reach the same litigation outcomes regarding the same technologies or same litigation parties (i.e., a flat landscape), then the information conveyed in a decisive battle in Dusseldorf will be well accepted in France. Interpreting the signal in a similar way, the opponents are more likely to reach a global

settlement or avoid infringing the IP, consequently the litigating parties are less likely to repeat the battle in multiple countries. In contrast, if the countries usually reach different decisions on the same case (i.e., a rugged landscape), then a verdict from Germany is not enough to discourage opponents from trying their luck again in France, regardless of the reputation and expertise of the Dusseldorf court. Thus, relationships across countries should be an important consideration in litigation location choice, beyond the characteristics of individual countries.

Using a sample of patent litigation cases by the Global Fortune 500 countries spanning 50 countries and 13 years (from 2005 to 2017), we test the effect of landscape on the geographic concentration of litigation activities, both at the firm level (whether to concentrate) and at the firm-country level (where to concentrate). At the firm level, we find a higher level of geographic concentration within firms when the relevant countries share similar litigation outcomes. At the firm-country level, we find that country characteristics are indeed important determinants for MNEs seeking litigation venues, but their effects are moderated by the landscape: countries that historically generate similar verdicts as other countries tend to amplify the attractiveness of the individual locations.

We hope to make three contributions to the literature. First, we aim to bridge the gap between corporate strategy, which emphasizes the importance of strategic coordination within and across organizations (Feldman, 2020), and the law and economics literature, which focuses on the unique characteristics of individual countries (Graham & Van Zeebroeck, 2013; Cremers et al., 2017). The global presence of MNEs and the national nature of legal enforcement provide an ideal setting for us to highlight the relationships across countries, i.e., the landscape, as an important determinant of firms' strategic choices.

Second, by taking a closer look at within-firm location decisions, this study offers an alternative explanation for the geographic clustering of litigation activities around the world. Economic and technological clustering is well known: Easy access to skilled labor, specialized suppliers, and knowledge spillovers in clusters (Marshall, 1920), local spinoffs of successful firms (Klepper & Sleeper, 2005), and the pool of managerial talents (Shaver, 2018) all perpetuate location advantages. However, one common feature among these explanations is that the outcomes from these favorable locations can be applied elsewhere (Alcácer & Zhao, 2012). Detroit would not have been the Motown if cars produced in Detroit can only be sold in Detroit, and the Bay Area in California will not be Silicon Valley if firms cannot recoup their R&D investments in the Valley from their global sales. Our study shows that firms may concentrate their litigation in one country even if the verdicts are only binding in that country. The reason is that when institutions are relatively homogeneous—or harmonized in the language of policymakers—outcomes from one location indicate what may come next elsewhere, hence shaping firm behaviors. In that sense, it is entirely possible that the flatter the world, the more concentrated economic activities are.

Finally, this paper also makes an empirical contribution. Despite the interest in patent litigation as a phenomenon, past studies on forum shopping (Atkinson, Marco, & Turner, 2009) and institutional targeting (Somaya & McDaniel, 2012) are mostly in a domestic setting. Lack of multi-country data and the challenge of sorting out litigation activities in the MNEs' entire corporate trees have been the main roadblocks. To our knowledge, this study offers the first comprehensive firm-level empirical analysis on the location choice of global patent litigation. Given the unique characteristics of litigating across countries, we hope this study enriches our understanding of the interaction between firm strategy and institutional environments.

2. THEORY DEVELOPMENT

2.1 Patent litigation as an information revelation process

IP is an important strategic asset in market competition (Cohen et al., 2000; Alcácer, Beukel, & Cassiman, 2017; Cotter, 2018). Yet, their boundaries and validities are far from certain, incurring significant information asymmetry among parties in IP disputes. First, definitions of cutting-edge technologies tend to be ambiguous and the complexity of technologies may generate inconsistent interpretations by firms (Lanjouw & Schankerman, 1997). Without the necessary information to define patent scope (Freilich, 2015, 2020), a large proportion of early-stage technologies are not codifiable. Second, patenting can be a strategic process, which may decouple the IP from the underlying technology. On the one hand, patentees often hold private information on the weak point of a technology and selectively disclose details in the patent (Graham et al., 2002). On the other hand, the same technology can be written differently by different patent lawyers with various degrees of replicability. Third, as patent documents cannot exhaust all applications of the patented technology, the assertion of a patent depends on the interpretation of the claims and often trigger controversy on the scope and validity of IP (Sherkow, 2016).

Competition across countries adds extra uncertainty to the assertion of IP rights. Despite the existence of international treaties, IP laws are ultimately national (Elmer & Gramenopoulos, 2019). Thus, even the same technology and same alleged infringement behavior may be interpreted differently in different countries, adding more uncertainty to the assertion of IP rights. All this prevents parties in IP disputes from finding common ground and reaching cooperative solutions (Cooter, 1989).

Patent litigation, thanks to its lengthy process and high stake, becomes an effective information revealing process (Choi, 1998). Litigation's lengthy process allows the parties to

exchange and evaluate information with each other under pre-specified guidelines. In their eagerness to win, litigants are either required to, or willing to, share more private information about their technologies and strategic actions, even taking the risk of revealing sensitive information to competitors (Awate & Makhija, 2021). Thus, a significant portion of information asymmetry (Png, 1983; Bebchuk, 1984; Schweizer, 1989; Spier & Spulber, 1993) is resolved during the early adjudication stage (Waldfogel, 1998), while divergent expectations and asymmetric stakes lead to trial (Priest & Klein, 1984; Somaya, 2003).

Meanwhile, IP litigation comes with high stakes, in terms of both financial commitments and market consequences. After all, the median cost of patent litigation is over \$1M⁵ and the typical duration till trial is from one to three years⁶. If defeated, the plaintiff will lose market power or forfeit future rents. Thus, the decision to enter into a litigation may serve as an observable and credible signal (Spence, 1974; Agarwal, Ganco & Ziedonis, 2009) that the plaintiff, with its private information, is confident in the case. In essence, the parties can infer from the lawsuits the motivation and strategic stake of the opponents (Reinganum & Wilde, 1986; Lanjouw & Lerner, 1998; Somaya, 2003).⁷

2.2 Global Landscapes for Patent Litigation

The global landscape for patent litigation is very different from the domestic one. In domestic patent litigation, a disputed matter can only be litigated once (*res judicata*) in a specific court and the litigation results have uniform effects over the entire jurisdiction. Using the metaphor of rugged landscapes by Levinthal (1997) and Siggelkow (2001), the domestic landscape is completely flat by nature. A verdict can be enforced through the whole country. In contrast,

⁵ <https://www.aipla.org/detail/journal-issue/2019-report-of-the-economic-survey>

⁶ <https://www.fr.com/wp-content/uploads/2019/05/2019-Q2-Guide-to-Patent-Litigation-in-Federal-Court-final.pdf>

⁷ While we focus on the incentives of the plaintiffs, the defendants' decision whether or not to settle also reveals private information on their part.

global patent litigation covers multiple independent jurisdictions of sovereign states. Decisions made in a country are independent of those made in others and, with few exceptions, cannot be enforced across jurisdictions. This renders litigants a dilemma: while disputed matters have to be evaluated independently in each jurisdiction for effective enforcement, it is not financially feasible to file expensive patent litigation in every country where disputes occur.

One approach to address this dilemma is to draw a parallel between domestic and global litigation: If the global legal landscape is less rugged, i.e., if the candidate countries are more homogenous in terms of their interpretation and enforcement of IP laws, then both the plaintiff and the defendant will form similar expectations regardless of where the litigation happens. Thus, litigants can strategically choose to sue in one of the candidate countries and convince their counterparts to reach global settlements. The attractiveness of a specific country hinges on two aspects: the characteristics of the signal and the landscape on which the signal travels. This is consistent with the prior literature that, while litigation as a legal process is mostly confined by national borders, the information revealed from the process travels across borders and influences the decisions of relevant parties worldwide (Beukel & Zhao, 2018; Cremers et al., 2017).

The global institutional landscape determines how likely the result from a focal case is replicable in other countries. When potential countries exhibit high levels of heterogeneity, information revealed in one country is not applicable in another. The law and strategy literature has highlighted some important characteristics that may influence the interpretation of signals in the global landscape. For example, litigation in common law countries, such as the U.S. and U.K., tends to uncover more information with its extensive discovery process. In bifurcated systems such as those in Germany and China, the alleged infringement and the validity of patents are reviewed separately at different venues (Cremers et al., 2017; Helmets, 2018), leading to

potentially mixed findings. Meanwhile, the participation of juries in the U.S. increases the uncertainty of litigation outcomes. Such institutional differences, together with the differences in patentee friendliness⁸, propensity of imposing injunction⁹, specialization in technologies¹⁰, and home court advantages¹¹, create further uncertainty on the implication of a litigation in one country for competition in others, hence preventing the travel of signal across countries.

In contrast, a flat landscape allows the plaintiffs and defendants to form expectations about lawsuits elsewhere based on signals generated in the focal country. Other competitors, doing backward induction based on the revealed information, may reconsider their decisions on whether to infringe the patents in the first place (Cooter & Rubinfeld, 1989), which leaves less room for further disputes in other jurisdictions. In other words, a flat institutional landscape leads to wider acceptance of a litigation outcome in other countries, thus sparing the global firms from repeated litigation. Therefore, firms making location choices for their patent litigation need to consider integrated strategies that encompass not only the country characteristics, but also the relationships across countries.

One important indicator of institutional homogeneity—or a flat landscape—is the similarity of litigation outcomes on the same case. That is, how patents in the same patent family or disputes between the same litigants evaluated by courts in different countries. A case in point is Novartis’ cancer drug Gleevec that was invalidated in India but upheld in other jurisdictions,¹²

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https://www.finnegan.com/a/web/47397/2G4ozJ/managing_intellectual_property_where_to_win_patent_friendly_cour.pdf

⁹ https://www.wiggin.com/wp-content/uploads/2019/09/38696_patent-litigation-mapping-a-global-strategy-7-521-8726-beautiful-version.pdf

¹⁰ <https://www.iam-media.com/global-guide/global-patent-litigation/202/article/patent-litigation-global-undertaking>

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https://www.finnegan.com/a/web/47397/2G4ozJ/managing_intellectual_property_where_to_win_patent_friendly_cour.pdf

¹² <https://www.ipwatchdog.com/2019/06/22/proper-interpretation-section-3d-indian-patent-act-save-incremental-innovations-existing-pharmaceutical-substances/id=110581/>

indicating an uneven terrain between India and other countries. While there is not a single indicator of litigation outcome, win rate is arguably the most important parameter that litigants take note of (Moore, 2001; Bian, 2018; Elmer & Gramenopoulos, 2019). Granted, the decision to go for trial and the decision on location choice are both endogenous, but neither fundamentally affects the litigant and court information reflected by the litigation outcomes (Priest & Klein, 1984; Moore, 2001; Allison, Lemley & Schwartz, 2014). Scholars have used win rate to infer other court characteristics, such as home bias (Hahn & Singer, 2007; Moore, 2002) and patentee-friendliness (Atkinson et al., 2009), and law firm publications frequently cite win rate as a basis for forum shopping¹³. IP professionals we interviewed also confirm the importance of win rate due to its high visibility.

Thus, we expect to see firms concentrate their patent litigation in fewer countries when litigants observe similar outcomes from the countries in their choice set:

Hypothesis 1 (H1) Conditional on the firm's decision to file patent litigation, there is a positive relationship between the patent litigation results similarities among the countries in the choice set and the geographic concentration of patent litigation.

2.3. Country Characteristics: Where to Concentrate

The possibility of signals traveling across countries allows firms to avoid litigating in every single country. Meanwhile, it raises the question of where to sue. Given firms' limited legal resources, it is critical for them to choose litigation venues from which they send the signals effectively and efficiently.

Different courts exhibit different levels of expertise in patent litigation. Some courts gained technological expertise because of the litigation needs of local businesses, such as the

¹³ <https://www.straffordpub.com/products/global-patent-litigation-trends-tools-and-strategies-to-enforce-your-patent-rights-globally-2020-06-02>

litigation against generic drug manufacturers in India. Some strategically located courts, such as the District Court of the Hague, attracted litigators because of their willingness to impose injunctions on critical ports of entry. Others, such as the U.K., allow the courts to set global FRAND¹⁴ price for the licensing of standard essential patents (SEPs), attracting SEP holders that hope to assert their IP rights worldwide. Regardless of the initial reasons, by reviewing a large number of cases, such courts accumulate domain-specific knowledge and become experts in the relevant industries (Legomsky, 1990).

We argue that litigation in experienced courts send out stronger signals for three reasons. First, the experienced courts know where to seek relevant—sometimes hidden—information and how to best assess the information, rendering decisions that other courts will likely respect. Second, these courts have developed a reputation for patent litigation and demonstrated a track record in their trials. Thus, the variation in litigation outcome is more likely to be attributed to the intrinsic merit of the case than to the randomness in the process. Finally, a litigant’s decision to sue in an experienced court, knowing that it would face detective eyes to every detail, signals its confidence in its case. Firms competing globally therefore should target courts with more technological experience for stronger signals beyond borders. Thus, we hypothesize:¹⁵

Hypothesis 2a (H2a) Conditional on a firm’s decision to file patent litigation, there is a positive relationship between the relevant experience of the focal country and the likelihood of that country being chosen for litigation.

Firms also improve signal quality over time by learning from experience (Kotha, Crama & Kim, 2018). While a court’s experience affects the strength of the signal, a litigant’s

¹⁴ FRAND stands for “fair, reasonable, and non-discriminatory”

¹⁵ Note that we hypothesize at the country level despite the discussion at the court level for two reasons: (1) Most countries outside of the U.S. have only one main court for IP litigation, so there is considerable overlap between the two levels; and (2) Variance across countries dominate the variance within.

experience with the court affects its efficiency in obtaining a strong signal. An effective lawsuit requires familiarity with local laws and procedures (Elmer & Gramenopoulos, 2019), presence of an internal or external legal team in the country (Sako, Chondrakis, & Vaaler, 2016), and constructive relationships with the local judiciary and public (i.e., potential jurors). All this requires long-term commitment and investments. Hence, litigants tend to litigate repeatedly in the same location where they have accumulated experience and know how to proceed. By litigating in countries with more past experience, litigants can send signals efficiently to inform competitors how confident they are regarding focal cases. Thus, we hypothesize:

Hypothesis 3a (H3a) Conditional on a firm's decision to file patent litigation, there is a positive relationship between the prior litigation experience of litigants in the focal country and the likelihood of that country being chosen for litigation.

2.4. Moderating effects of institutional landscapes

Prior arguments suggest that the global impact of patent litigation is determined by the strength of the signal from the focal country as well as the landscape across countries in the choice set. For signals to be far-reaching, the recipients in other countries in the choice set should expect similar results if the focal case were to be litigated in their own countries. If other countries historically produce similar litigation outcomes on the same cases, the opponents or potential entrants are more likely to refer to the information generated from the focal case and reduces their incentive to try a different draw of luck.

Note that results similarity is different from having the same level of technological expertise. Dusseldorf in Germany and the Kuala Lumpur High Court in Malaysia may have high similarity in their judgment of pharmaceutical cases, but the former is significantly more experienced and well respected. High similarity simply means that a verdict generated from

Dusseldorf is unlikely to be overturned in Kuala Lumpur, so repetitive litigation in Malaysia would seem futile once a decision is made in Germany. Therefore, we expect that results similarity strengthens the effect of country characteristics in attracting global litigators.

Hypothesis 2b (H2b) Patent litigation results similarity between the focal country and other countries in the choice set positively moderates the relationship between relative expertise of the focal country and likelihood of that country being chosen for litigation.

Litigants accumulate experience as they repeatedly engage in litigation in the focal country over time. This advantage itself does not necessarily contribute to reaching global settlement unless the global landscape is flat enough. If litigants expect homogenous litigation outcomes wherever they litigate, the advantage of litigating in more familiar countries will have stronger impacts. They can secure higher predictability with lower costs and leverage local litigation results more efficiently to convince competitors to come to negotiation tables. For this reason, we predict that a flatter global landscape will further increase the possibility of litigating in a country where the firm has more litigation experience.

Hypothesis 3b (H3b) Patent litigation results similarity between the focal country and other countries in the choice set positively moderates the relationship between the litigant's prior experience in the focal country and likelihood of that country being chosen for litigation.

METHODS

3.1 Sample

To empirically examine the location choice of global patent litigation, we construct a sample of Global Fortune 500 companies, from 2005 to 2017, excluding purely finance institutions. This sample has several features that match our research objectives. First, these firms are global

innovators and active users of IP as a strategic tool. Second, thanks to the public scrutiny on high-profile firms, we have detailed information on their global activities. Finally, a long enough observation window allows us to observe the dynamics over time.

For each of the parent firms, we compile comprehensive financial and ownership data, including those of its subsidiaries and branches using ORBIS, a Bureau Van Dijk product. Due to frequent mergers and acquisitions, the corporate family trees were reconstructed every year. In total, the parent firms in our sample have majority ownership (50% or more aggregated ownership) in 377,829 subsidiaries in 190 countries.

We then match the parent firms and subsidiaries to the Worldwide Patent Statistical Database (*PatStat*, 2021 Spring Edition) to extract their patent portfolios, i.e., the full collection of patents in force for each firm-year based on patent legal events, such as patent grant, termination, and extension of validity. Since a firm can only file infringement cases in countries where it has patents in force, its patent portfolio determines the choice set to litigate. We dropped the firms with less than two possible countries in their choice set, which enables us to focus on the location choice of global innovators. This step gives us a sample of 524 non-financial firms with a portfolio of over 11 million patents in force belonging to about 5.4 million unique patent families (INPADOC).

For patent litigation, we retrieve proprietary data for our sample firms—including all their subsidiaries—from Darts-IP, an IP data company owned by Clarivate Analytics. The global coverage of Darts-IP data allows us to observe case types, case outcomes, and litigation venues. Detailed information on the plaintiffs and defendants and their ultimate parents, including nationalities, is matched with the corporate family trees identified earlier. In total, 174 firms

across 33 industries (SIC 2 digits) show up as plaintiffs in infringement cases, having filed a total of 6,358 infringement cases (unique binder numbers) in 50 countries.

3.2 Variables

We have two levels of analyses. The firm-level analysis is to explain the geographic concentration of a firm's litigation activities, conditional on the decision to sue. The firm-country-year analysis is to explain the number of infringement cases that a firm files in a country. Accordingly, we have two sets of the variables and estimation models as detailed below.

Dependent variables

The first outcome of interest, *litigation concentration_HHI*, measures the extent to which the infringement litigations are concentrated within a handful of countries, as opposed to being dispersed among a large number of countries. For this variable, we calculate the Herfindahl index based on the number of patent infringement cases litigated by the focal firm and its subsidiaries across countries. As infringement litigation is a relatively rare event (Lanjouw & Schankerman, 1997; Somaya, 2003), we use the count of cases over the sample years to calculate the time-invariant pattern of concentration. In the robustness check, we also use entropy as an alternative measure of concentration (Pasipanodya & Knott, 2021). Note that a higher value of an entropy measure indicates a lower level of concentration, the opposite of the Herfindahl index.

The second outcome of interest is the *number of patent litigations* each sample firm, including its subsidiaries, files in the focal country-year. The unit of observation for the two dependent variables differs. *Litigation concentration_HHI*, is measured at the firm level whereas the *number of patent litigations* is measured at the firm-country-year level. Thus, these two outcome measures require different estimation models, as we explain below.

Explanatory variables

We calculate the main explanatory variable, result similarity, at the firm level and the firm-country level, corresponding to the two levels of analyses. At the firm level, the independent variable *results similarity_firm* measures how similar the patent litigation outcomes are among all countries in the focal firm's choice set, i.e., countries in which the focal firm has active patents to litigate. We follow two steps to calculate this measure:

First, for every pair of countries, we sort out the list of patent families that are involved in patent infringement litigations in both countries in the sample period. As illustrated in Figure 1, Country A and B shared five patent families while only three patent families have been litigated in both Country C and D. We then generate two vectors for each pair of countries indicating the litigation outcomes of the shared patent families: 1 if the patentee wins, 0 if tied or split win, and -1 if the alleged infringer wins. This setup allows us to control for the underlying technology and patentee characteristics that may drive litigation outcomes. We then calculate the results similarity scores for each pair of countries, cosine of the angle between the two vectors that ranges from -1 to 1, to determine how similar every two countries are. A results similarity score of 1 would indicate that two countries always reach the same results regarding the same technologies, while a results similarity score of -1 would indicate two countries always generate the opposite results¹⁶.

Second, we measure *results similarity_firm* by averaging the pair-wise results similarity scores between every two countries in the choice set. Taking account of the relative importance of countries, we also weigh the pair-wise results similarity scores by the GDP of the two countries, generating the alternative measure *results similarity_GDP*, and by the number of

¹⁶ According to our theory, higher results similarity between two countries will reduce the likelihood of the same case being litigated in both countries. Thus, some highly similar country pairs may not show up in our sample for the calculation of result similarity, leading to potential underestimation of the measure. That said, result similarity is just one of the many factors determining location choice of patent litigation, so the effect should be marginal.

industry leaders in the two countries, generating the alternative measures *results similarity_TOP*. We define industry leaders as the largest 5,000 firms by revenue in the firm's primary industry (the total number of firms may be fewer than 5000 in some industries) and obtain the data from Freund and Sidhu (2017).

At the firm-country-year level, the moderating variable *results similarity* measures how similar the patent litigation outcomes are between the focal country and the other countries in the choice set. Following a similar two-step generation process as described above, we first calculate the results similarity scores between every two countries based on litigation records prior to the focal year (at least 5 years¹⁷), and then measure *results similarity* by averaging results similarity scores between the focal country and the other countries in the choice set of the focal year. In the robustness check, we also use *results similarity* calculated from litigation outcomes throughout the sample period (not only the years prior to the focal case).

The independent variable, *country relevant expertise*, captures the strength of signals coming from the focal countries. To construct this variable, we first sort out the top three technology categories (defined by Darts-IP) in which the focal firm litigate most cases, and then calculate the percentage of all patent infringement litigations in these three categories that happened in the focal country prior to the focal year. That way, this is an institutional measure that is specific to the firm's area of expertise: a pharmaceutical company may find the most reputable courts in the U.S. and Germany while an information technologies (IT) company may consider China and the Netherlands the most prominent battlegrounds for SEPs.

To distinguish firms by their previous litigation experience in each country, we measure the other independent variable *firm-country experience* as the number of litigations filed by the

¹⁷ Thus, in our sample the first focal year is 2010 and last is 2017.

focal firm in the focal country divided by the total number of litigations filed by the focal firm prior to the focal year. While *firm-country experience* captures *one* litigant's preference for the focal country, *country relevant expertise* reflects the attractiveness of the focal country to *all* the peer litigants. Thus, these two variables are theoretically relevant, as one firm's preference for a country may be confounded by the country's attractiveness. As expected, *firm-country experience* and *country relevant expertise* have a statistical correlation up to 0.746. To distinguish these two variables, we orthogonalized these two and generate two variables, *country relevant expertise_orth* and *firm-country experience_orth*, which have a correlation of 0.000.

Control variables

In analyzing the factors behind the location choice of litigation, we control for a series of firm, country, and industry characteristics. The firm-level analysis is about the degree of geographic concentration of litigation activities within firms, so we only have firm and industry controls. First, we control for *firm choice set*, the logged number of countries in the choice set for the focal firm. The more countries in which a firm has patents in force, the more countries in which it can possibly enforce patent protection via litigation, and hence the lower the degree of concentration. Since we are focusing on the country distribution of litigations for a given number of litigations, we also control for *firm number of litigations*, measured as the logged number of infringement litigations. We include *firm assets*, measured as the firm's average assets (logged to correct for skewness) across all sample years, to control for the possibility that firm size directly affects the deep pockets needed for patent enforcement activities (Somaya & McDaniel, 2012). Finally, we include *global industry concentration*, the percentage of the largest four firms ranked by revenues in the industry (Freund & Sidhu, 2017). The idea is that signals from one country has implications for global competitors, who tend to encounter each other in multiple countries

(Beukel & Zhao, 2018). Hence, we expect a positive effect of global industry concentration on litigation concentration. Industry dummies (two-digit SIC codes) are included in all models.

In the firm-country-year level analysis, we first control for several firm-country level factors. *Firm-country patents proportion* is calculated as the number of patents in force the focal firm has in the focal country divided by the total number of patents in force in its portfolio, in the preceding year. Given the substantial costs of applying for, and maintaining, a patent portfolio (Alcácer et al., 2017), the relative size of the patent portfolio in the country represents the strategic importance of the focal country to the firm. This, in turn, correlates with the firm's commitment to patent enforcement in the country (Agarwal et al., 2009). To control for the firm's local business presence, we include *firm-country assets*, which is the logged total assets of the focal firm in the focal country of the preceding year.

Mirroring our firm-level analysis, we control for the same set of firm characteristics, only that they are now time-variant: *firm choice set*, *firm assets*, and *global industry concentration*¹⁸ in the preceding year, and *firm prior litigations*, the logged total number of litigations filed by the focal firm prior to the focal year.

To control for country characteristics, we include *plaintiff win proportion*, the percentage of plaintiff win¹⁹ in all infringement cases handled in the country prior to the focal year. A more favorable position for the plaintiff may attract more filings of infringement litigation in that country. Barring some unique circumstances, firms usually prefer to avoid lengthy legal procedures and the high financial costs that come with them. Thus, we control for *litigation process length*, measured as the logged average number of days of the prior infringement cases

¹⁸ The data in Freund and Sidhu (2017) only cover firm revenues from 2006 to 2014, so we use the value of 2006 for year 2005 and the value of 2014 for years 2015-2016.

¹⁹ In a patent infringement case, the patentee is the plaintiff.

in the focal country, to capture time duration of litigation. Finally, for a country to be a viable choice as location for litigation, it has to be wide open to all foreigners, which would be the case if foreign litigants come from a variety of countries. The variable *foreign litigants diversity* is calculated as one minus the Herfindahl index of the foreign litigants' nationality distribution across countries in the prior infringement cases in the focal country. Finally, we include *GDP*, the logged value of gross domestic product of the focal country, to control for market size. We expect a positive effect of GDP, as a larger market may draw a larger number of global competitors and witness more patent disputes. Year and industry dummies are included throughout the models to capture any other temporal and industry effects.

3.3 Models

We apply a Tobit model for the firm-level analysis since the dependent variable *litigation concentration_HHI* is truncated between 0 and 1. For the firm-country-year level analysis, we use a negative binomial specification, appropriate for count-dependent variables. Since the same firm may litigate in multiple countries in our sample period, we compute robust standard errors clustered by firm for potential interdependence across observations. In the robustness checks, we also use alternative estimation models with different ways to cluster the standard errors.

4. RESULTS

4.1 Geographic concentration of litigation

Table 1 presents the descriptive statistics and the correlation table for variables in the firm level analysis. Table 2 reports the results from the Tobit models examining litigation concentration.

H1 predicts that a global firm's patent infringement litigations are more concentrated across countries if the possible countries produce similar litigation results. In Models 1, where the dependent variable is a Herfindahl index, the coefficient of *results similarity_firm* is significantly

positive as hypothesized ($\beta = 1.465$; p -value = 0.027). For robustness checks, Model 2 and 3 regress the dependent variable on *results similarity_GDP* and *results similarity_TOP*, respectively, and show similar results. It supports the view that the whole landscape matters in the geographic concentration of litigations. Models 4—6 use the entropy index, *litigation concentration_entropy*, as the alternative measure of litigation concentration, and each introduces *results similarity_firm*, *results similarity_GDP* and *results similarity_TOP* separately. Coefficients of the independent variables *results similarity_firm* and *results similarity_GDP* are significantly negative, suggesting that higher levels of results similarity are associated with a lower level of litigation dispersion, i.e., higher level of litigation concentration. The coefficient of *results similarity_TOP* is insignificant (p -value = 0.110), but in the right direction. Overall, Results in Table 2 support H1.

4.2 Litigations in the focal countries

Turning to the firm-country level analysis, Hypotheses 2a, 2b, 3a and 3b predict the number of patent litigations filed by a firm in individual countries. Table 3 reports the summary statistics and the correlation table for the variables, and Table 4 reports the main results.

In Table 4, we include control variables only in Model 1, add *results similarity* in Model 2, and enter *country relevant expertise* in Model 3. To examine the independent effect of country relevant expertise while controlling for the firm specific experience, we enter *country relevant expertise_orth* as well as *firm-country experience_orth* in Model 7. The inclusion of the two orthogonal variables helps avoid multicollinearity in the model and increases the precision of the estimation. H2a predicts that firms file more infringement litigations in a country with more relevant litigation experience. The positive and significant coefficients of *country relevant expertise* ($\beta = 2.552$; p -value = 0.000) in Model 3 and *country relevant expertise_orth* ($\beta = 0.412$;

p -value = 0.000) in Model 7 are in support of H2a. Based on the result of Model 7, the marginal effect of *country relevant expertise_orth* on *number of patent litigations* with all variables at their mean values is 0.011 (p -value = 0.000), and one standard-deviation increase above mean in *country relevant expertise_orth* is associated with 57.9% increase in *number of patent litigations*.

Turning to the moderating effect, H2b suggests that results similarity between the focal country and other countries in the choice set strengthens the positive effect of relevant country expertise on the number of infringement litigations in the focal country. Model 4 and 8 in Table 4 test this hypothesis. While Model 4 uses the original value of *country relevant expertise*, Model 8 uses the orthogonal variable *country relevant expertise_orth* and controls for firm-country experience. The significant interaction coefficients of 2.844 in Model 4 (p -value=0.050) and 0.788 in Model 8 (p -value=0.022) support this prediction. Figure 2, based on the results of Model 8, shows the marginal effect of *country relevant expertise_orth* on the *number of patent litigations* conditioning on different levels of *results similarity*. We find a significant effect of *country relevant expertise_orth* when *results similarity* is above -0.24, i.e., 88% of the observations in the sample. In relative terms, we also see a considerable moderation effect of *results similarity*. For example, one standard deviation increase in *results similarity* above the mean leads to the marginal effect of *country relevant expertise_orth* increasing by 87.0% from the mean value.

H3a suggests that a firm would concentrate more litigations in a country where it has accumulated relatively more litigation experience. We also use two models to examine it. In Table 4 Model 5 we use the *firm-country experience* as the independent variable, and the positive coefficient of 2.552 (p -value=0.000) is in line with the prediction. In Model 7, the significant positive coefficient of *firm-country experience_orth* ($\beta = 0.258$; p -value = 0.000) with the

presence of *country relevant expertise_orth* also support H3a, meaning that firm specific experience shapes the location choice of litigation even taking account of the country's prevalence. Hence, H3a is supported. Translating the results of Model 7 into economic implication, the marginal effect of *firm-country experience_orth* on *number of patent litigations* with all variables at their mean values is 0.007 (p -value = 0.000), and one standard-deviation increase above mean in *firm-country experience_orth* is associated with 29.1% increase in *number of patent litigations*.

Further, we use Model 6 and 8 of Table 4 to examine H3b, which predicts a positive moderating effect of results similarity on the relationship between firm-country experience and the number of patent litigations. In Model 6, by estimating the coefficient of the interaction between *firm-country experience* and *results similarity*, we find supportive evidence for H3b ($\beta = 3.439$; p -value = 0.003). Model 8 that includes the orthogonal variable *firm-country experience_orth* as well as its interaction with *results similarity* shows similar pattern, as the coefficient of the interaction term is 0.483 with a p -value of 0.021. To better understand the economic significance, in Figure 3 we use the results of Model 8 to plot the marginal effect of *firm-country experience_orth* on the *number of patent litigations* varied by *results similarity*. The marginal effect is significant at the level of 5% for the 85% observations for which *results similarity* is above -0.16. Regarding moderating effect, one standard deviation increase in *results similarity* above the mean leads to the marginal effect of *firm-country experience_orth* increasing by 96.0% from the mean value, which implies an economically meaningful effect size.

Note that, at the firm-country level, the main effect of *results similarity* can go both ways. As argued in H1, higher similarity across countries leads to higher geographic concentration of litigation. Thus, it can be a positive effect on the "chosen" locations while a negative effect on

everyone else. Conversely, a country dissimilar from others may never be chosen because its signal does not travel far, or is more likely to be chosen because, without much information spillover, local litigation is the only effective way to protect the local market.

Most control variables have the expected coefficients. For instance, *GDP* is significantly positive at the 1% level through all models, indicating the important role of market size in drawing global litigation. The significant positive coefficient of the indicator regarding firm-specific innovation focus, *firm-country patents proportion*, means that local innovation activities drive firms to allocate more legal resources to deter competitors. Given that patent litigation is demanding, a firm's overall litigation experience will also increase the initiation of litigations in a country, as demonstrated by the significant positive coefficient of *firm prior litigations*. The main results also show that, a country with plaintiff-friendly courts (*plaintiff win proportion*) and that is widely acknowledged (*foreign litigants diversity*) will attract more global litigants. For the firm-country level analysis, we carry out a series of robustness checks to ensure that results are not specific to the above empirical setup. Tables 5 and 6 test alternative model specifications, Table 7 test alternative measures for the variables, Tables 8 and 9 vary the sample countries and industries included in our analysis.

In Table 5, due to potential interdependence across litigations in the same country, we estimate the models using both one-way clustering, where the errors are clustered by country, and two-way clustering with error terms clustered by country and firm. In Table 6, we use OLS models (which are consistent but less efficient) and add firm dummies to control for any unobservable firm characteristics. The results are consistent with those in Table 4.

In Models 1 and 2 of Table 7, we use all records in our sample—instead of the historical records prior to the focal year—to calculate *results similarity*. Since infringement cases are

infrequent events, and institutional changes tend to be slow, including all years in the calculation allows us to have more observations on court behavior. In Model 3 and 4, we accommodate the possibility that Global Fortune 500 firms are often highly diversified. Thus, we alternatively measure *country relevant expertise* as past litigation cases in the top five—instead of three—technology categories of the focal firm. All the main results hold in Table 7.

Table 8 address the concern that the pattern in location choice for global litigation may be driven by some outlier countries. First, due to institutional embeddedness, home country is preferred by the domestic litigating firms when it comes to legal enforcement. Second, two countries, the U.S. and China, account for nearly half of the infringement cases in our sample. Results in Table 8 show that our main hypotheses are supported even when we exclude the home country of the focal firm, or either of the two heavyweights.

Industry wise, IT and the pharmaceutical industry are heavyweights; almost all the top litigants are from these two industries. Yet, they have very different regulatory environments: whereas the IT industry is ruled by global technology standards and dispersed supply chains across countries, pharmaceutical firms face more country-specific hurdles for market entry. With a flatter landscape, IT firms may concentrate litigations in a few countries that are reputable in the whole industry in order to deter competitors more efficiently, and pharma firms may initiate more litigations in the countries where they have specific experience, hence fencing themselves in more markets. Indeed, results in Table 9 reflect this difference: H2a and H3a are supported in both industries, but H2b is only supported in IT and H3b is only supported in pharma.

DISCUSSION AND CONCLUSION

The competition for technological advantage has been increasingly global, and yet most studies on IP strategies tend to focus on institutions within countries. In this paper, we argue that the

location choice for global patent litigation is fundamentally different from that for domestic forum shopping, and that examining the landscape as a whole can provide insight beyond the sum of individual countries. Using a sample of patent litigation cases by the Global Fortune 500 companies spanning 50 countries and 13 years, we find that firms are more likely to concentrate their litigation activities in a small number of countries in a flat landscape, i.e., when the relevant countries historically share similar litigation outcomes. The landscape also moderates the effect of country characteristics in attracting global patent litigation, strengthening the appeal of countries with reputable courts and firm-specific experience.

Global litigation is a complex phenomenon. Despite our best effort, this study still has several limitations. First, our sample includes patent disputes at three types of venues: the patent and trademark offices (PTOs), the judicial courts, and, in the case of the U.S., the international trade commission (ITC). There are other battlegrounds for MNEs to compete for technological influence across countries. For example, national laws usually recognize arbitration as an alternative to litigation in resolving international disputes, and MNEs frequently lobby governments to establish regulatory hurdles against foreign technologies. The strategic use of battlegrounds can be an interesting study in its own.

Second, our empirical setup treats each litigation as a separate event, without accounting for the sequence of lawsuits across time and location. The epic battle between Apple and Samsung, for example, started from the Northern District of California in 2011 and escalated to a series of counter-claims and counter-sues in multiple U.S. courts, ITC, and the IP courts in eight other countries in the next seven years. It is challenging to pin down the relationships between the cases as they can be on completely separate technologies, only to be used as revenge in response to earlier cases. Relatedly, so far we have analyzed technologies at the patent level,

ignoring technology standards and patent pools, which may significantly affect the intensity and location choice of litigation (Choi & Gerlach, 2015). These are outside of the scope of this study but are interesting topics for future research.

Third, the focal firms in our analyses are the Global Fortune 500 companies, the largest MNEs in the world. We are leaving out small and medium enterprises that could be equally innovative. On the one hand, our parallel analysis on the full list of 2+ million patent litigation cases from Darts-IP shows that the Global Fortune 500 companies are the main ones playing the global games. After all, to have the possibility of choosing where to sue, firms have to have a global portfolio of patents to begin with, not to mention the legal teams familiar with global litigation, requiring a tremendous amount of resources.²⁰ On the other hand, there are born-global companies (Knight & Cavusgil, 2004) that arbitrage across countries when they are small and young. More research is needed to understand the heterogeneity among players in the global litigation game.

Finally, we have not fully captured the long-term dynamics behind litigation location choices. Over time, the “chosen” locations attract legal resources from firms and reputable law firms, further strengthening the signals from there. Firms also gain reputation as they engage in more legal actions (Agarwal et al., 2009; Clarkson & Toh, 2010), sending signals beyond particular disputes or particular opponents.

These limitations withstanding, we believe this study is making an important contribution to the literature. To the law and economics literature, this study highlights the importance of institutional landscape in firms’ forum shopping decisions. To the location literature, this study offers an alternative explanation for the geographic concentration of litigation within MNEs:

²⁰ <https://www.sternekessler.com/news-insights/news/patent-owners-taking-global-view-enforcement-efforts>

when the landscape is flat, litigation in one country can send important signals to other countries because they shape the expectations of the litigants participating in different versions of the same case. Empirically, this is one of the earliest studies on global patent litigation, overcoming a major data hurdle in tracking cross-border activities. We hope that this study can open the door to further inquiries into the strategic location choice of MNEs in a seemingly segregated world.

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Patent Family	Country A	Country B	Country C	Country D
No. 1	1	.	.	1
No. 2	1	1	.	1
No. 3	1	1	1	1
No. 4	1	0	1	1
No. 5	0	-1	1	0
No. 6	1	-1	.	0

Figure 1. Calculation of results similarity based on litigation outcomes on shared patent families

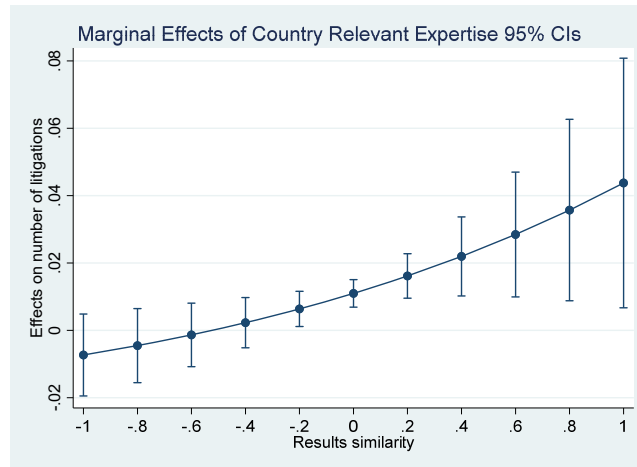


Figure 2. The moderating effect of results similarity on the marginal effect of country relevant expertise

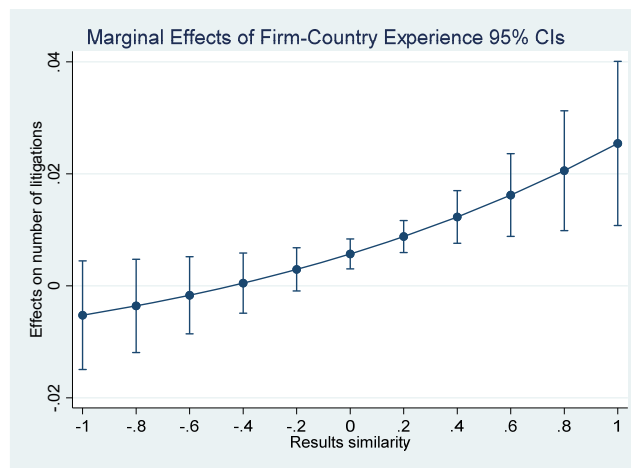


Figure 3. The moderating effect of results similarity on the marginal effect of firm-country experience

Table 1. Summary statistics and correlations: Firm level analysis

Variables	1	2	3	4	5	6	7	8	9
1 Litigation concentration_HHI	1.000								
2 Litigation concentration_Entropy	-0.958	1.000							
3 Results similarity_Firm	0.074	-0.093	1.000						
4 Results similarity_GDP	0.066	-0.082	0.926	1.000					
5 Results similarity_TOP	0.009	-0.012	0.825	0.811	1.000				
6 Firm choice set	-0.477	0.499	0.036	0.000	0.007	1.000			
7 Firm number of litigations	-0.607	0.716	-0.012	-0.023	-0.016	0.569	1.000		
8 Firm assets	-0.087	0.135	0.048	0.051	0.081	0.360	0.269	1.000	
9 Global industry concentration	-0.008	0.023	-0.021	-0.026	-0.002	0.052	-0.023	0.094	1.000
Mean	0.707	0.591	0.171	0.170	0.131	3.616	2.151	17.597	0.242
SD	0.286	0.640	0.060	0.067	0.064	0.637	1.692	0.979	0.120
Min	0.143	0.000	-0.171	-0.163	-0.167	1.386	0.000	15.172	0.087
Max	1.000	2.244	0.492	0.667	0.444	4.431	6.205	20.406	0.698

N=174

Table 2. Results similarity and patent litigation concentration

Tobit model	Litigation concentration_HHI			Litigation concentration_Entropy		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Independent variable</i>						
Results similarity_Firm	1.465 (0.654) <i>0.027</i>			-3.320 (1.628) <i>0.043</i>		
Results similarity_GDP		1.633 (0.643) <i>0.012</i>			-3.770 (1.601) <i>0.020</i>	
Results similarity_TOP			1.153 (0.667) <i>0.086</i>			-2.754 (1.714) <i>0.110</i>
<i>Control</i>						
Firm choice set	-0.406 (0.090) <i>0.000</i>	-0.401 (0.088) <i>0.000</i>	-0.432 (0.098) <i>0.000</i>	0.867 (0.231) <i>0.000</i>	0.857 (0.225) <i>0.000</i>	0.923 (0.251) <i>0.000</i>
Firm number of litigations	-0.109 (0.020) <i>0.000</i>	-0.111 (0.020) <i>0.000</i>	-0.110 (0.020) <i>0.000</i>	0.354 (0.062) <i>0.000</i>	0.359 (0.062) <i>0.000</i>	0.350 (0.062) <i>0.000</i>
Firm assets	0.034 (0.030) <i>0.263</i>	0.034 (0.030) <i>0.257</i>	0.032 (0.030) <i>0.292</i>	-0.021 (0.076) <i>0.781</i>	-0.021 (0.076) <i>0.782</i>	-0.017 (0.078) <i>0.824</i>
Global industry concentration	0.175 (0.365) <i>0.632</i>	0.183 (0.363) <i>0.614</i>	0.198 (0.367) <i>0.590</i>	0.223 (0.919) <i>0.809</i>	0.208 (0.912) <i>0.820</i>	0.189 (0.925) <i>0.839</i>
Industry dummies	Y	Y	Y	Y	Y	Y
Constant	1.414 (0.589) <i>0.018</i>	1.361 (0.584) <i>0.021</i>	1.610 (0.585) <i>0.007</i>	-2.449 (1.518) <i>0.109</i>	-2.331 (1.503) <i>0.123</i>	-2.860 (1.524) <i>0.063</i>
Observations	174	174	174	174	174	174
Log likelihood	-38.48	-37.93	-39.14	-96.48	-95.90	-97

Note: Robust SE are in parentheses, *p* values are italic.

Table 3. Summary statistics and correlations: Firm-Country level analysis

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Number of patent litigations	1.000															
2 Country relevant expertise	0.309	1.000														
3 Country relevant expertise_Orth	0.309	1.000	1.000													
4 Firm-Country experience	0.282	0.746	0.746	1.000												
5 Firm-Country experience_Orth	0.103	0.087	0.087	0.728	1.000											
6 Results similarity	-0.025	-0.095	-0.095	-0.075	-0.014	1.000										
7 Firm-country patents proportion	0.146	0.534	0.534	0.569	0.301	-0.081	1.000									
8 Firm-country assets	0.088	0.061	0.061	0.160	0.176	-0.114	0.257	1.000								
9 Firm choice set	0.072	-0.152	-0.152	-0.147	-0.063	0.065	-0.263	0.044	1.000							
10 Firm assets	0.029	-0.038	-0.038	-0.035	-0.014	0.013	-0.054	0.068	0.219	1.000						
11 Firm prior litigations	0.151	-0.077	-0.077	-0.057	-0.006	0.020	-0.128	0.027	0.514	0.119	1.000					
12 Plaintiff win proportion	-0.089	-0.294	-0.294	-0.193	0.014	-0.152	-0.136	0.256	0.007	-0.012	-0.013	1.000				
13 Litigation process length	-0.001	-0.012	-0.012	0.014	0.032	0.156	-0.050	0.021	0.016	-0.025	0.003	0.047	1.000			
14 Foreign litigants diversity	0.087	0.249	0.249	0.211	0.058	-0.126	0.151	0.252	-0.073	-0.011	-0.030	0.195	0.218	1.000		
15 GDP	0.200	0.583	0.583	0.471	0.101	0.082	0.493	0.061	-0.262	-0.040	-0.171	-0.184	-0.167	0.241	1.000	
16 Global industry concentration	-0.026	0.010	0.010	0.009	0.004	0.008	0.012	-0.020	-0.056	-0.009	-0.107	-0.006	-0.003	-0.001	0.022	1.000
Mean	0.223	0.054	0.069	0.055	0.056	0.203	0.049	9.534	3.759	17.908	2.769	0.246	5.412	0.808	27.846	0.275
SD	1.491	0.165	1.116	0.189	0.991	0.451	0.113	6.1	0.453	0.935	1.49	0.119	1.028	0.146	1.247	0.12
Min	0	0	-0.298	0	-6.265	-1	0	0	1.099	14.952	0	0	0	0	24.487	0.095
Max	47	0.946	6.11	1	8.317	1	0.989	20.473	4.382	20.477	6.054	0.571	7.397	1	30.604	0.911

N=17,280

Table 4. Results similarity and number of patent litigations

Negative binomial model			Original values				Orthogonal values	
DV: Number of patent litigations	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Independent variable</i>								
(1)Country relevant expertise			2.552 (0.491) <i>0.000</i>	2.435 (0.493) <i>0.000</i>				
(2)Firm-Country experience					2.552 (0.330) <i>0.000</i>	2.300 (0.342) <i>0.000</i>		
(3)Country relevant expertise_Orth							0.412 (0.060) <i>0.000</i>	0.411 (0.058) <i>0.000</i>
(4)Firm-Country experience_Orth							0.258 (0.048) <i>0.000</i>	0.214 (0.050) <i>0.000</i>
(5)Results similarity		-0.238 (0.103) <i>0.021</i>	0.053 (0.107) <i>0.624</i>	0.014 (0.107) <i>0.896</i>	-0.015 (0.099) <i>0.876</i>	-0.107 (0.100) <i>0.281</i>	0.072 (0.106) <i>0.495</i>	0.233 (0.142) <i>0.101</i>
(1)x(5)				2.844 (1.451) <i>0.050</i>				
(2)x(5)						3.439 (1.165) <i>0.003</i>		
(3)x(5)								0.788 (0.345) <i>0.022</i>
(4)x(5)								0.483 (0.209) <i>0.021</i>
<i>Control</i>								
Firm-country patents proportion	2.513 (0.541) <i>0.000</i>	2.404 (0.540) <i>0.000</i>	0.962 (0.601) <i>0.110</i>	1.104 (0.597) <i>0.064</i>	0.469 (0.498) <i>0.347</i>	0.581 (0.480) <i>0.226</i>	0.124 (0.537) <i>0.818</i>	0.210 (0.512) <i>0.682</i>
Firm-country assets	0.008 (0.010) <i>0.441</i>	0.008 (0.010) <i>0.419</i>	0.011 (0.011) <i>0.329</i>	0.010 (0.011) <i>0.333</i>	0.007 (0.010) <i>0.483</i>	0.005 (0.010) <i>0.580</i>	0.008 (0.010) <i>0.432</i>	0.007 (0.010) <i>0.509</i>
Firm choice set	0.270 (0.341) <i>0.429</i>	0.271 (0.346) <i>0.434</i>	0.358 (0.308) <i>0.245</i>	0.426 (0.284) <i>0.133</i>	0.195 (0.414) <i>0.638</i>	0.176 (0.406) <i>0.665</i>	0.222 (0.374) <i>0.553</i>	0.253 (0.304) <i>0.405</i>
Firm assets	0.072 (0.118) <i>0.540</i>	0.075 (0.117) <i>0.520</i>	0.075 (0.118) <i>0.524</i>	0.076 (0.117) <i>0.518</i>	0.103 (0.121) <i>0.393</i>	0.106 (0.119) <i>0.376</i>	0.098 (0.120) <i>0.415</i>	0.098 (0.118) <i>0.408</i>
Firm prior litigations	0.701 (0.118) <i>0.000</i>	0.701 (0.118) <i>0.000</i>	0.714 (0.118) <i>0.000</i>	0.710 (0.119) <i>0.000</i>	0.679 (0.123) <i>0.000</i>	0.680 (0.122) <i>0.000</i>	0.687 (0.121) <i>0.000</i>	0.689 (0.121) <i>0.000</i>
Plaintiff win proportion	-0.092 (0.448) <i>0.837</i>	-0.178 (0.458) <i>0.697</i>	1.482 (0.538) <i>0.006</i>	1.444 (0.536) <i>0.007</i>	0.913 (0.446) <i>0.040</i>	0.765 (0.450) <i>0.089</i>	1.440 (0.514) <i>0.005</i>	1.435 (0.506) <i>0.005</i>
Litigation process length	0.096 (0.059) <i>0.100</i>	0.119 (0.063) <i>0.059</i>	0.048 (0.058) <i>0.410</i>	0.051 (0.058) <i>0.383</i>	0.052 (0.052) <i>0.325</i>	0.054 (0.052) <i>0.300</i>	0.033 (0.053) <i>0.535</i>	0.030 (0.052) <i>0.570</i>
Foreign litigants diversity	2.351 (0.733) <i>0.001</i>	2.198 (0.729) <i>0.003</i>	1.086 (0.598) <i>0.069</i>	1.046 (0.591) <i>0.077</i>	1.260 (0.613) <i>0.040</i>	1.294 (0.612) <i>0.034</i>	0.987 (0.561) <i>0.079</i>	0.887 (0.548) <i>0.106</i>
GDP	0.893 (0.093) <i>0.000</i>	0.895 (0.091) <i>0.000</i>	0.698 (0.102) <i>0.000</i>	0.695 (0.102) <i>0.000</i>	0.723 (0.090) <i>0.000</i>	0.734 (0.094) <i>0.000</i>	0.667 (0.097) <i>0.000</i>	0.656 (0.097) <i>0.000</i>
Industry concentration	1.696 (2.256) <i>0.452</i>	1.717 (2.270) <i>0.449</i>	2.591 (2.188) <i>0.236</i>	2.893 (2.079) <i>0.164</i>	2.188 (2.587) <i>0.398</i>	2.159 (2.573) <i>0.401</i>	2.407 (2.432) <i>0.322</i>	2.652 (2.175) <i>0.223</i>
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y	Y
Constant	-37.263 (3.650) <i>0.000</i>	-37.322 (3.631) <i>0.000</i>	-31.689 (3.749) <i>0.000</i>	-32.021 (3.642) <i>0.000</i>	-32.288 (3.681) <i>0.000</i>	-32.565 (3.699) <i>0.000</i>	-30.491 (3.942) <i>0.000</i>	-30.347 (3.647) <i>0.000</i>
Observations	17,280	17,280	17,280	17,280	17,280	17,280	17,280	17,280
Log likelihood	-5213	-5210	-5160	-5157	-5114	-5106	-5106	-5091

Note: Robust SE are in parentheses, *p* values are italic.

Table 5. Robustness check: One way and two way clustering

Negative binomial model	One-way clustering at country		Two-way clustering at country and firm	
DV: Number of patent litigations	(1)	(2)	(3)	(4)
<i>Independent variable</i>				
(1)Country relevant expertise_Orth	0.412 (0.111) <i>0.000</i>	0.411 (0.112) <i>0.000</i>	0.412 (0.115) <i>0.000</i>	0.411 (0.116) <i>0.000</i>
(2)Firm-Country experience_Orth	0.258 (0.118) <i>0.028</i>	0.214 (0.089) <i>0.017</i>	0.258 (0.131) <i>0.049</i>	0.214 (0.097) <i>0.028</i>
(3)Results similarity	0.072 (0.293) <i>0.805</i>	0.233 (0.313) <i>0.457</i>	0.072 (0.300) <i>0.810</i>	0.233 (0.332) <i>0.483</i>
(1)x(3)		0.788 (0.411) <i>0.055</i>		0.788 (0.430) <i>0.067</i>
(2)x(3)		0.483 (0.225) <i>0.031</i>		0.483 (0.244) <i>0.047</i>
<i>Control</i>				
Firm-country patents proportion	0.124 (0.964) <i>0.898</i>	0.210 (0.940) <i>0.823</i>	0.124 (0.995) <i>0.901</i>	0.210 (0.965) <i>0.828</i>
Firm-country assets	0.008 (0.016) <i>0.616</i>	0.007 (0.015) <i>0.664</i>	0.008 (0.021) <i>0.706</i>	0.007 (0.020) <i>0.742</i>
Firm choice set	0.222 (0.177) <i>0.209</i>	0.253 (0.217) <i>0.244</i>	0.222 (0.306) <i>0.468</i>	0.253 (0.311) <i>0.415</i>
Firm assets	0.098 (0.088) <i>0.264</i>	0.098 (0.084) <i>0.243</i>	0.098 (0.125) <i>0.434</i>	0.098 (0.122) <i>0.421</i>
Firm prior litigations	0.687 (0.093) <i>0.000</i>	0.689 (0.097) <i>0.000</i>	0.687 (0.138) <i>0.000</i>	0.689 (0.142) <i>0.000</i>
Plaintiff win proportion	1.440 (1.215) <i>0.236</i>	1.435 (1.224) <i>0.241</i>	1.440 (1.191) <i>0.227</i>	1.435 (1.194) <i>0.230</i>
Litigation process length	0.033 (0.123) <i>0.790</i>	0.030 (0.125) <i>0.813</i>	0.033 (0.130) <i>0.800</i>	0.030 (0.132) <i>0.823</i>
Foreign litigants diversity	0.987 (1.178) <i>0.402</i>	0.887 (1.152) <i>0.441</i>	0.987 (1.201) <i>0.411</i>	0.887 (1.175) <i>0.450</i>
GDP	0.667 (0.178) <i>0.000</i>	0.656 (0.180) <i>0.000</i>	0.667 (0.185) <i>0.000</i>	0.656 (0.187) <i>0.000</i>
Industry concentration	2.407 (1.848) <i>0.193</i>	2.652 (1.869) <i>0.156</i>	2.407 (2.409) <i>0.318</i>	2.652 (2.254) <i>0.239</i>
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Constant	-30.491 (4.729) <i>0.000</i>	-30.347 (4.712) <i>0.000</i>	-30.491 (5.177) <i>0.000</i>	-30.347 (5.105) <i>0.000</i>
Observations	17,280	17,280	17,280	17,280
Log likelihood	-5106	-5091	-5106	-5091

Note: Robust SE are in parentheses, *p* values are italic.

Table 6. Robustness check: OLS estimation

OLS model	Without firm dummies		With firm dummies	
DV: Number of patent litigations	(1)	(2)	(3)	(4)
<i>Independent variable</i>				
(1)Country relevant expertise_Orth	0.508 (0.098) <i>0.000</i>	0.496 (0.094) <i>0.000</i>	0.519 (0.100) <i>0.000</i>	0.507 (0.096) <i>0.000</i>
(2)Firm-Country experience_Orth	0.077 (0.029) <i>0.010</i>	0.060 (0.034) <i>0.082</i>	0.072 (0.029) <i>0.016</i>	0.053 (0.035) <i>0.129</i>
(3)Results similarity	-0.032 (0.014) <i>0.028</i>	0.240 (0.095) <i>0.013</i>	-0.030 (0.015) <i>0.042</i>	0.254 (0.100) <i>0.012</i>
(1)x(3)		0.974 (0.351) <i>0.006</i>		1.018 (0.367) <i>0.006</i>
(2)x(3)		0.159 (0.086) <i>0.066</i>		0.165 (0.091) <i>0.071</i>
<i>Control</i>				
Firm-country patents proportion	-2.014 (0.631) <i>0.002</i>	-2.002 (0.621) <i>0.002</i>	-1.960 (0.639) <i>0.003</i>	-1.949 (0.629) <i>0.002</i>
Firm-country assets	0.017 (0.004) <i>0.000</i>	0.016 (0.004) <i>0.000</i>	0.017 (0.004) <i>0.000</i>	0.016 (0.004) <i>0.000</i>
Firm choice set	0.029 (0.056) <i>0.604</i>	0.028 (0.055) <i>0.615</i>	0.086 (0.077) <i>0.261</i>	0.089 (0.071) <i>0.212</i>
Firm assets	0.043 (0.021) <i>0.043</i>	0.042 (0.021) <i>0.048</i>	-0.045 (0.113) <i>0.689</i>	-0.053 (0.115) <i>0.645</i>
Firm prior litigations	0.120 (0.030) <i>0.000</i>	0.121 (0.030) <i>0.000</i>	-0.068 (0.047) <i>0.147</i>	-0.065 (0.045) <i>0.149</i>
Plaintiff win proportion	-0.059 (0.108) <i>0.586</i>	-0.058 (0.108) <i>0.593</i>	-0.043 (0.112) <i>0.702</i>	-0.047 (0.112) <i>0.677</i>
Litigation process length	0.021 (0.010) <i>0.034</i>	0.019 (0.009) <i>0.042</i>	0.020 (0.010) <i>0.040</i>	0.019 (0.009) <i>0.052</i>
Foreign litigants diversity	-0.108 (0.047) <i>0.023</i>	-0.138 (0.047) <i>0.004</i>	-0.114 (0.050) <i>0.023</i>	-0.147 (0.050) <i>0.004</i>
GDP	0.105 (0.022) <i>0.000</i>	0.096 (0.021) <i>0.000</i>	0.100 (0.022) <i>0.000</i>	0.090 (0.021) <i>0.000</i>
Industry concentration	-0.040 (0.433) <i>0.927</i>	-0.010 (0.438) <i>0.982</i>	-0.059 (0.399) <i>0.883</i>	-0.018 (0.400) <i>0.963</i>
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Firm dummies	N	N	Y	Y
Constant	-4.110 (0.862) <i>0.000</i>	-3.872 (0.830) <i>0.000</i>	-3.046 (2.096) <i>0.149</i>	-2.848 (2.114) <i>0.180</i>
Observations	17,280	17,280	17,280	17,280
R-squared	0.163	0.168	0.179	0.184
Log likelihood	-29877	-29826	-29715	-29661

Note: Robust SE are in parentheses, *p* values are italic.

Table 7. Robustness check: Alternative measures of focal variables

Negative binomial model	Alternative measure for results similarity		Alternative measure for country relevant expertise	
DV: Number of patent litigations	(1)	(2)	(3)	(4)
<i>Independent variable</i>				
(1)Country relevant expertise_Orth	0.358 (0.059) <i>0.000</i>	0.341 (0.058) <i>0.000</i>		
(2)Firm-Country experience_Orth	0.212 (0.033) <i>0.000</i>	0.155 (0.033) <i>0.000</i>		
(3)Country relevant expertise_Orth_5			0.395 (0.059) <i>0.000</i>	0.351 (0.061) <i>0.000</i>
(4)Firm-Country experience_Orth_5			0.257 (0.047) <i>0.000</i>	0.204 (0.051) <i>0.000</i>
(5)Results similarity_All	0.080 (0.153) <i>0.599</i>	0.208 (0.173) <i>0.228</i>		
(6)Results similarity			0.066 (0.106) <i>0.535</i>	0.108 (0.108) <i>0.317</i>
(1)x(5)		0.850 (0.405) <i>0.036</i>		
(2)x(5)		0.588 (0.199) <i>0.003</i>		
(3)x(6)				0.986 (0.360) <i>0.006</i>
(3)x(6)				0.535 (0.217) <i>0.014</i>
<i>Control</i>				
Firm-country patents proportion	0.926 (0.494) <i>0.061</i>	0.948 (0.466) <i>0.042</i>	0.133 (0.537) <i>0.805</i>	0.217 (0.516) <i>0.674</i>
Firm-country assets	0.008 (0.009) <i>0.368</i>	0.008 (0.009) <i>0.390</i>	0.008 (0.010) <i>0.431</i>	0.007 (0.010) <i>0.476</i>
Firm choice set	0.237 (0.274) <i>0.386</i>	0.257 (0.229) <i>0.261</i>	0.219 (0.379) <i>0.564</i>	0.270 (0.294) <i>0.359</i>
Firm assets	0.108 (0.098) <i>0.270</i>	0.097 (0.097) <i>0.314</i>	0.100 (0.120) <i>0.408</i>	0.088 (0.120) <i>0.465</i>
Firm prior litigations	0.709 (0.102) <i>0.000</i>	0.718 (0.102) <i>0.000</i>	0.685 (0.121) <i>0.000</i>	0.692 (0.123) <i>0.000</i>
Plaintiff win proportion	1.429 (0.392) <i>0.000</i>	1.287 (0.379) <i>0.001</i>	1.402 (0.517) <i>0.007</i>	1.158 (0.516) <i>0.025</i>
Litigation process length	0.069 (0.042) <i>0.104</i>	0.068 (0.042) <i>0.106</i>	0.034 (0.053) <i>0.518</i>	0.038 (0.053) <i>0.476</i>
Foreign litigants diversity	0.492 (0.456) <i>0.280</i>	0.495 (0.455) <i>0.277</i>	1.000 (0.559) <i>0.074</i>	1.010 (0.544) <i>0.064</i>
GDP	0.720 (0.094) <i>0.000</i>	0.710 (0.096) <i>0.000</i>	0.670 (0.097) <i>0.000</i>	0.668 (0.098) <i>0.000</i>
Industry concentration	2.683 (1.535) <i>0.080</i>	2.519 (1.479) <i>0.089</i>	2.404 (2.444) <i>0.325</i>	2.441 (2.025) <i>0.228</i>
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Constant	-31.883 (3.404) <i>0.000</i>	-31.440 (3.309) <i>0.000</i>	-30.611 (3.952) <i>0.000</i>	-30.581 (3.591) <i>0.000</i>
Observations	25,468	25,468	17,280	17,280
Log likelihood	-7441	-7418	-5108	-5092

Note: Robust SE are in parentheses, *p* values are italic.

Table 8. Robustness check: Exclusion of home country, US and CN choices

Negative binomial model	Excluding home country		Excluding US		Excluding China	
DV: Number of patent litigations	(1)	(2)	(3)	(4)	(5)	(6)
<i>Independent variable</i>						
(1)Country relevant expertise_Orth	0.531 (0.075) <i>0.000</i>	0.490 (0.067) <i>0.000</i>	2.644 (0.359) <i>0.000</i>	2.588 (0.355) <i>0.000</i>	0.392 (0.068) <i>0.000</i>	0.395 (0.066) <i>0.000</i>
(2)Firm-Country experience_Orth	0.363 (0.064) <i>0.000</i>	0.324 (0.063) <i>0.000</i>	0.502 (0.071) <i>0.000</i>	0.542 (0.107) <i>0.000</i>	0.231 (0.051) <i>0.000</i>	0.185 (0.051) <i>0.000</i>
(3)Results similarity	0.131 (0.104) <i>0.207</i>	0.482 (0.132) <i>0.000</i>	0.164 (0.106) <i>0.123</i>	0.265 (0.124) <i>0.032</i>	0.027 (0.106) <i>0.800</i>	0.168 (0.144) <i>0.244</i>
(1)x(3)		1.472 (0.318) <i>0.000</i>		0.987 (0.573) <i>0.085</i>		0.692 (0.365) <i>0.058</i>
(2)x(3)		0.656 (0.222) <i>0.003</i>		-0.193 (0.330) <i>0.558</i>		0.484 (0.203) <i>0.017</i>
<i>Control</i>						
Firm-country patents proportion	1.126 (1.037) <i>0.278</i>	1.643 (0.983) <i>0.095</i>	2.704 (0.800) <i>0.001</i>	2.668 (0.791) <i>0.001</i>	-0.104 (0.524) <i>0.843</i>	-0.044 (0.507) <i>0.931</i>
Firm-country assets	0.008 (0.010) <i>0.439</i>	0.006 (0.010) <i>0.542</i>	0.017 (0.011) <i>0.113</i>	0.017 (0.011) <i>0.117</i>	0.018 (0.010) <i>0.062</i>	0.016 (0.010) <i>0.089</i>
Firm choice set	0.134 (0.475) <i>0.778</i>	0.263 (0.354) <i>0.458</i>	0.662 (0.396) <i>0.095</i>	0.647 (0.395) <i>0.102</i>	0.174 (0.366) <i>0.635</i>	0.181 (0.300) <i>0.546</i>
Firm assets	0.155 (0.119) <i>0.192</i>	0.151 (0.116) <i>0.194</i>	0.027 (0.126) <i>0.830</i>	0.027 (0.125) <i>0.829</i>	0.059 (0.126) <i>0.643</i>	0.059 (0.125) <i>0.636</i>
Firm prior litigations	0.728 (0.126) <i>0.000</i>	0.745 (0.124) <i>0.000</i>	0.910 (0.142) <i>0.000</i>	0.909 (0.143) <i>0.000</i>	0.727 (0.128) <i>0.000</i>	0.728 (0.128) <i>0.000</i>
Plaintiff win proportion	1.494 (0.537) <i>0.005</i>	1.478 (0.530) <i>0.005</i>	0.292 (0.545) <i>0.592</i>	0.102 (0.560) <i>0.856</i>	1.272 (0.536) <i>0.018</i>	1.280 (0.526) <i>0.015</i>
Litigation process length	0.033 (0.053) <i>0.536</i>	0.028 (0.052) <i>0.585</i>	0.136 (0.049) <i>0.005</i>	0.141 (0.049) <i>0.004</i>	0.023 (0.038) <i>0.545</i>	0.019 (0.037) <i>0.615</i>
Foreign litigants diversity	0.748 (0.531) <i>0.159</i>	0.672 (0.521) <i>0.197</i>	0.485 (0.471) <i>0.304</i>	0.486 (0.466) <i>0.297</i>	1.039 (0.535) <i>0.052</i>	0.947 (0.524) <i>0.071</i>
GDP	0.629 (0.105) <i>0.000</i>	0.603 (0.104) <i>0.000</i>	0.391 (0.106) <i>0.000</i>	0.400 (0.103) <i>0.000</i>	0.689 (0.103) <i>0.000</i>	0.680 (0.104) <i>0.000</i>
Industry concentration	3.028 (2.591) <i>0.243</i>	3.273 (2.201) <i>0.137</i>	3.377 (2.465) <i>0.171</i>	3.368 (2.459) <i>0.171</i>	1.911 (2.508) <i>0.446</i>	2.180 (2.272) <i>0.337</i>
Year dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
Constant	-31.225 (4.451) <i>0.000</i>	-31.128 (3.872) <i>0.000</i>	-24.475 (4.355) <i>0.000</i>	-24.625 (4.327) <i>0.000</i>	-30.081 (3.929) <i>0.000</i>	-29.904 (3.633) <i>0.000</i>
Observations	16,434	16,434	16,256	16,256	16,427	16,427
Log likelihood	-4163	-4145	-3452	-3451	-4719	-4705

Note: Robust SE are in parentheses, *p* values are italic.

Table 9. Robustness check: Industry subsamples

Negative binomial model	IT		Pharmaceutical	
DV: Number of patent litigations	(1)	(2)	(3)	(4)
<i>Independent variable</i>				
(1)Country relevant expertise_Orth	0.377 (0.087) <i>0.000</i>	0.338 (0.081) <i>0.000</i>	0.510 (0.113) <i>0.000</i>	0.533 (0.104) <i>0.000</i>
(2)Firm-Country experience_Orth	0.211 (0.107) <i>0.050</i>	0.326 (0.095) <i>0.001</i>	0.590 (0.261) <i>0.024</i>	0.399 (0.236) <i>0.091</i>
(3)Results similarity	0.745 (0.483) <i>0.123</i>	0.758 (0.456) <i>0.096</i>	0.159 (0.103) <i>0.123</i>	0.103 (0.194) <i>0.593</i>
(1)x(3)		0.849 (0.292) <i>0.004</i>		-0.240 (0.558) <i>0.667</i>
(2)x(3)		-0.672 (0.547) <i>0.219</i>		2.192 (0.800) <i>0.006</i>
Control				
Firm-country patents proportion	-1.136 (0.847) <i>0.180</i>	-1.082 (0.818) <i>0.186</i>	5.255 (2.195) <i>0.017</i>	5.168 (2.176) <i>0.018</i>
Firm-country assets	0.015 (0.024) <i>0.522</i>	0.015 (0.023) <i>0.528</i>	0.010 (0.011) <i>0.373</i>	0.010 (0.011) <i>0.379</i>
Firm choice set	0.108 (0.980) <i>0.912</i>	0.712 (0.749) <i>0.342</i>	0.486 (1.459) <i>0.739</i>	0.566 (1.459) <i>0.698</i>
Firm assets	-0.292 (0.249) <i>0.240</i>	-0.270 (0.206) <i>0.191</i>	0.047 (0.280) <i>0.866</i>	0.029 (0.281) <i>0.919</i>
Firm prior litigations	0.981 (0.188) <i>0.000</i>	1.007 (0.168) <i>0.000</i>	0.890 (0.306) <i>0.004</i>	0.920 (0.292) <i>0.002</i>
Plaintiff win proportion	3.816 (1.158) <i>0.001</i>	3.565 (1.119) <i>0.001</i>	0.081 (0.780) <i>0.917</i>	0.146 (0.751) <i>0.846</i>
Litigation process length	-0.107 (0.101) <i>0.290</i>	-0.097 (0.103) <i>0.349</i>	0.130 (0.039) <i>0.001</i>	0.099 (0.036) <i>0.006</i>
Foreign litigants diversity	4.069 (2.013) <i>0.043</i>	3.777 (1.958) <i>0.054</i>	0.287 (0.504) <i>0.570</i>	0.395 (0.493) <i>0.423</i>
GDP	1.081 (0.142) <i>0.000</i>	1.084 (0.134) <i>0.000</i>	0.230 (0.084) <i>0.006</i>	0.217 (0.084) <i>0.010</i>
Industry concentration	2.484 (2.447) <i>0.310</i>	3.785 (2.277) <i>0.097</i>	-133.842 (34.574) <i>0.000</i>	-134.251 (34.960) <i>0.000</i>
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Constant	-39.671 (7.295) <i>0.000</i>	-42.574 (6.500) <i>0.000</i>	1.399 (8.784) <i>0.873</i>	1.780 (8.574) <i>0.836</i>
Observations	4,458	4,458	2,981	2,981
Log likelihood	-1316	-1308	-2103	-2097

Note: Robust SE are in parentheses, *p* values are italic.