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ORGANIZATIONAL LEARNING IN RARE EVENTS: THE CASE OF LEARNING TO LITIGATE INTELLECTUAL PROPERTY (IP)

Kristina Vaarst Andersen
Copenhagen Business School
Innovation and Organizational Economics
kva.ino@cbs.dk

Karin Beukel
Copenhagen University
Department for Food and Resource Economics
kab@ifro.ku.dk

Beverly B. Tyler
North Carolina State University
Poole College of Management
btyler@ncsu.edu

Abstract

When organizations encounter rare events they often find it challenging to extract learning from the experience.

We analyze opportunities for organizational learning in one such rare event, namely Intellectual Property (IP) litigation, i.e., when organizations take disputes regarding their intellectual property to court. We propose, that organizations can learn to litigate, although it is a rare event, by applying mechanisms in a current litigation case that have been successful in previous litigation cases. However, we also posit, that the usefulness of these

learning mechanisms for a current litigation case is contingent on the type of litigation, contract versus infringement cases. If the organization is involved in litigation based on a contract breach, we suggest that learning will be less useful because the contract preceding the litigation defines the modus operandi and leaves the organization little discretion to utilize any learning from past litigation success. Thus, learning appears to be most beneficial in infringement cases. Based on statistical analysis of 14,602 litigation court cases in China, we find support for our hypotheses. Our findings suggest that organizations can learn to litigate, although litigation is a relatively rare event, if they leverage what they have learned from previously successful litigation. However, learning is less likely to be applicable to contract cases than it will be in infringement cases.

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When organizations encounter rare events they often find it challenging to extract learning from the experience. We analyze opportunities for organizational learning in one such rare event, namely Intellectual Property (IP) litigation, i.e., when organizations take disputes regarding their intellectual property to court. We propose, that organizations can learn to litigate, although it is a rare event, by applying mechanisms in a current litigation case that have been successful in previous litigation cases. However, we also posit, that the usefulness of these learning mechanisms for a current litigation case is contingent on the type of litigation, contract versus infringement cases. If the organization is involved in litigation based on a contract breach, we suggest that learning will be less useful because the contract preceding the litigation defines the modus operandi and leaves the organization little discretion to utilize any learning from past litigation success. Thus, learning appears to be most beneficial in infringement cases. Based on statistical analysis of 10,211 litigation court cases in China, we find support for our hypotheses. Our findings suggest that organizations can learn to litigate, although litigation is a relatively rare event, if they leverage what they have learned from previously successful litigations. However, learning is less likely to be applicable to contract cases than it will be in infringement cases.

Introduction

When firms take disputes regarding their intellectual property to court it can have a negative impact on their market value (Bhagat, Brickley, & Coles, 1994; Lerner, 1995), and require substantial resources, with an average cost of IP litigation ranging between \$50,000-\$10 mil USD depending on country and case (Alcacer, Beukel, & Cassiman, 2015; Graham & Van Zeebroeck, 2014). Firms therefore try to avoid IP trials (Lanjouw & Schankerman, 2001) and IP litigation is consequently a rare event for most firms (Lanjouw & Lerner, 1998; Somaya, 2003). But despite the rarity, IP litigation is financially and strategically important and hence opportunities for improving the probability for a successful case outcome are critical for litigating firms. While the research on learning in rare events has considered several important contexts, to our knowledge no one has considered whether firms learn from litigation. This gap in the literature has led us to ask two research questions. First, do firms learn to litigate based on experience? Second, what contextual factors affect the application of this learning to future litigation cases?

Research on litigation has sought to understand the factors that influence the probability of winning litigation cases. Research rooted in economics and law have been the primary contributors to our current understanding of the many different reasons organizations, particularly for-profit firms, decide to take disputes regarding others use of their intellectual property to court (e.g. Agarwal, Ganco, & Ziedonis, 2009; Graham & Somaya, 2004; Lanjouw & Schankerman, 2001; Polidoro & Toh, 2011; Somaya, 2003). This research has found a variety of factors that contribute to the likelihood firms will win when involved in litigation (Janicke & Ren, 2006; Lanjouw & Lerner, 1998; Moore,

2003; Somaya, 2003). Some of these factors are the type of technology, for example firms have a higher success rate in winning a Biotech, Mechanical, or Chemical IP litigation, than Electrical, Electro-mechanical or Computer-processes IP litigation whether the firm is the plaintiff or defendant, whether the firm is foreign or local, and how a firms financial resources influence the likelihood of their winning litigation (Janicke & Ren, 2006; Moore, 2003). However, although litigation research in economics and law has attracted some attention and provided a cursory understanding of a number of factors that influence success in litigation, the organizations research has yet to adequately integrate this research with the learning literature to assess whether and how organizations can learn to litigate. This limitation of the organizations research could be the result of two important factors. First, the lack of studies on how firms learn to litigate could be a result of the erratic and infrequent nature of firm initiated litigation (Lanjouw & Lerner, 1998; Somaya, 2003), as rare events has shown to impede organizational learning (e.g. Beck & Plowman, 2009; Christianson, Farkas, Sutcliffe, & Weick, 2009; Starbuck, 2009). Organizational learning, the process of creating, maintaining, and transferring knowledge within an organization (March & Simon, 1958), focuses on how organizations through repeated relatively homogeneous events build-up experience and thereby reach superior performance (Argote, 1999). But for most firms, litigation is such a rare event that there is little experience build-up, limiting the ability of the firm to develop related learning capabilities (Zollo, 2009, Starbuck & Shamsie et al. 2009). We build a theoretical framework for understanding whether and how firms learn to litigate by drawing on the literature on organizational learning from rare events, with particular focus on organizational learning from rare strategic events such as alliances, contracting

and mergers/acquisitions (Zollo, 2009). Moreover, we posit that prior learning is more beneficial to firms involved in litigation based on infringement than firms involved in litigation based on a breach of contract, because agreed upon terms of the contract leave the firm little discretion to utilize learning. Second, the limited attention to the role of learning in organizations research on winning litigation to date might in part be due to the fact that empirical investigations of litigation in economics and law are based primarily on investigations of individual litigation cases, not following each individual firm over time (Janicke & Ren, 2006; Moore, 2003). We address this limitation of prior research by using a unique longitudinal dataset of firms involved in 10,211 court cases in China from 2001 to 2009.

This study explores whether and how firms learn to litigate. Building on economics and law litigation research and the organizational learning literature, we propose, that firms can learn to litigate based on prior successful litigation, although litigation is a rare event. Moreover, we posit that prior learning is more applicable to infringement cases than contract cases, because in litigation of a contract breach the contract defines the agreed upon terms and leaves the firm little discretion to utilize learning from past successful litigation. Thus, learning appears more beneficial in infringement cases than contract cases. Our findings suggest that firms can learn from engaging in the rare strategic event of litigation, that this learning is driven by prior successful litigation and that the usefulness of learning is contingent upon the type of case the firm is litigating due to varying opportunities for utilizing learning in the litigation process across case types.

Our study makes two contributions to the organizational learning in rare events literature and one to the economics and law litigation literature. First, we develop theory to explain when and how firms can learn to litigate from their relatively rare litigation experiences and propose related hypotheses. Second, our study provides empirical support for our hypothesized relationships using a large, longitudinal dataset of court cases in China, where we follow firms over a period of 9 subsequent years. Third, scholarly research in economics and law have proposed an understanding of IP litigation that emphasizes the heterogeneity of litigation outcomes determined by a number of factors of the firms, e.g. being defendant or plaintiff or litigating a certain type of technology. However, this research disregards any effect that could be caused by firm organizational learning, which this study provides.

Learning to Litigate

Theory on organizational learning, the process of creating, maintaining, and transferring knowledge within an firm (March & Simon, 1958), focuses on firms' opportunities to build experience and superior performance through repeated and relatively similar events (Argote, 1999). However, for most firms, litigation is such a rare event that there is little experience build-up (Lanjouw & Lerner, 1998; Somaya, 2003). Organizational learning from rare events is possible (Beck & Plowman, 2009; Christianson et al., 2009; Lampel, Shamsie, & Shapira, 2009; Starbuck, 2009), but organizational discretion in teasing out patterns and causalities is higher for rare events compared to when firms develop and refine routines based on repeated occurrences, simply because infrequent, ambiguous, and erratic feedback limits the opportunity for

reality checks (Christianson et al., 2009; Rerup, 2009; Starbuck, 2009). However, in some rare events, including the rare strategic event of litigation, firms receive clear, timely feedback, which increase learning opportunities. The verdict in litigation cases consists of a clear ruling and an elaborate, written explanation for the ruling¹. Firms have some discretion in interpreting these outcomes, but losing a litigation can hardly be interpreted as a success, and firms are therefore unlikely to develop overconfidence in their litigation abilities when they lose a case firms, as Zollo (2009) demonstrated in the case of the rare event of acquisition.

Prior literature has focused on the influence on learning in rare events during unclear feedback (e.g. in mergers and acquisitions such as described in Zollo, 2009) where the room for managerial discretion is large. The idea of rare events being limited by its contextual situation is imminent in a number of papers: Rerup's (2009) analysis of the importance of richness when learning from rare events, Madsen's (2009) analysis of mines learning from minor and major disasters, Beck and Plowman's (2009) analysis of the importance of middle managers, and Christianson et al.'s (2009) analysis of reorganization in the face of disaster at the B&O Railway museum. Each paper offers part of a framework for understanding how firms learn from rare events and which conditions facilitates or hinders learning. In this paper we build on their insight and add two conditions for understanding learning in rare events.

Another difference across the existing work on organizational learning from rare events is the issue of agency as the degree and timing of firms' agency varies across types of rare events. In the case of acquisitions analyzed by Zollo (2009), firms have a high

¹ One of the principles of Fair trial regulated under Conventions for Human rights are that a written outcome should explicitly document the verdict, to ensure that parties have understood the reason for a verdict held against or for them.

degree of agency in deciding whether to acquire, when to acquire and which firms to target and close deals with. In the case of mines dealing with disasters analyzed by Madsen (2009), organizational agency rests predominantly in reactive responses and attempts of avoiding future disasters. Our context is somewhere in between. Firms do not choose to have their IP infringed upon or their contracts violated, but they have some agency in regard to how they handle the situation. Institutional pressure may force them to take action, but the specific actions are very much at their own discretion. This distinction in how much agency and when in the process of dealing with rare events firms have room to maneuver may influence findings across studies of organizational learning in rare events. In deliberate and self-inflicted rare events such as acquisitions (Zollo, 2009), firms may enter the situation with the perception that no learning is necessary, which will greatly decrease their motivation to extract any competence from the situation and their attention to discrepancies and details. Without motivation and focused attention learning is difficult, and learning from rare events with all the additional challenges is even more difficult (Lampel et al., 2009; Rerup, 2009; Starbuck, 2009). Without deliberate effort to extract learning and clear and timely feedback, firms may build more confidence than competence (Zollo, 2009). Based on the few available studies on learning from rare events, we propose that learning – competence building in Zollo’s terminology – may benefit not only from performance and the absence of confidence, but also from a sense of uninitiated urgency of the situation brought about by lack of agency in initiating the event. In the situation of acquisition analyzed by Zollo (2009), the confidence is tied to the acquiring firms’ control of the process. We suggest, that in the case of IP litigation, where the situation is imposed on firms, as in the case of mining

firms' learning from minor and major accidents analyzed by Madsen (2009), learning from rare events is possible.

Learning from past success

Experience is a precondition for learning, but the outcome of the experience also influences the motivation to learn (Felin & Foss, 2011; Moatti, Ren, Anand, & Dussauge, 2015). Therefore, we now turn to how clear and quickly delivered positive outcomes in previous litigation processes affect firms' learning to litigate. When the repetition of a particular type of litigation is unlikely, there are weak incentives for extracting learning from rare events (Rerup, 2009). Furthermore, unfortunately learning from rare events requires firms to allocate attention and resources to the learning process (Rerup, 2009; Weick & Sutcliffe, 2006; Zollo & Winter, 2002).

In addition, because rare events are not expected to reoccur in the foreseeable future, there is little room for firms to focus their attention and resources on extracting knowledge from a rare event and storing it in organizational memory. For example, Starbuck (2009) argues that “*Learning from rare events' holds more meaning for behavioral scientist than for the people who are actually involved in the events*”(p. 927, Starbuck, 2009) as the learner should be able to find similarities across specific events which requires the learner to disregard the differences in the cases (Salgado, Starbuck, & Mezas, 2002), why learning from rare events as opposed to repeated events over long time horizon are challenging (Starbuck, 2009). Ocasio (1997) finds three reasons for why organizations lack attentional resources to capture learning: First, as the focus of attention is misleading the learner; second, as the context of the attention guides a different

learning situation; or third, the structural distribution of attention, which relates to the situation of the decision maker, which can be influenced by both internal and external organizational issues.

However, positive outcomes may motivate attention allocation to learning (Christianson et al., 2009; Lampel et al., 2009; Starbuck, 2009; Zollo, 2009). First, experiencing a positive outcome strengthens firms' intent to learn in order to be able to replicate the actions taken if a future litigation case arises with a similar situation (Ocasio, 1997). Second, positive feedback facilitates learning from rare events through an increase in attention focus and confidence, which encourage firms to allocate more resources to the learning process (Ocasio, 1997). Third, positive feedback further facilitates learning from rare events, because their attention and confidence will encourage them to allocate more resources to the learning process (Ocasio, 1997). This may lead to self-fulfilling prophecies, as firms subsequent to winning IP litigation cases invest heavily in future litigation cases based on the conviction that effort will increase their chance of winning.

On the other hand, firms experiencing failures in rare events will tend to categorize the event as not merely rare but even unique, exceptional, and produced or driven by exogenous factors beyond the firm's control (Starbuck, 2009). The causes for the unfortunate outcome will be interpreted as external to the firm and limit the firms' intent to learn and incentives for allocating attention to analyzing the experience and what might be learned (Ocasio, 1997; Starbuck, 2009). This leads us to expect, that experience beyond experiential learning – namely learning from past success - influence the probability of successful case outcomes:

H1: The higher the share of litigation cases the firm has won in the past the higher the probability they will win the current case.

Learning Constraints of Contracts Relative to Infringement Litigation

Firms' opportunities for utilizing their learning in the case of litigation may be constrained by certain conditions of the litigated case. Two distinctly different settings for IP litigation exist: infringement litigation and contract litigation. Infringement litigation is between a plaintiff and a defendant, where the defendant allegedly has utilized (without consent) the IP owned by the plaintiff (Heath & Petit, 2005). In an infringement case no prior contract has been negotiated between the plaintiff and defendant, where the plaintiff has allowed the defendant to benefit from their IP. It is therefore often parties unknown to each other. A typical infringement case is initiated when the allegedly infringing product is spotted in the market by sales personnel or detectives hired to conduct market surveillance (Alkaersig, Beukel, & Reichstein, 2015). After this identification, samples of the allegedly infringing product are bought, to serve as evidence. Then a cease and desist letter is sent, by the plaintiff to the defendant, stating that the defendant must stop infringing on their IP and destroy the infringing products by a certain date or legal proceedings will be initiated (Alkaersig et al., 2015; Angrist, Chandrasekharan, Heaney, & Cook-Deegan, 2010; Fisher & Ieee, 2000). If the defendant continues the allegedly illegal production distribution and/or sales of the infringing product, the plaintiff follows through with their threat and files the lawsuit in the appropriate legal jurisdiction.

IP litigation based on a contract breach is very different from a litigation based on an infringement case. In contract litigation cases a prior contract has been negotiated that outlines the conditions for the partnership or license, what will transpire if the conditions of the contract are not upheld, and under what conditions the contract will be terminated. A contract encompassing IP between firms most likely concerns strategic alliances, consortia, licensing, outsourcing or supplying (Anand & Khanna, 2000b). Typically, firms engaging in contractual exchanges in order to share knowledge, products, services, and technologies do so to improve their innovative and financial performance (Dyer & Ouchi, 1993; Lane & Lubatkin, 1998; Larsson, Bengtsson, Henriksson, & Sparks, 1998; Mowery, Oxley, & Silverman, 1996).

A contract is a tool for managing inter-organizational relationships. Although the complexity involved in contracting is high, contracting is a relatively frequently occurring activity and organizations can 'learn to contract' (Mayer & Argyres, 2004). Learning to contract is a distributed learning process where different parts of the organization engage in the contracting process (Argyres & Mayer, 2007; Bercovitz & Tyler, 2014). Argyres and Mayer (2007) explain how the different individuals in the organization take different roles in the negotiation of a contract, that the lawyer's tasks are different from those of managers and engineers, and that many of the clauses in a contract cannot be constructed without several intra-organizational parties participating. They further suggest, that lawyers most often are in charge of certain clauses in the contract (e.g. the decision and control rights, dispute resolution and contingency planning), due to their competencies in legal matters and the distance between them and the project. While managers and engineers are better able to specify the roles and

responsibilities in the contract as this requires in-depth knowledge of the technology, processes and systems. Writing a contract is therefore a distributed learning process in firms, where different stakeholders generate different learnings (Argyres & Mayer, 2007; Bercovitz & Tyler, 2014). As firms learn to contract they establish routines to specify the steps that will be taken during the contract process (Anand & Khanna, 2000a; Argyres & Mayer, 2007; Bercovitz & Tyler, 2014; Mayer & Argyres, 2004). Thus, organizational and inter-organizational routine development and contract design evolve over time (Argyres, Bercovitz, & Mayer, 2007; Bercovitz & Tyler, 2014), although contracts may rely to some extent on industry or firm standards (Tirole, 2009).

Despite the efforts made in firms to develop solid contracts, contracts are characterized as incomplete (Grossman & Hart, 1986; Hart & Moore, 1990), meaning that it is not possible nor economically feasible to foresee and specify the legal consequences in a contract of any possible state of the relationship or potential misuse by the parties that could occur. Defining all relevant contingencies of potential states and agreeing on the remedies in the event they occur is complex and resource demanding process (Battigalli & Maggi, 2002). In fact, the cost of drafting the solution to a certain contingency can exceed the benefits from writing a contract, when the contingency is unlikely to occur (Posner, 1986).

Two contract clauses are of particular interest with respect to the litigation process, namely contingency planning and dispute resolution clauses. In these clauses the contracting partners aim to anticipate the problems that could occur during the execution of the contract (contingency planning) and how occurring problems should be dealt with (dispute resolution) (Joskow, 1985; Macneil, 1978; Williamson, 1983). The heterogeneity

of options in both contingency planning and dispute resolution are endless (Mayer, 2006), and it is difficult to assess during contract negotiation which terms would be preferable if the partner were to breach the contract. For example, negotiations must determine which court to use if a dispute arises, i.e., state, country, etc., and the content of the clause can also vary greatly across contracts even within the same firm (Argyres & Mayer, 2007).

Therefore when prior contracting partners face litigation, the team which has been through the distributed learning process of writing the contract, have already identified the means of which the dispute should be resolved, this is managed in the dispute resolution and contingency planning of the contract (Argyres et al., 2007). The contract thereby outlines how a plaintiff can act when experiencing a dispute, for example in the contract it will be stated in which court the litigation should be tried, as well as other terms in relation to the litigation, leaving less room for maneuver when litigating a contract case than that of an infringement litigation.

Contracts are therefore likely to serve as a source of rigidity, rigidity because of the stiffness and inflexibility the terms decided, e.g. in terms of the dispute resolution, put on the plaintiffs options. In fact the plaintiff might learn over time that a certain venue is unfavorable for a lawsuit, however, as the contract states the venue as location to resolve the dispute, the contract must be litigated in the venue. Other types of rigidity, e.g. intra-organizational political frictions and exchange partner reservations (e.g. Cyert & March, 1963; Hannan & Freeman, 1984), has been identified as a being negatively influencing performance, innovation, organizational change and organizational growth (Leonardbarton, 1992). When organizations face rigidity they respond by narrow information processing and centralize and formalize control (Staw, Sandelands, &

Dutton, 1981). We expect the same to be the case during litigation, instead of utilizing learning from prior successful litigation, the team focuses attention on the contract, and narrows the information processing. This constraints the usefulness of the organizational learning collected through previous successful litigation and stifles any creativity needed to build arguments for the case in court which could surprise the opponent and convince the judge. We therefore hypothesize that:

H2: If the current case is a contract case, the positive relationship between organizational learning from previous successful litigation and likelihood of winning the case will be negatively moderated.

Methods

To understand the relationship between, organizational learning in rare events, engaging in contract cases and litigation outcome, we use a longitudinal dataset in which we can observe organizations' involvement of 4,786 plaintiffs and 5,550 defendants in 10,211 court cases in China from 2001 to 2009. Our data is organized at the organizational level, with each observation representing an organization acting as plaintiff in a court case. To avoid left truncation, we use observations from 2001 to 2004 to create a baseline of organization experience and focus our analyses on the period from 2005 to 2009.

Data

Our data come from CIELA, a private service provider delivering statistical analysis of civil and administrative IP litigation cases in China to clients. CIELA is part of the London based IP specialist consultancy group Rouse & Co International LLP and gathers published IP judgments and settlements across all 94 major IP courts in the 35 leading cities in China². The data is collected through CIELA affiliated employees paying regular and frequent visits to all major IP courts and manually recording cases and rulings. Data are then analyzed and sold to organizations in search of optimizing their IP litigation strategy.

The CIELA data includes information on case rulings, appeals and jurisdictions as well as opportunity to track organizations' experience in the court system. Far from all disputes end up in court (Lumineau & Oxley, 2012), thus we can only study cases where organizations have not been able to or interested in reaching private settlement. Figure 1 shows how the rate of cases increased dramatically from 2001 to 2004. We focus our analysis on the stable period 2005-2009 and use the previous period to calculate organizations' experience levels.

Insert Figure 1 here

One reason for choosing the Chinese litigation data for estimating the learning effects is the local focus of how Chinese firms utilize IP. Chinese firms operate mainly locally in their approach to patenting, a recent study shows that only 4% of the patents

² Simple analysis of the data is publicly available at ciela.cn, and we are grateful to CIELA for allowing us to use the richer source files.

registered in China by Chinese also is registered in the US, emphasizing that China is one of the most locally oriented nation in terms of patent applications (Alcacer et al., 2015). In fact all Chinese firms in total has less patent registered in the US than what IBM did on their own (Alcacer et al., 2015). Furthermore, descriptive statistics show that in the US and Europe foreign plaintiffs vary between 15-51%, and foreign defendants vary between 17-62%, while the number of foreign plaintiff in China has been reported at either 3,4% and 23% depending on source, and foreign defendants as low as 1% (Alcacer et al., 2015). Therefore, choosing to use Chinese IP litigation data ensures that learnings from international litigations are accounted for.

IP litigation in China is not new, but the history is different from that of the west. Already in the 19th century China had laws for IP, however, during the Cultural Revolution (1966-1976) the IP laws were completely abandoned. It was therefore not until Deng Xiao Peng introduced the Open door policy in 1979 that the work in getting the IP legal framework up again was initiated. For China to enter into the World Trade Organization (WTO) in 2001 China had to initiate the compliance with the Trade Related Aspects of Intellectual Property Rights (TRIPS). China has therefore from 2000 and onwards been implementing new IP legislations, almost yearly, to comply with TRIPS.

Emerging economies are characterized by weak legal and regulatory environment, this is also the case for China, and as a result the Chinese legal environment has provoked considerable criticism from parties that wishes to establish an environment where businesses can rely on being treated fairly by the courts (Luo 2000). At the same time the Chinese economy has grown by 2 digit GDP growth rates for over a decade now. During this period, many international firms have moved production and R&D to China, why

Chinese firms have built strong capabilities in manufacturing, and rightfully China has been labelled “the worlds production site”. Now China produces almost a quarter of global manufacturing output, while in some industries taking up almost all production, e.g. 80% of air-conditioners, 70% of mobile phones and 60% of shoes. IP and IP protection in China has therefore become a very important economic factor as much of the worlds contracting on production is happening in China.

Chinese organizations have a different approach to contracting than what is typical in the west, Chinese organizations value the underlying relationship more than that of the contract (Wong & Chan, 1999). Contracts are therefore signed relatively easily as Chinese organizations tend to see it as a way to start a relationship. Dispute handling in China, in cases where a contract ex-ante has been signed to minimize opportunistic behavior, is also different from that in the west. Chinese organizations value collectivism and harmony, and this influences how they resolve disputes (Trubisky, Tingtoomey, & Lin, 1991), consistent with seeing relationships as long-term investments Chinese organizations will try to avoid confrontation and try and solve challenges quietly without anyone loosing face (Hoon-Halbauer, 1999). Also, partners will try and rely on other mechanisms (e.g. guanxi) to get a case solved prior engaging in a battle in public, which a court case is. The context in which we conduct this study is therefore a conservative case when as terms of disputes might be less restrictive in the Chinese case, as the parties have spent less time on negotiating these than if relying on IP litigation in western countries.

Matching contract and infringement cases

We wish to test how prior successful litigation affect the likelihood of winning a litigation and if this positive relationship is moderated by case type distinguishing between cases litigated based on contract breach and based on infringement. Organizations litigating contract cases might differ from organizations litigating infringement cases, and we wish to compare organizations' likelihood of winning above and beyond factors leading organization to litigating contract cases. We are not aware of any natural experiment or exogenous shock in the context, but we have opportunity to distinguish between comparable organizations involved in contract and infringement cases. We apply this quasi-experimental design by creating matched pairs of organizations litigating contract cases and comparable organizations litigating infringement cases to identify organizational learning and moderating effects above and beyond any organizational characteristics leading organizations to litigate contract cases in the first place. We therefore chose to estimate all models for both the full data and for a subsample of matched pairs of organizations involved in litigation based on breach of contract and infringement respectively. We create a sample consisting of organizations involved in contract cases and a organizations involved in infringement cases, comparable on relevant observables which may affect the probability of involvement in a litigation based on breach of contract. This means that the 493 organizations acting as plaintiffs in contract cases and the comparable sample of organizations acting as plaintiffs in infringement cases have similar probability of being involved in a litigation based on breach of contract. By comparing organizations involved in contract cases with a matched sample of organizations involved in infringement cases comparable on

important characteristics, we can identify a moderating involvement in cases with a prior contractual relationship and the likelihood of a favorable case outcome.

We applied propensity score and exact matching procedures to obtain this comparable matched sample of organizations acting as plaintiffs in infringement cases. Our aim was to construct a control sample of organizations involved as plaintiffs in infringement cases with same level probability of being involved as plaintiffs in contract cases as the one we could observe in our data. The propensity score matching technique is based on the likelihood that an observation would pursue a contract case as plaintiff conditional on observables (Rosenbaum & Rubin, 1983, 1985). We used a logistic regression specification to estimate the conditional probabilities of involvement in contract cases as plaintiff and ran the procedure with replacement to allow organizations involved as plaintiffs in infringement cases to be matched with multiple organizations engaged in contract cases. The propensity score matching procedure works best if employing a limited number of regressors (Dehejia & Wahba, 2002), and we use two: organizations' ratio of appearing as plaintiff versus defendant calculated as number of times the organization has litigated as plaintiff divided by the number of times the organization has litigated in the three years leading up to the current case (Share plaintiff) and organizations' experience with the Chinese court system calculated as the logged number of cases the organization has litigated in the three years leading up to the current case (Experience (ln)).

In addition to the propensity score matching procedure, we applied three exact matching criteria: First, to address variation across domestic and foreign firms we match on whether the litigating organization is based in mainland China or abroad (Foreign

firm). Foreign organizations may experience difficulties in navigating the Chinese court system that domestic organizations do not face and we consequently wish our matched pairs to reflect variations in this challenge and extraordinary economic investment in cases made by foreign firms. Second, we match on the timing of the litigation, as the Chinese court system undergoes a rapid development in the observed period, formalizing and expanding the protection and enforcement of intellectual property rights (Time period). Third, we match on whether the focal litigation takes place in the major cities of Beijing and Shanghai or elsewhere (Big city court). Again this refers to the development of the Chinese IPR system, which has developed more rapidly and diligently in the major cities than in provincial areas. Finally we match on the type of IP litigated, whether the focal case concerns violation of a patent or any other types of intellectual property (Patent). We may expect variation in the propensity to violate patent rights across contract and infringement litigation. We match contract and infringement cases 1:3. Potential bias in standard errors is corrected for by employing cluster correction effects (by both plaintiff and defendant) in the estimations. This process follows the examples of (Cameron, Gelbach, & Miller, 2011; Dahlander & McFarland, 2013; Kleinbaum, Stuart, & Tushman, 2013). Analysis of the matched observations shows no significant differences between treated and untreated observations on the matching variables.

Analysis

Dependent variables: Our dependent variable is the Litigation outcome which is measured as a binary variable where 1 denotes winning and 0 losing the case. Court rulings are delivered in two parts: the ruling and a more elaborate explanation of the

decisive factors which the court based the ruling on. Our dependent variable draws only on the first part of the information on whether the organization won or lost the litigation. This information falls in three categories identifying if the organization acting as plaintiff won, partially won or lost the litigation. We combine the two categories identifying positive outcomes into one identifying all types of winning outcomes. For various reasons, organizations do not necessarily litigate with the intention to win the litigation completely, and the partial winnings should therefore be considered as positive outcomes.

Independent variables: The variable Share win measures organizations experience with winning or partially winning cases. We calculate it as the share of positive outcomes divided by the number of cases the organization has been litigating in the three years leading up to the focal case. The variable contract identifies whether the case litigated is based on a contractual dispute or on infringement, this is a dummy variable taken the value 1 if the organization is litigating a case based on a contract breach. To identify organizations with experience from winning previous litigation cases where the focal case is litigated based on a contractual dispute we interact our two key variables and create the variable Contract*Share win. This variable identifies when firms have opportunity (being involved in a case litigated based on a contractual dispute) for leveraging positive experience from previous litigation (having a history of winning the majority of litigated cases).

Controls: To qualify our dependent variable, we control for whether plaintiffs are satisfied with litigation outcomes, regardless of the ruling. Organizations may be dissatisfied with court rulings even when they win completely or partially. The winning organization may consider the size of damages unacceptable, even if they officially won

the case. And organizations partially winning a case may decide to appeal in hope of winning completely or at least receiving a more favorable outcome. We address this issue by including the control plaintiff appeal identifying whether the plaintiff in the litigation case chooses to appeal. We also control for the different type of IP. In China a patent can mean an industrial design, a utility model (also called small patent) or an invention patent. We control for experience in each of the different types patents.

The learning build by the focal organization acting as plaintiff in the case will depend on the experience of its counterpart, the defendant. To control for the effect of defendants experience we include three variables mirror in the experience variables for the focal organization, the plaintiff: the logged number of cases the defendant has litigated in the past three years (Defendant experience(ln)), the share of these cases won by the defendant (Defendant share win), and the interaction term between the share of cases won by the defendant in the past three years and the case type (litigation based on contract breach or infringement) (Contract*Defendant share win).

All matching variables are included as controls in the estimations, however, any significant effects in models estimated on the matched pairs can only be interpreted as within group variation due to the matching. All accumulated measures are calculated in three year windows.

Model choice

Our dependent variable takes the values of 0 and 1 and we consequently consider estimating a logit or probit model, we chose a logit specification, but see no difference in effects or significance levels across the two specifications.

Another issue is that heteroskedasticity may present a problem for the reliability of results. We address this issue with two estimation strategies: First, as we wish to control for clustering of observations on both plaintiff and defendant in each case, we wish to cluster by both variables in one estimation. We use an approach developed by Cameron, Gelbach, and Miller (2011) that allows for clustering of standard errors based on more than one variable. This allows us to simultaneously cluster standard errors for both plaintiff and defendant. The approach has been used by Kleinbaum, Stuart, and Tushman (2013) studying e-mail exchange within in an organization, and by Dahlander and McFarland (2013) studying faculty collaboration at Stanford. We review the probability plots and variance and find some though not much variation across the probability distribution. Second, we reestimate all models with Huber–White robust standard errors clustering observations by plaintiff in one estimation and defendant in another. These models produce similar results to our main models and are available from the authors upon request. The underlying distribution allows estimation of a linear model, which we utilize as a robustness check of our results, but utilizing a linear probability model with a limited dependent variable can lead to prediction of probabilities outside the realistic spectrum of 0-1, where prediction of negative probabilities is the main concern. Only 5% of our observations have negative predicted probabilities in our main model (model 3), and we can hence use with the linear probability model as robustness check. Results do not vary across logit and linear specifications.

Results

In table 1 we present the descriptive statistics and in Table 2 the pairwise correlations of the dependent, independent and control variables.

Insert Table 1& 2 here

Several interesting observations can be seen from the descriptive statistics, on average there is a 76.6% chance of winning the litigation if being plaintiff. Most plaintiffs have are not often being litigated against, as Share plaintiff is .98. The data also shows that in China during the period investigated few cases, less than 1%, were with foreign firms involved. This supports our choice of utilizing Chinese data in our efforts to control for international litigations. However, given the attention that the media, US chamber of Commerce, and European Chamber of Commerce have used on arguing that foreign firms did not get protection for their IP in China, it is surprising that in reality only very few cases have been tried with foreign firms. The litigations in China have mainly been Chinese against Chinese. The litigations are mainly ruled in a venue in Beijing (42.5%) and Shanghai (10.9%). Furthermore, it is shown that the type of IP litigation covered in the sample mainly is divided between Copyright cases (45.1%), Patent litigations (24.5%) – however including both design patents, utility models and inventions patents (invention patents is the patents that in US and European research on patents are investigated), Trade marks (19.7%) and Unfair competition (10.7%).

In terms of correlations in Table 2, no variables show above .7 correlations, suggesting less of a concern in terms of multicollinearity.

In table 3 models 1 to 5 predict the plaintiff organizations' likelihood of winning the focal litigation in the restricted sample of matched pairs, while models 6 to 10 predict the plaintiff organizations' likelihood of winning the focal litigation in the full sample of all litigation within the period. Model 1 and 6 are the baseline models estimating effects of the match variables, in Model 2 and 7 controls are included. Model 3 and 8 include the key variable Share win, in model 4 and 9 the controls for defendants' experience are included, the full models are displayed as model 5 and 10, which include all key variables and the interaction terms. For estimations in models 6 to 10 we sample 5 sets of matched pairs to minimize effects of sampling errors. Our results are consistent across all five samples though some variables change significance levels for two samples. All variance inflation tests produce satisfactory results with a main variance inflation factor well below 5 for all models.

The direct effect of litigating based on a breach of contract remains insignificant across all models in the matched sample, whereas it is negative and significant in the full sample, this underlines the importance of matched sample. The direct effect of organizations' share of past cases won is significantly positive in model 3, 4 and 5 estimated on the full data and in model 9 and 10 estimated based on the sample of matched pairs. The interaction between the share of past cases won and the type of case litigated is significantly negative in both model 5 and 10. Interestingly, the controls capturing the learning of the defendant mirror the key variables capturing the learning of the plaintiff perfectly in terms of effect size, direction and significance. Facing defendants with ample learning from a high share of previous cases won reduces plaintiffs' likelihood of winning the focal case, and this relationship too is moderated by

the focal case being litigated based on a contract breach. Interestingly we see a significantly positive effect of experiential learning until we add the key variable measuring learning from past successful litigation. This indicates that in our studied setting, learning based on success trumps experiential learning. We see a significantly positive effect of organizations being based abroad (Foreign firm) in the full sample, a significantly negative effect of litigating in either Shanghai or Beijing (Big city court). Patent cases are significantly less likely to be won by the plaintiff in model 1 to 5, but we find no significant differences across different patent types.

Insert Table 3 here

Discussion and Conclusion

In this paper, we analyze how organizational learning from rare events may influence the likelihood of successful litigation outcome. We further study if this learning is contingent on case type. Based on data gathered by an international law firm, we study 4,786 firms acting as plaintiffs litigating IP in China over a period of 9 years and find first, that firms may learn to litigate, and second, that the value of learning depends on the type of case the firm is litigating.

Our study makes two contributions to the literature on organizational learning. First, our findings show that in the setting studied, learning based on success trumps experiential learning. Adhering to a behavioral theory logic we posit that when

organization receive positive clear and timely feedback as they do when winning a litigation, it will increase their attention and confidence as well as lead them to allocate more resources. Whereas firms that will receive negative clear feedback, as firms do when losing a litigation, will categorize the rare event as unique and exceptional, explaining that the case was lost due to exogenous factors, putting them in a situation where they will most likely not have an incentive to allocate attention to the learning from the litigation. Second, we provide evidence for how utilizing the learning from prior successful litigation is constrained given the conditions of the case litigated. In a case litigated based on a breach of contract, the terms of the contract is limiting the maneuver options of firms, in such setting firms will narrow information processing and centralize and formalize control in such a way that attention is giving to the contract and not the learnings from prior successful litigation. In cases litigated based on suspicion of infringement, the attention is not removed by any rigidity originating in a contract, why attention is kept on identifying the discrepancies and similarities comparing prior cases won with the current case litigated.

An additional benefit of our study is to link organizational learning literature to literature in economics and law. Literature rooted in economics tend to focus on static measures such as technology and type of plaintiff in determining reason for engaging in litigation (e.g. Agarwal et al., 2009; Graham & Somaya, 2004; Lanjouw & Schankerman, 2001; Polidoro & Toh, 2011; Somaya, 2003) and outcomes in litigations (Janicke & Ren, 2006; Moore, 2003). To this literature we add considerations relating to organizational learning, explicating additional factors to take into account.

An empirical benefit of our study is the novelty of being first to provide empirical data for Chinese litigations, so far research has centered mainly on US litigations (Janicke & Ren, 2006; Moore, 2003), but also more recently European litigations (Graham & Van Zeebroeck, 2014; Schliesser, 2014), while litigation in China has been left out, even though the increase in importance of China on the IP application and IP litigation world scene (Alcacer et al., 2015).

Like other research this study has a number of empirical limitations that opens paths for future research. First, in an effort to control for international learnings from other litigations, we limit our research to only include IP litigations in China. The group of foreign firms, which most likely would be large multinational corporations is small in this sample (below 1%) why international court cases are expected to interfere less with this sample. Furthermore, Chinese firms have shown to be less active in IP registering outside China (Alcacer et al., 2015) suggesting China as a setting where experience in dealing with IP will be present in data covering China and less need for international data. However, though we are confident that the results for litigating in China is representative giving insights into learning from rare events, we suggest that research will replicate our study covering both US and European litigations, where also learnings across countries can be included. Second, litigation is not only a process in which firms operate with their internal team of IP lawyers, often also external lawyers are part of preparing and executing litigations. In this paper we did not study the influence of external lawyers in isolation but instead we viewed the selection and usage of external lawyers as part of the organizational learning. Fine grained data on this could enable

elaboration of the boundary conditions of learning from successful rare events, e.g. if aspects of the use of external lawyers moderate the value of organizational learning.

Our results have implications for future research. First, there are some limitations to the generalizability of this study. To begin, it has focused on a certain country, China, there is therefore a need to test the applicability of the findings to different regional contexts. In these contexts however it becomes very important to have global IP litigation data, as patent litigation outside China is a global battlefield. Future research can then address the boundary conditions for the effectiveness of positive experience accumulation across borders. Second, additional research also including firm market performance variables is needed. There is a need to empirically investigate whether firms' performance also is a boundary condition influencing firms ability to learn from prior successful litigations.

In this paper we explored learning as a determinant for winning litigations and we find that learning to litigate is central to the successfulness of firms' litigation activities. When plaintiffs in IP litigation receive quick and clear positive feedback, this helps focus their attention on litigation feedback and motivates them to allocate resources that enhance learning. Second, we explore the moderating effect of case type, finding that organizational learning is most applicable in cases without contractual constraints. However, there is still much to be learned, it is our hope that the rationale behind investigating litigations as rare events will encourage future research projects to provide a deeper understanding of the conditions under which firm can learn from the rare event of litigation.

Tables and Figures

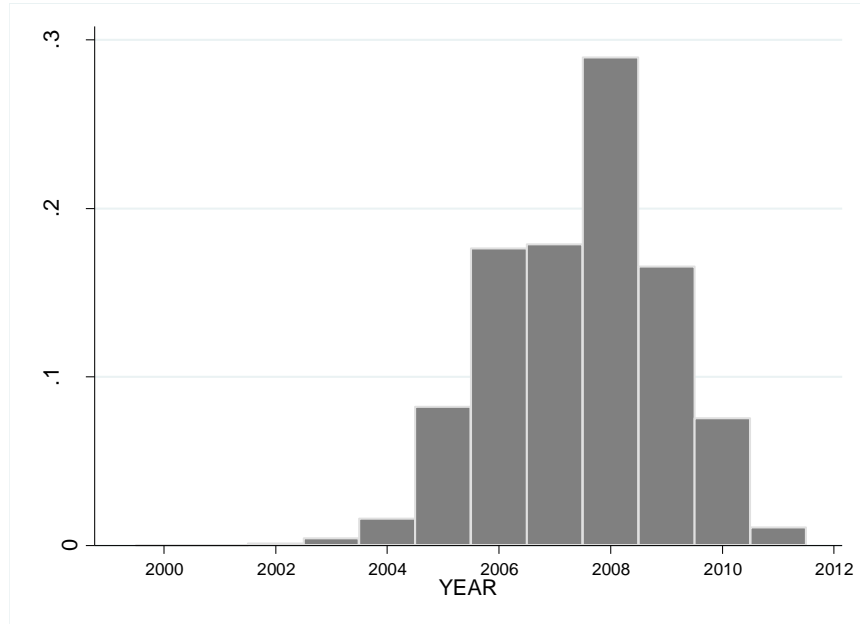


Figure 1: Distribution of IP litigation court cases per year

Table 1: Descriptive statistics, full sample

Variable	Mean	Std. Dev.	Min	Max
Litigation outcome	.7660	.4234	0	1
Contract*Share win	.0022	.0464	0	1
Contract*Defendant share win	.0026	.0592	0	2.7081
Share win	.4654	.9855	0	4.8752
Experience (ln)	.4290	.9953	0	5.0039
Experience (ln) Design patent	.0677	.3712	0	4.0943
Experience (ln) Invention patent	.0188	.1780	0	3.6376
Experience (ln) Utility models	.0270	.1958	0	3.0445
Defendant share win	.3720	.9266	0	6.1612
Defendant experience (ln)	.3510	.9783	0	7.2313
Plaintiff appellant	.1567	.3636	0	1
Contract	.0482	.2143	0	1
Share plaintiff	.9822	.0889	.0155	1
Foreign Firm	.0897	.2858	0	1
Time period	.4859	.4998	0	1
Big city court	.5344	.4988	0	1
Copyright	.4505	.4976	0	1
Patent	.2454	.4303	0	1
Trademark	.1972	.3979	0	1
Unfair competition	.1069	.3090	0	1
Beijing	.4249	.4944	0	1
Shanghai	.1094	.3122	0	1

Table 2: Pairwise correlations, full sample

	1	2	3	4	5	6	7	8	9	10
1 Litigation outcome	1.000									
2 Contract*Share win	-0.0075	1.000								
3 Defendant Contract*Share win	0.0111	0.1420*	1.000							
4 Share win	0.1711*	0.0900*	-0.0093	1.000						
5 Experience (ln)	0.1303*	0.0100	-0.0128	0.7127*	1.000					
6 Experience (ln) Design patent	0.0373*	-0.0047	-0.0047	0.3203*	0.2811*	1.000				
7 Experience (ln) Invention patent	0.0197*	0.0032	-0.0050	0.1367*	0.1397*	0.0376*	1.000			
8 Experience (ln) Utility models	0.0175	0.0065	-0.0065	0.2085*	0.1679*	0.2122*	0.1376*	1.000		
9 Defendant share win	-0.1816*	-0.0045	0.1017*	-0.0339*	-0.0335*	-0.0472*	-0.0235*	-0.0382*	1.000	
10 Defendant experience (ln)	-0.0829*	-0.0125	0.0192	0.0968*	0.0416*	-0.0512*	-0.0255*	-0.0366*	0.6055*	1.000
11 Plaintiff appeal	-0.5723*	-0.0030	-0.0088	-0.0985*	-0.0821*	-0.0286*	-0.0113	-0.0097	0.0928*	0.0506*
12 Contract	-0.0147	0.2102*	0.2098*	-0.0985*	-0.0891*	-0.0402*	-0.0220*	-0.0273*	-0.0788*	-0.0700*
13 Share plaintiff	-0.0032	-0.0811*	0.0016	-0.0770*	-0.0294*	0.0248*	-0.0028	-0.0004	0.0256*	0.0010
14 Foreign firm	0.0724*	-0.0149	-0.0148	0.0306*	0.0180	-0.0290*	-0.0034	-0.0434*	-0.1214*	-0.1036*
15 Time period	0.0554*	-0.0006	-0.0084	-0.0767*	-0.1193*	-0.0529*	-0.0326*	-0.0022	-0.3065*	-0.2848*
16 Big city court	-0.1007*	0.0357*	0.0356*	-0.0596*	-0.0486*	-0.1164*	-0.0689*	-0.0490*	0.3518*	0.3077*
17 Copyright	-0.0523*	0.0151	0.0352*	0.1068*	0.1794*	-0.1526*	-0.0957*	-0.1186*	0.4461*	0.3742*
18 Patent	0.0202*	-0.0184	-0.0269*	0.0079	-0.0671*	0.2880*	0.1645*	0.2302*	-0.2250*	-0.1933*
19 Trademark	0.0433*	0.0084	-0.0075	-0.0505*	-0.0573*	-0.0749*	-0.0351*	-0.0662*	-0.2102*	-0.1699*
20 Unfair competition	0.0004	-0.0095	-0.0095	-0.1180*	-0.1217*	-0.0589*	-0.0298*	-0.0444*	-0.1343*	-0.1147*

	11	12	13	14	15	16	17	18	19
11 Plaintiff appeal	1.000								
12 Contract	-0.0318*	1.000							
13 Share plaintiff	0.0372*	-0.0760*	1.000						
14 Foreign firm	-0.0139	-0.0547*	0.0562*	1.000					
15 Time period	-0.0525*	0.0242*	-0.0280*	0.0160	1.000				
16 Big city court	-0.0173	0.0756*	-0.0534*	0.0329*	-0.1339*	1.000			
17 Copyright	0.0028	-0.0020	-0.0419*	-0.2245*	-0.0709*	0.3556*	1.000		
18 Patent	-0.0269*	-0.0530*	0.0637*	-0.0255*	0.0604*	-0.3204*	-0.5164*	1.000	
19 Trademark	0.0156	0.0996*	0.0171	0.2342*	-0.0212*	-0.1207*	-0.4488*	-0.2826*	1.000
20 Unfair competition	0.0129	-0.0513*	-0.0433*	0.0953*	0.0573*	0.0289*	-0.3133*	-0.1972*	-0.1714*

Table 3: Logit models, clustering by plaintiff and defendant. Dependent variable Winning 1st instance (full sample) in Model 1-5.

Dependent variable Winning 1st instance (restricted sample) in Model 6-10³

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Contract*Share win					-1.290*					-5.512***
					[0.779]					[2.019]
Contract*Defendant share win					2.201***					5.977***
					[0.714]					[1.610]
Share win			1.234***	1.273***	1.319***			1.791	3.383*	5.531***
			[0.263]	[0.217]	[0.219]			[1.367]	[1.781]	[1.642]
Experience (ln)	0.380***	-0.002	-0.018	-0.029	-0.029	1.553**	0.661	0.044	0.442	0.442
	[0.126]	[0.103]	[0.105]	[0.105]	[0.105]	[0.752]	[0.893]	[1.046]	[0.931]	[0.931]
Experience (ln) Design patent				-0.179	-0.188			.	.	.
				[0.289]	[0.288]			.	.	.
Experience (ln) Invention patent				-0.105	-0.104			.	.	.
				[0.200]	[0.200]			.	.	.
Experience (ln) Utility models				-0.145	-0.145			0.740	0.039	0.039
				[0.444]	[0.444]			[1.861]	[1.397]	[1.397]
Defendant share win				-1.144***	-1.207***			0.793	-4.314***	-4.314***
				[0.362]	[0.366]			[1.359]	[1.618]	[1.618]
Defendant experience (ln)				0.177	0.191			-3.360***	-1.138	-1.138
				[0.122]	[0.126]			[1.182]	[0.749]	[0.749]
Plaintiff appeal	-3.566***	-3.532***	-3.547***	-3.552***	-3.556***	-4.461***	-4.516***	-4.701***	-4.863***	-4.946***
	[0.213]	[0.205]	[0.207]	[0.191]	[0.190]	[0.803]	[0.820]	[0.922]	[0.808]	[0.790]
Contract	-0.343*	-0.232	-0.174	-0.337*	-0.397**	0.806	0.807	0.844	0.177	0.070
	[0.196]	[0.198]	[0.199]	[0.180]	[0.180]	[0.636]	[0.633]	[0.651]	[0.498]	[0.504]
Share plaintiff	0.262	0.421	0.717*	0.877**	0.829**	-0.567	-0.302	0.491	0.660	1.320
	[0.503]	[0.443]	[0.413]	[0.393]	[0.391]	[1.776]	[1.752]	[1.365]	[1.331]	[1.287]
Foreign firms	0.920***	0.813***	0.789***	0.717***	0.711***	0.969	0.798	0.803	1.521	1.754
	[0.239]	[0.225]	[0.224]	[0.223]	[0.223]	[0.916]	[0.891]	[0.914]	[1.232]	[1.329]

³ The number of observations varies slightly as a few of the smallest courts are perfect predictors of success/failure in the matched sample.

Time period	0.037 [0.182]	0.105 [0.173]	0.106 [0.171]	-0.091 [0.121]	-0.098 [0.121]	-0.183 [0.979]	-0.146 [0.982]	-0.027 [1.058]	-1.847*** [0.629]	-1.902*** [0.609]
Big city court	-0.897*** [0.231]	-0.845*** [0.235]	-0.863*** [0.236]	-0.834*** [0.235]	-0.831*** [0.236]	-3.823*** [1.251]	-3.934*** [1.262]	-4.066*** [1.236]	-5.956*** [1.433]	-6.201*** [1.413]
Patent	-0.362** [0.183]	-0.254 [0.183]	-0.292* [0.176]	-0.481*** [0.145]	-0.485*** [0.145]	0.315 [1.025]	0.300 [1.021]	0.330 [1.040]	-0.849 [0.947]	-0.896 [0.946]
Trademark	0.106 [0.192]	0.221 [0.193]	0.223 [0.189]	-0.025 [0.143]	-0.026 [0.143]	0.923 [1.057]	0.911 [1.063]	0.993 [1.112]	-0.912 [0.697]	-1.013 [0.690]
Unfair competition	-0.057 [0.201]	0.113 [0.210]	0.150 [0.209]	-0.096 [0.157]	-0.104 [0.156]	1.978* [1.039]	1.978* [1.038]	2.091* [1.090]	1.055 [1.051]	0.937 [1.036]
City dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.589*** [0.501]	2.129*** [0.456]	1.772*** [0.442]	1.937*** [0.454]	1.994*** [0.454]	3.300** [1.430]	3.067** [1.456]	2.265 [1.826]	6.157*** [2.068]	5.815*** [1.976]
Pseudo LL	-3.920.260	-3.866.813	-3.819.781	-3.763.665	-3.755.919	-655.665	-650.216	-643.300	-511.313	-483.825
No of Obs	10211	10211	10211	10211	10211	1436	1436	1436	1433	1433

* p<0.1, ** p<0.05, *** p<0.01

References

- Agarwal, R., Ganco, M., & Ziedonis, R. H. 2009. REPUTATIONS FOR TOUGHNESS IN PATENT ENFORCEMENT: IMPLICATIONS FOR KNOWLEDGE SPILLOVERS VIA INVENTOR MOBILITY. **Strategic Management Journal**, 30(13): 1349-1374.
- Alcacer, J., Beukel, K., & Cassiman, B. 2015. Capturing Value from IP in a Global Environment. **White paper - The global enterprise center - NYU Stern**.
- Alkaersig, L., Beukel, K., & Reichstein, T. 2015. **Intellectual Property Rights Management: Rookies, Dealers, Strategists and Strategic Dealers**: Palgrave Macmillan.
- Anand, B. N., & Khanna, T. 2000a. Do firms learn to create value? The case of alliances. **Strategic Management Journal**, 21(3): 295-315.
- Anand, B. N., & Khanna, T. 2000b. The structure of licensing contracts. **Journal of Industrial Economics**, 48(1): 103-135.
- Angrist, M., Chandrasekharan, S., Heaney, C., & Cook-Deegan, R. 2010. Impact of gene patents and licensing practices on access to genetic testing for long QT syndrome. **Genetics in Medicine**, 12(4): S111-S154.
- Argote, L. 1999. **Organizational Learning: Creating, Retaining and Transferring Knowledge**: Kluwer Academic Publishers, Boston.
- Argyres, N., & Mayer, K. J. 2007. Contract design as a firm capability: An integration of learning and transaction cost perspectives. **Academy of Management Review**, 32(4): 1060-1077.
- Argyres, N. S., Bercovitz, J., & Mayer, K. J. 2007. Complementarity and evolution of contractual provisions: An empirical study of IT services contracts. **Organization Science**, 18(1): 3-19.
- Battigalli, P., & Maggi, G. 2002. Rigidity, discretion, and the costs of writing contracts. **American Economic Review**, 92(4): 798-817.
- Beck, T. E., & Plowman, D. A. 2009. Experiencing Rare and Unusual Events Richly: The Role of Middle Managers in Animating and Guiding Organizational Interpretation. **Organization Science**, 20(5): 909-924.
- Bercovitz, J. E. L., & Tyler, B. B. 2014. Who I Am and How I Contract: The Effect of Contractors' Roles on the Evolution of Contract Structure in University-Industry Research Agreements. **Organization Science**, 25(6): 1840-1859.
- Bhagat, S., Brickley, J. A., & Coles, J. L. 1994. THE COSTS OF INEFFICIENT BARGAINING AND FINANCIAL DISTRESS - EVIDENCE FROM CORPORATE LAWSUITS. **Journal of Financial Economics**, 35(2): 221-247.
- Cameron, A. C., Gelbach, J. B., & Miller, D. L. 2011. Robust Inference With Multiway Clustering. **Journal of Business & Economic Statistics**, 29(2): 238-249.
- Christianson, M. K., Farkas, M. T., Sutcliffe, K. M., & Weick, K. E. 2009. Learning Through Rare Events: Significant Interruptions at the Baltimore & Ohio Railroad Museum. **Organization Science**, 20(5): 846-860.
- Cyert, R. M., & March, J. G. 1963. **A Behavioral Theory of the Firm**. Oxford: Blackwell.
- Dahlander, L., & McFarland, D. A. 2013. Ties That Last: Tie Formation and Persistence in Research Collaborations over Time. **Administrative Science Quarterly**, 58(1): 69-110.

- Dyer, J. H., & Ouchi, W. G. 1993. JAPANESE-STYLE PARTNERSHIPS - GIVING COMPANIES A COMPETITIVE EDGE. **Sloan Management Review**, 35(1): 51-63.
- Felin, T., & Foss, N. J. 2011. The endogenous origins of experience, routines, and organizational capabilities: the poverty of stimulus. **Journal of Institutional Economics**, 7(2): 231-256.
- Fisher, D. E., & Ieee, I. 2000. **Managing the risks of commercializing new technology**.
- Graham, S., & Somaya, D. 2004. **The use of patents, copyrights and trademarks in software: Evidence from litigation**.
- Graham, S., & Van Zeebroeck, N. 2014. Comparing patent litigation across Europe: A first look. **Stanford Technology Law Review**, 17.
- Grossman, S. J., & Hart, O. D. 1986. THE COSTS AND BENEFITS OF OWNERSHIP - A THEORY OF VERTICAL AND LATERAL INTEGRATION. **Journal of Political Economy**, 94(4): 691-719.
- Hannan, M. T., & Freeman, J. 1984. STRUCTURAL INERTIA AND ORGANIZATIONAL-CHANGE. **American Sociological Review**, 49(2): 149-164.
- Hart, O., & Moore, J. 1990. PROPERTY-RIGHTS AND THE NATURE OF THE FIRM. **Journal of Political Economy**, 98(6): 1119-1158.
- Heath, C., & Petit, L. 2005. **Patent Enforcement Worldwide: A Survey of 15 Countries, Writings in Honour of Dieter Stauder**. Oxford: Hart Publishing.
- Hoon-Halbauer, S. K. 1999. Managing relationships within sino-foreign joint ventures. **Journal of World Business**, 34(4): 344-371.
- Janicke, P., & Ren, L. 2006. Who wins patent infringement cases. **Aipla Quarterly Journal**, 34(1): 1.
- Joskow, P. L. 1985. Vertical integration and long-term contracts: The case of coal-burning electric generating plants. **Journal of Law, Economics, and Organization**: 33-80.
- Kleinbaum, A. M., Stuart, T. E., & Tushman, M. L. 2013. Discretion Within Constraint: Homophily and Structure in a Formal Organization. **Organization Science**, 24(5): 1316-1357.
- Lampel, J., Shamsie, J., & Shapira, Z. 2009. Experiencing the Improbable: Rare Events and Organizational Learning. **Organization Science**, 20(5): 835-845.
- Lane, P. J., & Lubatkin, M. 1998. Relative absorptive capacity and interorganizational learning. **Strategic Management Journal**, 19(5): 461-477.
- Lanjouw, J., & Lerner, J. 1998. The enforcement of intellectual property rights: a survey of the empirical literature. **Annales d'Economie et de Statistique**, 49-50: 223-246.
- Lanjouw, J. O., & Schankerman, M. 2001. Characteristics of patent litigation: a window on competition. **Rand Journal of Economics**, 32(1): 129-151.
- Larsson, R., Bengtsson, L., Henriksson, K., & Sparks, J. 1998. The interorganizational learning dilemma: Collective knowledge development in strategic alliances. **Organization Science**, 9(3): 285-305.
- Leonardbarton, D. 1992. CORE CAPABILITIES AND CORE RIGIDITIES - A PARADOX IN MANAGING NEW PRODUCT DEVELOPMENT. **Strategic Management Journal**, 13: 111-125.

- Lerner, J. 1995. PATENTING IN THE SHADOW OF COMPETITORS. **Journal of Law & Economics**, 38(2): 463-495.
- Lumineau, F., & Oxley, J. E. 2012. Let's Work It Out (or We'll See You in Court): Litigation and Private Dispute Resolution in Vertical Exchange Relationships. **Organization Science**, 23(3): 820-834.
- Macneil, I. R. 1978. CONTRACTS - ADJUSTMENT OF LONG-TERM ECONOMIC RELATIONS UNDER CLASSICAL, NEOCLASSICAL, AND RELATIONAL CONTRACT LAW. **Northwestern University Law Review**, 72(6): 854-905.
- Madsen, P. M. 2009. These Lives Will Not Be Lost in Vain: Organizational Learning from Disaster in US Coal Mining. **Organization Science**, 20(5): 861-875.
- March, J. G., & Simon, H. A. 1958. **Organizations**.
- Mayer, K. J. 2006. Spillovers and governance: An analysis of knowledge and reputational spillovers in information technology. **Academy of Management Journal**, 49(1): 69-84.
- Mayer, K. J., & Argyres, N. S. 2004. Learning to contract: Evidence from the personal computer industry. **Organization Science**, 15(4): 394-410.
- Moatti, V., Ren, C. R., Anand, J., & Dussauge, P. 2015. DISENTANGLING THE PERFORMANCE EFFECTS OF EFFICIENCY AND BARGAINING POWER IN HORIZONTAL GROWTH STRATEGIES: AN EMPIRICAL INVESTIGATION IN THE GLOBAL RETAIL INDUSTRY. **Strategic Management Journal**, 36(5): 745-757.
- Moore, K. A. 2003. Xenophobia in American courts. **Northwestern University Law Review**, 97(4): 1497-1550.
- Mowery, D. C., Oxley, J. E., & Silverman, B. S. 1996. Strategic alliances and interfirm knowledge transfer. **Strategic Management Journal**, 17: 77-91.
- Ocasio, W. 1997. Towards an attention-based view of the firm. **Strategic Management Journal**, 18: 187-206.
- Polidoro, F., Jr., & Toh, P. K. 2011. LETTING RIVALS COME CLOSE OR WARDING THEM OFF? THE EFFECTS OF SUBSTITUTION THREAT ON IMITATION DETERRENCE. **Academy of Management Journal**, 54(2): 369-392.
- Posner, R. 1986. **Economic analysis of law** (3rd ed.). Boston, MA: Little Brown and Company.
- Rerup, C. 2009. Attentional Triangulation: Learning from Unexpected Rare Crises. **Organization Science**, 20(5): 876-893.
- Rosenbaum, P. R., & Rubin, D. B. 1983. THE CENTRAL ROLE OF THE PROPENSITY SCORE IN OBSERVATIONAL STUDIES FOR CAUSAL EFFECTS. **Biometrika**, 70(1): 41-55.
- Rosenbaum, P. R., & Rubin, D. B. 1985. CONSTRUCTING A CONTROL-GROUP USING MULTIVARIATE MATCHED SAMPLING METHODS THAT INCORPORATE THE PROPENSITY SCORE. **American Statistician**, 39(1): 33-38.
- Salgado, S. R., Starbuck, W. H., & Mezias, J. M. 2002. The accuracy of managers' perceptions: A dimension missing from theories about firms. In J. G. M. M. Augier (Ed.), **The Economics of Choice, Change, and Organizations: Essays in Memory of Richard M. Cyert**: 168-185. Cheltenham, UK: Edward Elgar.

- Schliesser, P. 2014. Patent Litigation and Firm Performance. The Role of the Enforcement System. **Industrial and Corporate Change (forthcoming)**.
- Somaya, D. 2003. Strategic determinants of decisions not to settle patent litigation. **Strategic Management Journal**, 24(1): 17-38.
- Starbuck, W. H. 2009. Cognitive Reactions to Rare Events: Perceptions, Uncertainty, and Learning. **Organization Science**, 20(5): 925-937.
- Staw, B. M., Sandelands, L. E., & Dutton, J. E. 1981. THREAT-RIGIDITY EFFECTS IN ORGANIZATIONAL-BEHAVIOR - A MULTILEVEL ANALYSIS. **Administrative Science Quarterly**, 26(4): 501-524.
- Tirole, J. 2009. Cognition and Incomplete Contracts. **American Economic Review**, 99(1): 265-294.
- Trubisky, P., Tingtoomey, S., & Lin, S. L. 1991. THE INFLUENCE OF INDIVIDUALISM COLLECTIVISM AND SELF-MONITORING ON CONFLICT STYLES. **International Journal of Intercultural Relations**, 15(1): 65-84.
- Weick, K. E., & Sutcliffe, K. A. 2006. Mindfulness and the quality of organizational attention. **Organization Science**, 17(4): 514-524.
- Williamson, O. E. 1983. CREDIBLE COMMITMENTS - USING HOSTAGES TO SUPPORT EXCHANGE. **American Economic Review**, 73(4): 519-540.
- Wong, Y. H., & Chan, R. Y. K. 1999. Relationship marketing in China: Guanxi, favouritism and adaptation. **Journal of Business Ethics**, 22(2): 107-118.
- Zollo, M. 2009. Superstitious Learning with Rare Strategic Decisions: Theory and Evidence from Corporate Acquisitions. **Organization Science**, 20(5): 894-908.
- Zollo, M., & Winter, S. G. 2002. Deliberate learning and the evolution of dynamic capabilities. **Organization Science**, 13(3): 339-351.