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Patent Litigation Strategy and Its Effects on the Firm

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Patent litigation has attracted scholarly attention to reconcile multiple views for new research. Accordingly, this paper addresses patent litigation strategy and its effect on the firm. Based on 106 papers and articles, six books, the author's logic and practice impressions, it first defines patent litigation strategy and differentiates similar concepts. Second, based on the process, the author fine-tunes patent litigation strategy into three tactics: threat, filing and verdict. Then, she categorizes and examines the impact of patent litigation on market value, monetary gain/loss and strategic collaboration. The findings show that the effect on the market value is more complex and ambiguous than anticipated, and sometimes contradictory. The analysis shows the consistency of monetary effect in practice, that firms tend to have higher monetary gains from private settlement than from legal awards. It also demonstrates that existing studies lag behind reality in investigating the detailed role of patent litigation on strategic collaboration from partnership (e.g. licensing and strategic alliance) to takeover (i.e. merger and acquisition). Finally, the author reflects on the findings, and maps out critical paths toward new research. This process also reveals that stakeholders, industrial settings and country environments moderate the studied relationship. This paper contributes to knowledge and practice: appreciates the interdisciplinary endeavors to draw the findings; categorizes patent litigation and its effect; and critiques prior studies on the relationship to integrate knowledge for future research.

Introduction

Patent litigation strategy (PLS) is an integral part of business practice. Firms embrace this strategy to restate their proprietorship and compete against their rivals. Nonetheless, the complexity of technology is often represented by multiple ownership of patents embedded within products or process. Consequently, disputed patents rise in number, involved parties, geographic coverage and financial compensation requested. Firms therefore expect to gain positive outcomes from adopting PLS. Despite the verdict on winners and losers in court, however, the victor and underdog seem blurred in the market. A case in point is the most publicly exposed global battle between Apple and Samsung. Their disputes have had different resolutions across jurisdictions, making the legal winner hard to tell, let alone the market champion. Like Apple and Samsung, firms fight in court, even thoughtheycastdoubtsabouttheworthinessofpatent wrangles for the parties involved, the fairness of industrial competition and the effectiveness for firms.

Aligning with practice, research has generated an array of studies motivating us to synthesize prior contributions. First, multidisciplinary themes beg for a holistic investigation. Case-based legal studies (Allison *et al.* 2004; Allison *et al.* 2009; Priest and Klein 1984) and statistical modeling in economics (Bebchuk 1984; Fournier and Zuehike 1989; Lerner 2010) are as dynamic as ever. Nonetheless, such disciplinary segregation has changed since the 1990s to see the bi-disciplines of law and economics (Choi 1998; Lanjouw 1994; Waldfogel 1995), and integration with business and management (Aoki and Hu 1999; Reitzig *et al.* 2010; Yang and Sonmez 2014). Prior research recognizes the link between disputed patents and strategic management for competition (Chen *et al.* 2015; Lanjouw and

Schankerman 2001; Lerner 1994), patent portfolio (Heyman 2005; Ken and Tsai 2010), innovation (Meniere and Parlane 2008), information support (Choi 1998), and costs and wealth (Bhagat *et al.* 1994; Elhauge and Krueger 2013). Based on prior studies, we categorize patent litigation into three streams: characteristics (e.g. rates and traits), determinants (e.g. costs) and effects (e.g. impacts and outcomes), but we confine this study to investigating the 'effect'.

Second, prior studies yield varied findings, so we assess them to reveal consistency and contradictions, and make justified arguments. For example, it would be insufficient to examine the characteristics of litigated patents and their relationship with firm value (Henry 2013). This is because heterogeneity exists in value among patents although 'litigation can help extract returns from patented innovation' (Lanjouw and Schankerman 2001, p. 131). This is also because firmsmayhavestrategicintentsinadoptingPLS,such as rivalry and freedom to operate (Aoki and Hu 1999; Grindle and Teece 1997). Moreover, firm and industrial characteristics (e.g. size, technology, competition) impact firms (Lerner 1994; Meniere and Parlane 2008). It is thus a formidable task that we intend to attempt to integrate these elements logically.

Finally, our study responds to scholarly calls for academic endeavors. Lanjouw and Lerner (1998) examine the costs and benefits of patent litigation in the US and set economic foundation for understanding the motivations to litigate and the impact on innovation. Our study responds to their call to examine the impact of patent litigation on firm behaviors. Somaya (2012) surveys prior studies on the patent strategy in economics, law and management and provides a roadmap for business research. He categorizes patent enforcement as a domain of patent strategy and strategic management of patents, alongside patent acquisitions and patent licensing (Arora *et al.* 2001). This survey confirms the significance of patents in business and opens avenues for examination. He points out the richness of 'patent right' study, but the shortfall in studies on the outcomes, which is insightful for our study. Moreover, Weatherall and Webster (2014) examine patent enforcement and find that infringement is common, but enforcement is informal. In this process, non-practicing entities' litigation (i.e. firms that do not create or develop patents, but buy them out from others for out-licensing opportunities) is rampant against practicing companies (i.e. firms that create, develop and commercialize patented products and processes). They also highlight that litigation attracts empirical attention, but produces few solutions.

Therefore,wefollowtheirwisdomtoemphasizestudies on 'solutions' – the effect of PLS.

Given the above motivations, this paper aims to master interdisciplinary literature to advance critical research in the area of PLS and its effect on firms. Within the aim, we intend to achieve three objectives: First, we clarify the PLS concept and differentiate it from similar jargons to avoid confusion. Second, we categorize and examine three PLS effects: market value, monetary gain/loss and strategic collaboration. Finally, we integrate prior studies and our logical reflections to map out the studied relationship, clarify empirical boundaries and direct future research.

Accordingly, we structure the paper as follows. After the Introduction, the section headed 'Approach' reveals the review process and analytics used to conduct the critique. 'Concept' clarifies PLS and the relevant terminology. 'Themes' categorizes PLS effects on firms: market, monetary and strategic effects. 'Integration' maps out the studied relationship and clarifies empirical boundaries to establish paths for future research. 'Discussions' explains the theoretical and empirical contributions and implications for practice. 'Conclusions' responds to the three objective questions and points to future research directions.

Approach: process and analytics

We first used keywords 'patent litigation' and 'intellectual property (IP) litigation' to search databases, including Business Source Complete, JSTOR, Emerald, LexisNexis, Wiley, ProQuest, ScienceDirect and the Web of Science. The search allowed coverage of multidisciplinary works up to March 2018. Despite the non-restrictive approach towards search disciplines, the thematic relevance dictates the inclusion of publications. We set no spatial restriction searching publications in English to ensure coverage of all the countries studied. Nonetheless, for content consistency, we focused on patent litigation and excluded disputes of other IP rights (e.g. trademarks, industrial designs and copyrights) and contractual violations. We also centered on litigation-based dispute resolution and excluded other channels, including consultation (between disputants), mediation (through a third party) and arbitration (quasi-legal; Yang 2013).

The next step was screening, skimming and organization of relevant publications. We grouped publications into the 'most relevant', 'peripheral' and 'distant', and deleted the 'irrelevant'. Software, such as NVivo and Endnote was used for theme-based categorization. On further reading, annotations took place to summarize materials, categorize and structure findings. Syntheses were then conducted to organize concepts, theoretical and empirical findings, and other information (e.g. journal, disciplines). We also conducted a reverse search to ensure full inclusion of relevant references. As a result, 106 papers, articles and six books were included for this review. We identified no concentration of publications in any journal, but multidisciplinary interests in law, economics and businesses.

Among the publications, six books[1] touched on IP litigation from different angles and gave us reasons for inclusion. Arora *et al.* (2001) examine how industry structure and IP facilitate technology markets basedoncaseandhistoricalevidence.Douglas(2015) examines dispute cases to illustrate how judicial practice has evolved in China over the last 30 years. This book complements the study by Yang (2003), which focuses on the IP system in China from historical evolution to the establishment to identify issues and recommend solutions. Warshofsky (1994) portrays landmark patent disputes over ownership in the technology history. Yang (2008, 2013) examines the nation-based IP systems in the global IP environment, and provides strategies and tactics to profit from IP.

To integrate prior studies, we use three analytical techniques: featured synthesis; the relevance tree; and content analysis. The featured synthesis is to organize and integrate contents under common themes in relation to the studied theories, empirics and methods (Pykal¨ ainen¨ *et al.* 2009). This technique helps assess the similarities and differences in prior work and is considered effective in identifying research gaps. We use the 'relevance tree' to identify and categorize relevant concepts (Hart 1999). We also conduct content analysis to compare and contrast all the relationships. As a result, we are able to examine PLS tactics and effects (market, monetary and strategic) on firms.

Concept: patent litigation strategy

This section centers on conceptual clarification, including on PLS itself, its relevant, similar terminologies and tactical categorization. This clarification helps readers to avoid confusion through visual mapping and word display. Figure 1 visualizes all these concepts and their connections using the relevance tree method. Table 1 adds definitional details and clarifies distinctions.

Patent litigation strategy and tactics

Prior studies define PLS with litigious focus in court, but we define PLS considering temporal actions and strategic outcomes. That is, PLS is a planned action that firms take, from threatening to sue, filing a law suit, to defending and/or countersuing opponent(s) in court to seek resolutions for patent dispute(s). Such an action engenders market (e.g. stock value), monetary (e.g. compensation and damage recovery) and strategic (e.g. licensing, alliance, mergers and/or acquisitions) effects.

We argue that this definition provides depth and breadth. First, we stress the significance of potential 'strategic outcomes'. Multiple disciplines are consistent in emphasizing legal actions in court, but the strategic implication is often unmentioned. In reality, behind these legal actions, the ultimate purpose is to generate strategic value from dispute resolutions. Patent owners may take pre-legal actions before considering the costly, lengthy and unpredictable court proceedings. The new definition emphasizes that resolutions may/may not be in court, because disputants may settle privately.

Second, we stress the defending and countersuing action that firms take against their opponent. Patent litigation actions are not only proactive to take the adversary to court, but also defend or file a countersuit. They indicate the complexity of patent litigation in which disputants often play the double role of both plaintiff and defendant (Cockburn and MacGarvie 2011).

Third, we use 'patent dispute' rather than 'patent infringement'. The five dictionaries (Oxford, Cambridge, Collins, Merriam-Webster and Dictionary.com) are consistent in their definitions. 'Dispute' emphasizes debate, argument, controversy,

[1] Asearchusingthekeyword'patentlitigation'intheAmazon book store generated 391 hits, including multiple editions of the same title. Skimming through these books allowed us to draw three conclusions of their common characteristics: guide-based, law-focused and process-oriented.

disagreement and opposing views that require judgment; 'infringement' stresses a violation, an act of breaking the law,unauthorized useofIPmaterials,andinterference with other's right. However, before a judgment is concluded, an infringement is considered as one party's allegation against the other. In our study context, therefore, 'dispute' connotes the breadth of the meaning referring to any patent-related issue between two (or more) parties from minor disagreement and infringement to counterfeiting that triggers litigation. Negotiations to resolve their dispute collapsed before a court verdict, although the disputants had reached a tentative settlement. The US Supreme Court verdict resulted in RIM paying US$612.5m to the NPT.

PLS distinction from relevant terminologies

Patent litigation strategy is related to similar concepts that require clarification. With regard to Figure 1 and Table 1, we argue that these concepts

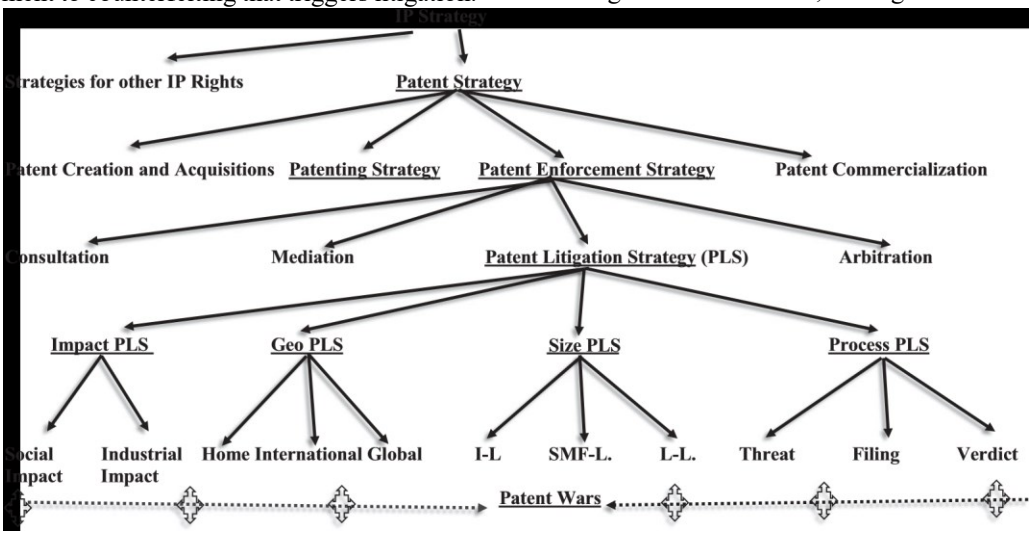

Figure 1. Similar concepts

Notes*: The underline refers to concepts more closely relevant to PLS. Dotted lines and arrows indicate possible directions. For example, the dotted line for patent wars means that 'wars' can happen in all categories of PLS. The four-directional arrows on the dotted line symbolize the two-way effects of PLS and patent wars in multiple directions. Under the Size PLS, I-L refers to litigations between individuals and large firms; SMF-L means litigations between small–medium-sized firms and large firms; L-L refers to litigations between large firms.*

Finally, we include possible effects beyond patent litigation. Since disputants seek resolutions by various means, opportunities open up to achieve effective outcomes. This means that disputants may rely on court or themselves to resolve disputes toward the desired effect. While they may attain damage recovery or compensation, strategic outcomes in the form of licensing, strategic alliance, mergers and acquisitions canalsobepossibletoenhancebusinessopportunities on both sides (Creighton and Sher 2009; Marco and Rausser 2008; Shapiro 2003). The litigation process often commences when amicable means of resolution fail. To illustrate, the dispute between the Research in Motion (RIM) Blackberry, Canada, and NPT, US (2000–2006)isalandmarkcase(USCourtofAppeals 2006) in history. The NPT approached the RIM and other firms in 2000 regarding its wireless technology. detail more differences than resemblances. One variance is that they contain broader strategic meaning than PLS. For example, prior work uses PLS and patent enforcement strategy interchangeably (Agarwal *et al.* 2009; Lanjouw and Lerner 1998). Nevertheless, patent enforcement strategy allows broader strategic actions to resolve disputes, including approaching the disputant privately, administrative measures in a trade commission and patent office, or quasi-legal approach (i.e. arbitration; Yang 2003, 2008, 2013). The IP litigation strategy is another concept used in scholarly work (Agarwal *et al.* 2009; Simcoe *et al.* 2009), as a substitute for PLS. Intellectual property, however, is a broad concept, including patents, copyrightsandtrademarks.Theserightsdifferinprotect ive terms, granting criteria and business implications, althoughtheysharesimilarcharacteristicsofintangibili

ty, exclusivity, legality and territoriality (Yang 2013, pp. 22–25). The interchangeable use causes confusion, thus separating them in examination enhances research precision. As Agarwal *et al.* (2009) emphasize, despite the interchangeable use of IP and patent enforcement, their focus on patents accounts little for other IP rights. Litigation should thus be seen as 'the tip of the enforcement iceberg' (Wheatherall and Webster 2014, p. 3).

Similarly, all these concepts connote strategic but different intentions. Patent litigation strategy is to resolve disputes and eliminate barriers in the market; impact litigation is to use a dispute case to effect policy changes (i.e. introducing a new law or revising existing policy) and maximize social and industrial influence. Both involve litigation and may intend for dispute resolution and strategic impact simultaneously, but the intention differs (i.e. social impact vs. industrial standard). This type of impactful litigation is also called strategic litigation. The impact may exert industrial transformation or disruption. A salient example is the FRAND and RAND negotiations between the US and the EU to set standards in the software industry. The patent wars in the industry expose a situation that existing policy and laws fall behind the reality of technological advancement, and new policy has to be introduced across countries. Another typical example is the smartphone patent war, in which companies in the same and supporting industries sue one another to restate their proprietorship. Behind the legal wrangles, disputants intend to influence technology standards emerging in the industry (e.g. software patents). Another similarity among all these concepts is the availability of judicial means to resolve issues, although some of the strategies emphasize non-legal actions. For example, patenting strategy emphasizes being granted a patent, which may involve judicial actions when another party challenges the originality of the application.

We also emphasize that size matters to PLS, which can be relevant to the size of disputants and the geographical scale for litigation. Disputants in patent litigation are often categorized based on the scale of

Table 1. Patent litigation strategy and differentiation from similar concepts[a]

Strategy concept	Definition and strategic intent	Distinction from PLS
Patent litigation strategy (PLS)	Strategy that firms adopt to threaten to sue, file a law suit, defend and/or countersue opponents for dispute resolutions that have market, monetary and/or strategic effects	
Patent enforcement	Strategy taken to enforce patent ownership and resolve disputes from private communication between disputants, mediation through a third party, arbitration to judicial resolutions in court	PLS is a smaller concept within patent enforcement
Patenting	Strategy to file a patent application for the purpose of being granted an ownership right	PLS is intended to resolve patent disputes with others
Patent	Comprehensive strategic actions that firms adopt to create, protect and commercialize patent-related products and processes	Broader than PLS to encompass all the above strategies
International patent litigation	PLS that firms adopt in an international jurisdiction to resolve patent disputes across borders	A type of PLS based on geo-spread, focusing on disputes between countries
Global patent litigation	PLS that firms adopt at a global scale to resolve disputes in many countries	A type of PLS based on geo-spread. Multiple jurisdictions are involved with patent disputes across many countries for similar cases
Impact patent litigation	Litigate to win, but more to use the legal means in patent disputes and outcomes to influence social and/or industrial policy changes	A type of PLS based on impact. Cases are often related to social issues and industrial standards
Patent war	PLS that multiple firms adopt aggressively to defend ownership rights against opponents in the same or similar industry. The strategic purpose is often oriented towards gaining competitive advantage (e.g. patent standard)	A type of PLS involving multiple players in the same industry. That is, many players in the same or similar industry are involved with simultaneous actions against one another

[a]Impact litigation is often adopted by non-governmental organizations on social issues, such as child welfare, gender, human rights and racial equality. It can also be in the area of patent businesses. A typical case is the dispute between Polaroid and Kodak in 1976–1985. After ten years of global battle, a landmark verdict was concluded in Polaroid's favor: patent infringements against Kodak on seven patents owned by Polaroid, substantial compensation to Polaroid (US$873.2m), and to its consumers (Kodak volunteered to compensate its consumers). The outcome of this case effects changes in corporate and public views regarding the significance of patents on corporate success. To avoid confusion, we call this sort of litigation 'impact litigation' rather than strategic litigation. However, we have to bear in mind the fuzzy boundaries of these two concepts.

firms. Individual disputants are rare, and winning ratestendtobelow,althoughthereareexceptions(e.g. Dr. Saffran against Johnson & Johnson and Boston Scientific Corporation; Barry *et al.* 2014). Often, large companies with financial foundations and key patents in the industry adopt PLS to challenge their opponents. We argue that, behind the legal battles, it is often related to the rivalry in competitive markets. The historical cases of patent wars for the landmark technologies, such as the sewing machine, electric light bulb, diapers, cotton gin and airplane were all reflections of industrial competition to secure ownership and market shares. The modern patent wars for smart phone technologies between Samsung and Apple, and other companies, were no different, but a historical repetition.

We also categorize size PLS between small–medium-sized firms (SMFs) and large corporations because of their frequent encounters using PLS. This is different from the categorization of practice and non-practice firms (often large and SMFs). Statistically, litigations based on these two parties are consistent, that is, non-practicing entities top the ranking of plaintiffs, and practicing firms (large firms as targets) top that of defendants. Despite these realities, we will shun the practice and non-practice differentiation, since both large firms and SMFs demonstrate a non-practicing nature, depending on the technology concerned. Companies tend to buy out similar technologiesforthepurposeofaccumulationanddeteri ng confusion of ownership. Some of these technologies may not be developed with time.

Finally, geographical scales generate home, international and global PLS, but litigation is nationbased. That is, cases with foreign involvement are handled in the country where dispute occurs based on the local legislation. In the digital age, it is common that PLS is international or even global in nature. The international PLS spreads into only a few countries for dispute resolution. However, when cases become global, the technology must be at stake, and litigation involves many countries across continents for similar disputes. The most salient example of such global influence of litigation is between Samsung and Apple, which were plaintiffs and defendants to each other with similar disputes in 20 jurisdictions (Yang and Sonmez 2014).

Process-based litigation tactics

We categorize PLS into three process-based tactics – threat, filing and verdict – to examine their effect on firms (i.e. plaintiffs and defendants). The three tactics are grounded on five legal stages of litigation: decision to litigate; declaration of filing; court hearing; trial; and verdict (Lanjouw and Schankerman 2001). Theircategorizationalignswithscholarshipandpractic e that PLS is a process that disputants go through to resolve disputes. It is thus logical to assess these stages and find out how they affect firms. With their insights, we simplify these actions, considering both disputants and the information availability. The internal decision to litigate is omitted and replaced by the threat to litigate, since firms do approach a disputant for resolution before taking any administrative and/or judicial actions, and such information seems more exposed than that of internal decisions. We also omit court hearing and trial, because detailed information is often unavailable owing to confidentiality. Filing a case, however, tends to be publicized, and so is the verdict.

Themes: patent litigation effects

This section focuses on themes and categorizes the role of PLS on firms. Table 2 summarizes the syntheses and categorization. Our findings reveal that prior studies center on the market effect, although the results are incongruent. The monetary effect seems consistent based on practice impressions that private settlement generates more benefit to the parties than legal settlement. The strategic effects are gaining significance, but yield sporadic scholarly attention.

Patent litigation strategy and market effect

Patent litigation–threat tactics. The patent litigation–threat tactics centers on the impact of pre-litigation actions on firms. We define this sub-strategy as a warning from the plaintiff to litigate against the defendant unless the latter, as the alleged offender, agrees to negotiate and settle the dispute privately. So, this tactic is about how patent litigation threats of taking the opponent to court (yet) affect the plaintiff and defendant (Bessen and Meurer 2006; Bhagat *et al.* 1994).

Empirical evidence seems to support the theoretical argument for a positive effect on the patent owner and plaintiff. Tekic and Kukolj (2013) find that patent

dealers adopt this sub-strategy to increase the value of their patents: the higher the threat, the greater the monetary value of the patent; thereby, the better performance of the firm. This study stresses the difficulty in examining the threat effect on patent values because of the non-transparent market and non-available data on monetization. The authors gathered the dealer's assessment on 392 patents in the electronic industry and concluded that patent litigation threats and market value of patents are positively related.

This strategy is frequent, owing due to firms' desire to settle and the prospect of generating patent value rather than 'see you in court' (Weathrall and Webster 2014). Several studies seem consistent that mostdisputes areeventuallysettledratherthangofurther in court, although rates vary across data sources.

Patent litigation–filing tactics. We argue that the patent litigation–filing tactics is a planned action that a plaintiff takes to file a case formally in court against its defendant for dispute resolution. Statistically, patent litigation filings in US courts trend upward (2013–2015). Empirics are richer for examining the relationship between this tactics and its effect on firms; accordingly we have synthesized the findings further into three sub-categories: dual loss; plaintiff's gain vs. defendant's loss; and combined negative effect.

Prior studies recognize no winner in the duel. The study of law suits (Bhagat *et al.* 1998) indicates that defendants lost 1.5% of their market value and their plaintiffs 0.31%. Later studies were consistent that all involved (except one) plaintiffs and defendants have suffered from negative consequences of the dispute

Table 2. PLS effects on firms: market, monetary and strategic effect[a]

PLS and tactics	Plaintiff	Defendant	Relevant literature
Tactics	Market effect		
Threat	+	Unclear	Tekic and Kukolj (2013)
Filing			
Dual loss	–	–	Bessen and Meurer (2008); Bhagat and Romano (2002a,b); Englemann and Cornell (1988); Koku *et al.* (2001)
Win–lose	Unaffected	–	Bhagat *et al.* (1994)
	+	–	Raghu *et al.* (2008); Rudy and Black (2018); Wang *et al.* (2010)
Combined loss	–	– More	Bessen and Meurer (2008); Bhagat *et al.* (1998); Lerner (1995); Raghu *et al.* (2008)
Verdict	+	–	Henry (2013); Marco (2005); Schliessler (2013); Sherry and Teece (2004); Wang (2017)
	+ But unworthy	–	Henry (2013); Marco (2005)
	Unaffected	–	Lo (2013); Yang and Sonmez (2014)
	Monetary effect		
All tactics*	+	–	Crampes and Langinier (2002); Hoti *et al.* (2006); Kesan and Ball (2006)
	Strategic effect		
All tactics*	Conceptual, and empirics seem unclear and undetailed		Bagheri, *et al.* (2016); Choi (2010); Creighton and Sher (2009); Lanjouw and Schankerman (2003); Marco and Rausser (2008); Mattioli (2012); Shapiro (2003)

[a]Although private settlement and strategic collaboration occur mostly before a trial, they may also be agreed on after the court verdict against infringement. Sometimes, the monetary and strategic settlement are combined (e.g. compensation and licensing). *Prior studies addressed the litigation strategy without separating the three tactics we categorized: Threat, filing and verdict.

For example, 93–95% of US patent disputes settle (Moore 2003; Lanjouw and Schankerman 2004), but recent studies show much lower rates of 65% (Kesan and Ball 2006), 77% (Bhattacharya *et al.* 2007) and 73–76% (Howard and Maples 2016). Some non-US studies confirm consistent findings of an 85% settlement rate in the UK (CJA 2006), Australia (Rotstein and Weatherall 2007) and Germany (Cremers 2009).

filing (Bhagat and Romano 2002a,b; Koku *et al.* 2001). Based on lawsuits against US public firms (1984-1999), defendants suffer from a loss of 0.62% of the stock market value and the effect for plaintiffs is also negative at −0.38% (Bessen and Meurer 2008). The study on five corporate litigations in Texas (Englemann and Cornell 1988) also shows sigificant value leakages for both parties.

Prior studies reveal that plaintiffs were either unaffected or gained market value on filing, and the defendant lost. A study of 355 corporate lawsuits (including patent litigation) announced in *The Wall Street Journal* (1981–1983) proves that plaintiffs were unaffected, but defendants suffered from an average 1.2% loss of their market value (Bhagat *et al.* 1994). A study of 65 pairs of plaintiffs and defendants in the information technology industry confirms that patent litigation filing has positive effects for plaintiffs, but negative market reactions for defendants (Raghu *et al.* 2008). A study of 108 Taiwanese patent suits in the electronic industry proves that patent litgation negatively affects defendants' stock prices (Wang *et al.* 2010).

Prior studies also identify the combined loss of market value on filing. The market value falls on average by 3.1%, based on the filing of 20 patent disputes (Bhagat *et al.* 1998). A study of 26 litigated cases in the US biotech firms (1980 and 1992) shows that the combined market value falls by 2% (Lerner 1995). Despite the loss for both disputants, in line with Bhagat *et al* (1998), on a patent suit, defendants bear more market decline (i.e. almost 3%; Bessen and Meurer 2008) and even negative abnormal returns (Raghu *et al* 2008).

Patent litigation–verdict tactics. Scholars have examined the relationship of litigation–verdict tactics and market effects on firms. Sherry and Teece (2004) find that plaintiffs win 45% of the litigation during the trial period. Wang (2017), based on lawsuit verdicts inTaiwan,affirmsthatplaintiffs winandachieve significantly positive abnormal returns. Marco (2005, 2006) and Henry (2013) find that the US Court of Appeals for the Federal Circuit (CAFC) is a pro-patent agent, and the market reacts toward plaintiffs' gain and defendants' loss. They conclude, however, that the positive impact is unsubstantial and may be unworthy of the effort, time and money for litigation.

Schliessler (2013) analyzes stakeholders' credit rating changes in response to patent litigation verdicts in Germany. The bifurcated patent litigation system (i.e. the separation of litigation against validity and infringement) allows patentees to enforce patents that may be invalidated at a later stage as a result of parallel decisions involved. This pro-patent approach in Germany, like the US system, has created advantages for the plaintiff. Plaintiffs therefore gain from litigation, and defendants lose on a settlement or defeat, and even more so for small and inexperienced defendants.

Moreover, court verdicts against disputes affect market value across international jurisdictions. Based on 16 litigated cases between Apple and Samsung, Yang and Sonmez (2014) demonstrate that patent litigation verdicts matter little to the firm market value for the plaintiff and defendant (i.e. overall no effect or insignificantly negative). This relationship holds true across six international jurisdictions (US, Korea, Japan, UK, Germany and the Netherlands). The findings suggest that home-turf advantages are overrated for dispute resolution, despite both firms filing first at home. Firms should prioritize amicable partnership over bitter feud.

The incongruent prior findings appear to generate more questions than answers as to the relationship between patent litigation–verdict tactics and the firm. While prior work recognizes the confounding effects of mixed verdicts on the market value, it seems difficult to conclude the degree of impact. Some studies have examined patent litigation tactics in the form of validity and infringements together, and may further exacerbate the confounding effect (Henry 2013), providing ground for further investigation of the relationship.

PLS and monetary gain/loss

Practice and statistics seem consistent regarding the relationship between PLS and monetary gain/loss: Private settlement seems preferred, is on average higher than legal awards in court, and occurs throughout the litigation process. Most patent litigation starts in court, but ends up with settlement, indicating that thestrategyfunctionsbecauseofprospectivegainsfor plaintiffs and potential opportunities for defendants.

Culturally, it is not embarrassing to resolve disputes in court in law-abiding countries (e.g. the US, the UK), but in some other countries (e.g. China, Japan), going to court is traditionally perceived as shameful, hellish and incompetent in self-resolution (e.g. Alford 1995; Yang 2005; Yu 2001). Therefore, firms of such origins are traditionally keen on private settlement because of their aversion to litigation and belief in harmony (Moore 2003; *op. cit.*). Nonetheless, we have to recognize the changing nature of judicial behavior across countries. Evidently, China has to handle more local disputants (98%) than any other country in the world (Harvey 2012). Japanese firms do stand up to fight in US courts when they feel being put in a 'indignant' situation (Moore 2003).

Moreover, costs are the economic justification for private settlement. Patent litigation in Europe (CJA 2004) and Australia (Weatherall and Webster 2010) confirm consistently that private settlement would cost at least 50% less than litigation. Costs, however, do not necessarily imply the strategic stakes and sensitivity of dispute resolutions (Agarwal *et al.* 2009). The impression is that the plaintiff – the winner – takesitall,becausethedefendantfocusesonthelongtermstrategicbenefit,especiallymarketopportunities through licensing, and overriding the plaintiff's reputation through strategic alliance.

Private settlement is preferred, since legal award generates more uncertainties beyond the costs, lengthy procedures, unpredictable outcomes (Yang 2013), emotional distress and harm, and damage (Lanjouw and Lerner 1996). Plaintiffs are allowed to request injunctive relief while waiting for trial, that is, the court, once it accepts the request, issues a temporary restraining order of operational cessation againstdefendants.Theinjunctionandcourtproceedings would cause defendants financial damage, danger of bankruptcy, and force them to settle on unfavorable terms.

Statistics suggest that private settlement has more to gain than legal awards. The top 20 private settlements (1980–2005) generate an average compensation of US$0.5bn relative to US$0.25bn from court verdicts; the largest private settlement reaches US$1.4bn, but the legal award is US$873m for the same period (Hoti *et al.* 2006). Legal awards carry more uncertainty, and only few reach a verdict. The Machina study (Howard and Maples 2016) of patent litigations in the US (2009–2015) reveals that nearly 75% of litigation cases settle privately, the remaining 16% are procedural for transfer or consolidation, and nearly 10% of the rest reach verdicts (the win-rate is 5.1% and 4.25%, respectively, for plaintiffs and defendants). However, the damage awards remain small in proportion (1.8% since 2000), few in cases, and asymmetric in outcomes (90% below 9.6m). Therefore, the damage awards are trending downwards for patent litigation (Barry *et al.* 2014).

Two cases further show the benefit of private settlement in financial terms. In the *Dr. Michelson* v. *Medtronic* case over spinal surgical technologies, Medtronic filed a lawsuit against Dr Michelson, who subsequently countersued. The court verdict in 2005 wasinDrMichelson'sfavorfor$1bnincompensation and licensing deals. However, the disputants ignored the verdict and subsequently agreed on US$1.35bn covering court expenses, compensation and licensing deals.

PLS and strategic effect

We define the strategic effect as the non-judicial resolution and mutual commercial opportunities created for disputants in the process of litigation, including strategic partnership (i.e. licensing, strategic alliance) and strategic takeover (i.e. merger, acquisition). Under strategic partnership, firms agree on a royalty payment to form a licensor and licensee relationship between them or to each other (cross-licensing) or strategic alliance relationship when two arch rivals agree to collaborate and complement resources (e.g. patents) to implement a joint project. Strategic takeover allows two firms to become one (merger) or one firm to acquire the other (acquisition). It helps to strengthen corporate control over patents and eliminate market competition.

Firms seemwilling to adopt strategic approaches to resolving patent disputes. Theoretically, confronted with litigation arsenals, disputants seem to desire collective resolutions, such as government-imposed actions or firms' collective response. When firms settle disputes, they trade patents in the form of licensing or cross-licensing (Grindeley and Teence 1997; Lanjouw and Schankerman 2003) and have repeated interactions to incentivize cooperative settlement (Bernheim and Whinston 1990). Through strategic alliance, firms are able to complement their knowledge, effort and information towards a collective goal (Niesten and Jolink 2015). Despite the overall negative effect of acquisitions on shareholder wealth, hostile takeover and related industrial liaison seem to help superior performance (Tuch and
O'Sullivan, 2007).

The above arguments seem profound in this era of information technology. Multiple ownership and technological complexity create patent thickets and force firms to settle with a collaborative deal (Schankerman and Noel 2006; Ziedonis 2004). Disputants are aware of the genomic costs for them (Harhoff *et al.* 2007) and become strategic in patent litigation using patent portfolio as a defense or a weapon to extract revenues (Weatherall and Webster 2014). Companies may turn threat of litigation and operational hold-up to a licensing deal. This strategic outcome should be seen as a force for healthy competition and better consumer options, because rivals are forced to complement their effort toward technological advancement (*op. cit.*; Shapiro 2000). Meanwhile, firms can opt to countersue using their patent portfolios in complex industries such as computer, electronics and instruments (Bessen and

Hunt 2007) and impose costs on rivals (Meurer 2003) through strategic defense in court and holdup in the market.

Despite the theoretical arguments that patent litigation leads to collaboration, empirical evidence is sporadic, but insightful. Every patent licensing is virtually a settlement on patent dispute (Shapiro 2003). Larger firms rely on repeated interactions in IP to discipline behaviors (Lanjouw and Schankerman 2003). Moreover, the open innovation (Bogers *et al.* 2017) and the need for speedy innovation (Ruckman and Mccarthy 2017) have also pushed the collaborative effort towards partnership rather than confrontation. Based on case studies of US–Taiwan patent disputes and interviews of Taiwanese corporate managers in the US jurisdiction, the pursuit of strategic competitiveness is apparent from patent cases filed in court. The US plaintiff sued its Taiwanese counterparts and upstream and downstream partners in order to isolate their operational relationship. In response, the defendant and partners form an alliance against litigation. Despite the weaker technological capabilities and costly sales decline, the strategic partnership enhances the long-term effect of vertical cooperation among the Taiwanese firms studied.

The strategic partnership between Google and its Android coders (Bagheri, *et al.* 2016) is further evidence of strategic collaboration. Lodsys filed patent litigation against Android coders. To defend its partners, Google filed a request for the re-examination of two patents involved in litigation in the US patent office. Its initiative and strategic move had a positive effect on strengthening the partnership, that is, patent sheltering to form umbrella protection and defensive intervention to the whole platform (Bagheri *et al* 2016).

Sporadic research also recognizes that patent disputesandstrategicsettlementsarerelated.Theroyalty rateinlicensingisareflectionondisputants'strengths and weaknesses in patent litigation and their ability to complement each other's patent portfolio for commercialization (Shapiro (2003). Patent enforceability is a significant predictor of the timing of corporate consolidation to eliminate overlapping technologies across firms (Marco and Rausser 2008). Corporate litigants resolve their disputes through mergers, so legal framework should be in line to help establish the burden of proof and provide deference for collaboration.

Integration: mapping and boundary

This section maps out research directions and clarifies study boundaries. Figure 2 and Table 3 show that PLS in the form of threat, filing and verdict tactics affects the market value, monetary gain/loss and strategic partnership, and the relationship is moderated by multiple factors. The remainder of the section surrounds thisframeworktoillustrate how,fromtheoretical and empirical perspectives, PLS affects firms.

Theoretical enhancement

Existing studies suggest the need to examine ambiguities, under-studies and gaps in PLS effects. The threat of patent litigation on markets requires new research to address this understudied field. The only study (Tekic and Kukolj 2013) advances a unique and significant step in understanding the relationship between litigation threat and market value. It draws conclusions from patent dealers, therefore, limits the generalization of the findings. However, it helps set new directions for analyzing the PLS effect based on data sets from multiple companies and multiple technologies. As for the filing and market effect, despite the richness of studies and negative effect for defendants, plaintiffs' win–lose results have mixed outcomes of losing, winning or no effect. Like patent filing, with regard to the relationship between verdict and market effect, existing research seems to point to a clear loss for defendants, but mixed answers for plaintiffs, suggesting further examination.

Meanwhile, the relationship between PLS tactics and monetary gain or loss requires empirical contribution. Practice impressions allow us to assume that private settlement yields better monetary returns than legal awards, plaintiffs' gains and defendants' losses. Moreover, the conclusions are based on undifferentiated tactical effects as a whole. Future studies should thus consider addressing which PLS tactic effects more monetary gains with empirical evidence. For example, is there a significant relationship betweenthetacticaloptionsandtheamountofmonetary settlement?

Patent litigation–strategic effects in terms of partnership and takeover require scholarly attention, as a barely examined but significant relationship. For example, what tactics lead to strategic effects and in what form (licensing, strategic alliances, mergers and

acquisitions)? What is the role of particular tactics in firms' decision to opt for one strategic action over the others? Are there any differential PLS effects between under-willingness and under-coercion?

Empirical enrichment

Our study identifies ambiguities, contradictions and voids in empirical boundaries (direct stakeholders, industries and country contexts) for future enrichment (Table 4). We discuss these boundaries, including specific issues, study justification and practice.

Direct stakeholders matter to PLS effect. Although existing studies reveal that plaintiffs gain more than defendants, this is overshadowed by a lack of study of the topic. Prior studies suggest that the advantage belongs to plaintiffs, since they use patents as a bargaining chip. That is, patent owners bargain for an outcome in their favor. We argue, however, that PLS is

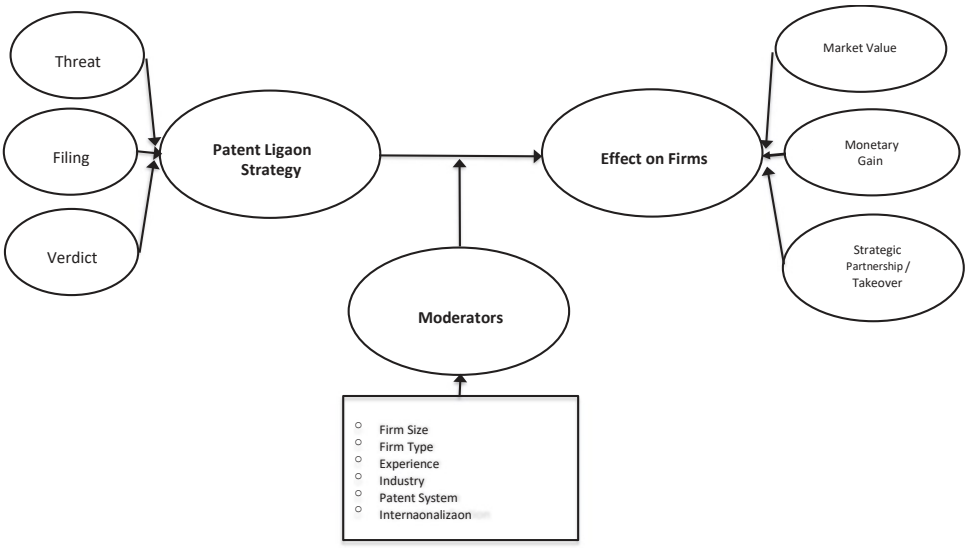

Figure 2. Conceptual framework

Table 3. PLS effects on firms

Constructs and variables		Conceptualization and operationalization
PLS	Threat	Warning to the alleged disputant 'See you in court'
	Filing	Plaintiff files a case of patent dispute in court against its adversary
	Verdict	Court decisions on a patent dispute
Effect on firm	Market Effect	Gain or loss of market value
	Monetary Effect	Damage recovered or compensated
	Strategic Effect	
	Strategic Partnership	Dispute parties agree to collaborate through licensing or strategic alliance
	Strategic Takeover	Dispute parties agree to merger or acquisition
Moderators	Firm Size 1	In value (e.g. return on investment)
	Firm Size 2	In number of employees
	Firm Type	Whether dispute firm is domestic or international
	Firm Experience	Number of years handling patent disputes
	Industry	Type of industry the dispute parties are involved with (i.e. complex, discrete)
	Patent System	Litigation system to handle patent disputes (i.e. pro-patent)
	Internationalization	Dispute is cross-border involving two or more countries

a zero-sum game for disputants, who have to endure the uncertainty of blurred win–lose situations, and often negative effects on involved firms. The defendant may turn the situation around and threaten countersuing; thereby exacerbating the uncertainty. This is likely when disputants are owners of key patents in a competing complex industry where a product may have multiple patents embedded with multiple owners. Consequently, both sides have to compromise. As a result, the PLS–effect relationship opens up alternatives

Table 4. Empirical boundaries to moderate PLS effects

		Moderators, ambiguities, contradictions and voids	References
Direct stakeholders			
Size	Between large corporations	Market dominance; strategic partnership; compensation; Overall insignificant market reactions	Lerner (1995); Lanjouw and Lerner (1996); Lanjouw and Schankerman (2001); Yang and Sonmez (2014)
	Large corporations vs. SMFs	Strategic partnership; Compensation (large firms win more cases); Market entry (small firms)	Agarwal *et al.* (2009); Allison *et al* (2004); Ball and Kesan (2009); Benssen and Meurer (2006); Lanjouw and Lerner (1996); Lanjouw and Schankerman (2004); Lerner (1995); Schliessler (2013)
	SMFs vs. SMFs	Unclear	Unclear
	Firms vs. individuals	Strategic partnership; Compensation; Insignificant for firms and negative for individuals	Koku *et al.* (2001); Vaughan (1948)
Patent treatment Practicing firms vs. NPFs		Strategic partnership; Practicing firms win more cases	Reitzig *et al.* (2010); Weatherall and Webster (2014)
National identity Local vs. foreign firms		Local US firms win more cases; Strategic partnership; Foreign firms win more cases in China; Locals and foreigns have equal chance to win 80% of litigation in China	Clermont and Eisenberg (1996); Lanjouw and Schankerman (2001); Moore (2003); Harvey (2012); Bian (2017)
Industrial players			
Discrete high tech (e.g. chemical, pharmaceutical, mechanics)		High dependence on patent protection; Few patents embedded in products and processes; Reverse enigneering; Prevalent infringement; Non-fuzzy ownership	Aggarwal *et al.* (2009): Lerner (1995); Lanjouw and Schankerman (2001); Lerner (2010); Raghu *et al* (2008); Wang *et al.* (2010); Yang and Sonmez (2014)
Complex high tech (e.g. Electronics, IT, Software, Biotech)		High dependence on patent protection; Many patents owned by multiple owners; Patent thickets and difficulty in commercialization; Prevalent infringement; Ambiguous disputes	
Countries – Patent systems			
Pro-patent countries (e.g. US, Western EU) vs. Other Countries		Chance of plaintiffs (often patentees) winning a case is higher and more predictable in a pro-patent nation	Henry and Turner (2006); Lo (2013); Rudy and Black (2018); Schliessler (2013); Weatherall and Jensen (2005); Yang and Sonmez (2014)

for both parties (e.g. licensing, litigation) accompanied by uncertainties.

Direct stakeholders seem to be the most complex among all the empirical boundaries that we have studied. They, as plaintiffs and defendants, are mostly firms; disputes are often interfirm or with one party being corporate, but plaintiffs are mostly patentees takingadvantageoftheirownership.Thesestakeholders are often differentiated by size (e.g. large corporations vs. SMFs; firms vs. individuals), by their way of handling patents (e.g. practicing firms vs. nonpracticing entity), or by their national identity (e.g. local vs. foreign firms). We discuss these boundaries to provide a pointer for future study.

Does size matter? One consideration for future examination is, regardless of plaintiffs or defendants, their large size matters in determining the often positive effect of PLS. Size here can be a broad concept to include the scale of legal reliance, sales of the company, the number of employees and costs of the litigation itself. Inventors' lack of finance and business ability tend to invite corporate abuse (Vaughan 1948). Prolonged patent litigation further burdens individual inventors. Therefore, they desperately seek purchasers, and often the larger holder of relevant patent portfolios dictates the price and method of payment (e.g lump sum rather than roylaties). Despite receiving financial reward, the

returns may reflect little on the importance and use of patents.

Disputes between individuals and companies generate consistent findings. Koku *et al.* (2001) demonstrate different market reactions for involved individuals (i.e.insignificant) andcompanies(i.e.significantly negative). They argue that corporate lawsuits fall into two categories: patent infringement and contract violations. It should be unsurprising to note that disputes affiliated with individual inventors are increasingly replaced by corporate disputes. This is because patents are often owned by firms rather than individuals, with increasing costs of patenting, rising need for firms to strengthen their patent portfolios, mounting scale of commercializing patented products (e.g. production and distribution) and potential expensesofdisputeresolutions.Thecorporateownership is also due to the existence of service inventions, that is, inventors as employees tend to be contract bound and have obligation to assign and relinquish their rights to their employers at the time of invention. Prior studies reveal that small firms litigate more, but they bear higher stakes than large firms (Allison *et al.* 2004; Ball and Kesan 2009; Bessen and Meurer 2006). Large enterprises benefit more than small firms, owing to their higher success rates in litigation (Schliessler 2013). They tend to have better access to internal counsels (Bellis and Gustin 1992)thanSMFs,whotendtorelyonexternaladvice. As for sales and employment, large firms in litigation tend to demonstrate ten times more sales (15.3bn vs. 1.5bn), and employ far more workerss (52,426 vs. 1139; Lanjouw and Lerner 1996). As for costs, SMFs have to bear a much higher burden than large firms (Bessen and Meurer 2008). The cessation of production and legal fees drive financially strapped firms to settle on unfavorable terms (Lanjouws and Lener 1996). The asymmetric effect of patent litigation on entrepeneurial firms (i.e. private, small and young) and established firms is also related to ownership market (private vs. public), size in patent portfolios (small vs. large), age (young vs. established), experience (little vs. rich), capacity (small vs. large) and financial status (weak vs. strong; Agarwal *et al.* 2009; Lanjouw and Schankerman 2004; Lerner 1995). Domestic unlisted companies with a small portfolio of 100 patents would have a higher probability of litigation (2% vs. 0.5%) than medium-sized firms with 500 patents (Lanjouw and Schankerman 2004). Large firms tend to have higher citations of their patents (indication of highe value). All these give them more advantage than SMFs to strike deals and settlements. Disputes between practicing firms (mostly large corporations) and NPFs have attracted attention, especially those heavily reliant on patents to generate profit (namely patent monetizers). They are praised for buying patents and helping independent inventors to commercialize inventions, but they are also criticized for holding on to these patents without development, and waiting for their prey to threaten and create licensing or extract compensation (Reitzig *et al.* 2010; Weatherall and Webster 2014). Byrd and Howard (2014) report that top plaintiffs in 2013 were all NPFs (e.g. Melvino, Wyncomm and Thermolife International), and their defendants were all large practicing firms (e.g. Apple, Amazon and AT&T). Despite the active plaintiff role, NPFinvolved disputes seem to have two consistent results (*op. cit.*): They win fewer judicial battles than practicing firms (25% vs. 35%), and private settlement is more common than legal awards.

To sum up, size does matter for PLS effects, but future studies need to clarify contradictions, explain ambiguities and fill gaps. First, size should be detailed: legal reliance, corporate sales, the number of employees, and the costs of patent litigation. These size details can help comparison and suggest which one matters most. Second, individuals and SMFs also won cases as exceptions against large enterprises. What are their traits and the detailed actions of PLS that influence the outcome? Their typical experiences would be a significant learning tool for other independentinventors andSMFs.Finally,achievingapositive PLS effect relies on legal counsel and experienced managers. However, there is little study about their influence on PLS effects. This area of study is significant for assisting learning and revealing to what extent experience matters to PLS effects.

Does local or foreign matter? Disputants can be local and foreign stakeholders, but limited empirics show contradictions for their role in PLS effects. On the one hand, Clermont and Eisenberg (1996) refute the popular perception of xenophobia in US courts and emphasize that foreign parties win more civil cases in court than domestic parties do (63:37 ratio). Lanjouw and Schankerman (2001) find that US domestic firms litigate five times as much as their foreign disputants in all technology categories studied. Despite the high probability of litigation

from US disputants, they also find a comparable frequency of litigation suggesting that foreign firms are not disadvantaged. In contrast, based on interviews with 62 experienced chief patent counsels of US corporations, Moore (2003) concludes that the win rate for American parties is 64%, consistent with popular perception. Her later study (Moore 2003) asserts the argument about discrimination against foreign disputants in US jury trials. Bhattacharya *et al.* (2007) affirm that local firms are advantaged in US courts, and judge and jury biases exist against foreign disputants (1995–2000). Such discrimination may discourage foreign firms from entering the US and from developing new products for US consumers (Moore 2003). We argue that the contradictory findings are due to their different ways of handling the data: timeframe (1987–1994 vs. 1999–2000); subjects (civil vs. patent cases); and methodology (e.g. how to measure foreignness; *op. cit.*).

Regardless of the disagreement, Clermont and Eisenberg (1996) and Moore (2003) confirm that foreigners are American court averse. Although foreign applicants acquire nearly 50% of US patents, with patents proved more valuable (Lanjouw and Schankerman 2001; Pakes and Simpson 1989), only 13%enforcetheirrightsincourt,incontrastto87%of US patentees (Moore 2003). This substantial discrepancy is due to foreign applicants' cynicism towards their prospect of judicial success in a foreign country, perceptions of jury prejudice, cultural tradition of non-judicial resolution to conflicts, and costly legal expenses. Xenophobia in patent enforcement is likely to impact on international business (Moore 2003), and therefore it is a grave concern for deeper empirical substantiation.

In addition to the contradictory findings surrounding US studies, research on China seems to generate consistent realties. Traditionally, going to court is considered a shameful experience, but it is a final resort for conflict resolution. Bian (2017) reveals a winning rate of 80% for local and foreign plaintiffs, based on 2014 litigation data in China. Meanwhile, foreignplaintiffshavehigherwinratesthantheirlocal peers. The findings suggest positive discrimination in China towards foreign disputants.

To sum up, the mixed findings above rationalize the need to clarify local and foreign stakeholders' roles in PLS effects. One prospect is to use the most recent data to examine the detailed role that these stakeholders have played to determine PLS effects. Another significant gap to be filled is to examine how such a role has changed for better or for worse to influence the main relationship, given the changing nature of the national and international litigation environment. Finally, local and foreign equality in different countries as an influence on PLS effects is a direction for studies. The above subjects are significant for examining the field of patent litigation, since they hold direct answers addressing national treatment in different countries, a global principle that requires compliance.

Industrial variations matter to PLS effect. Discrete vs. complex PLS effect. Prior research acknowledges that patent litigation weighs differently across industries, and we categorize them into two strategic groups of high technologies: discrete (traditional high-tech) and complex industries. Discrete industries share some common characteristics: high dependence on patent protection, fewer patents are embedded in products and processes, reverse engineering is common, and infringement can be prevalent, but disputes are non-fuzzy in terms of ownership (e.g. a new medicine). The complex industries also depend highly on patent protection, but multiple patents owned by multiple owners are embedded in products and processes, creating patent thickets and difficulty in commercialization, and infringement is more prevalent and disputes are ambiguous in terms of ownership.

Statistically, a relationship between litigation outcomes and industrial variations exists. The financial products and services sector is proven to be the highest in disputes, because patents are litigated 27– 39 times more than the all-industry average (Lerner 2010). Across all industries, the median success rate is 33%, but four US industries (i.e. consumer products, computer, medical devices, pharmaceutical and biotechnology) reach up to 40% (Barry *et al.* 2014). Between pharmaceutical and biotech industries, the litigation rate is 1/50 vs. 3/50 (Lanjouw and Schankerman 2001; Learner 1995). The difference may be related to experience with disputes, since new industries such as biotech have fewer precedents (Lanjouw and Schankerman 2001).

Severalauthorshavestudiedthecomplexindustries and their litigation outcomes. These include software and semi-conductor (Aggarwal *et al.* 2009), biotech (Lerner 1995), electronics (Wang *et al.* 2010), information technologies (Raghu *et al* 2008), smartphone (Williams and Safiullah 2012; Yang and Sonmez2014)andfinancialservices(Lerner2010).Since

productsorprocessesintheseindustrieshavemillions of patents embedded under different proprietorship, firms have to seek multiple permissions to achieve freedom to operate (Teece and Sherry 2004). Therefore, seeking strategic resolution appears to be beneficial among them and for society.

To sum up, prior studies recognize that PLS effects are often related to industrial variations. However, this emerging field requires clarity and enrichment. For example, given the different nature of proprietorship between discrete and complex industries, future studies may have to evidence whether or not companies in complex industry litigate and lead to more strategicpartnership than thosein concreteindustries.

PLS and cooperation across industrial rivals. Industrial rivalry and global competition across countries mean that innovation speed creates competitive advantages. This means that instead of having head-on competition, competitors across industries and countries realize that cooperation with their enemies brings more benefit than competing with them. The discussions on technology complexity reinforce such needs, since innovation in the industry has multiple ownership. This ownership structure creates blockages for innovative progress if diverse stakeholders get involved. Moreover, no individual companies and countries can generate all the technologies that they want (Bosworth and Yang 2000). In addition to the practical need, theoretical argument also supports cooperation. The proposal of open innovation, that is, a distributive process of managing knowledge flows purposefully across organizations (Chesbrough and Bogers 2014), is timely to reflect the need for cross-organizational cooperation. This is because alliance network ecosystems generate industrial dynamics (Bogers *et al.* 2017), and enhance firm performance in high-tech industry (Faems *et al.* 2010; Stuart 2000).

One area for study is the detail of cooperative deals struck under unfavorable conditions. Licensing, for example, is often the result of PLS under coercive terms. Such practice suspicions require verification usingempiricaldata.Specifically,futurestudiescould fill a gap in knowledge about how PLS adoption compares and contrasts under coercion and willingness, leading to different cooperation. This study field is significant, because the innovation speed is directly associated with licensing outcomes, but so far findings are inconsistent (Ruckman and McCarthy 2017). To sum up, PLS may lead dynamic industrial collaboration rather than competition, but it is insufficient to rely on practice impressions and sporadic studies to make this assumption; thereby, scientific research will help provide evidence. Such a trend is due to the larger global ecosystems of change and industrial characteristics of technologies (getting more complex with limited technology concentration). Undersuchenvironments,PLSmayleadtomorecooperation in licensing and strategic alliance. For example, how licensing, strategic alliances and merger and acquisitions are compared and contrasted under a PLS push?

Global contexts matter to PLS effect. Existing empirical inquiries are highly concentrated on the US, regardless of disciplines (Lo 2013; Weatherall and Jensen 2005; Yang and Sonmez 2014). Examinations also took place in advanced EU countries (e.g. the UK and Germany) and in high technology and geographical areas (e.g. Korea, Taiwan; China). The global nature of patent disputes has attracted wide media and practice attention, but limited scholarly investigation has opened up future studies.

Despite the lack of studies, there is a consistent recognition that international disputes cause more uncertainty for the firm, owing to variations in litigation systems across countries. Institutional contexts do matter for the adoption of PLS (Rudy and Black 2018). Countries have different expectations, antecedents and practices in patent enforcement. Despite the jurisdictional variations, Yang and Sonmez (2014) confirm no significance of home-turf advantages for Apple and Samsung, and no obvious jurisdictional biases toward these two firms. Meanwhile, they did admit that it is hard to generalize, since Apple and Samsung can probably only represent two key players in the smartphone industry, which may be less affected by judicial variations. Both firms confirmed that they should take advantage of their domestic environment to countersue their disputants and defend their own markets. The positive home advantage in the US is also substantiated, because local firms have a better chance of winning court disputes than foreign peers do (Bhattacharya *et al.* 2007; Moore 2003).

To sum up, the above studies indicate that PLS effects have been recognized in practice as a global phenomenon, and sporadic studies have also examined them in the international context. However, the study limitations point in three directions for clarity and enrichment. First, one unsettled argument concerns PLS effects across jurisdictions. Therefore, furthercomparisonswouldleadtoclarityfortwogroups: pro-patent and non-pro-patent countries. Second is

the question whether different jurisdictions generate home advantages for PLS effects. The research will contribute to the studies of national treatment from the perspective of patent litigation. Finally, despite the jurisdictional outcome, a gap can develop in whether PLS across different jurisdictions has a certain influence on the effects: strategic partnership and monetary compensation.

Discussion

This paper draws on scholarly argument, practice impressions and our own logic to address the effect of PLS, thereby making theoretical, empirical contributionsandprovidingimplicationsforpractice.Ourtheoretical contribution is threefold: clarifying the PLS concept; schematizing PLS effects; and reasoning the research directions. Clarifying the PLS concept leads to understanding that this strategic intent has gone beyond judicial actions. This conceptualizing process includes comparing and contrasting similar concepts to prevent future confusion. The theoretical connection between PLS and its market, monetary and strategic effects helps form a fundamental understandingofhowdifferentstagesofthepatentlitigation effect either positive or negative results. Finally, our contribution is to map out future research directions centering on PLS effects for dynamic research.

Our empirical contributions are threefold. First, we recognize that stakeholders (plaintiff and defendant) and their characteristics play vital roles in determining PLS effect. Therefore, we recommend further studies to address how different sizes of stakeholders have varied PLS effects. Second, we have also identified the significant boundaries of industrial rivalry. The nature of grouping in the form of discrete and complex industries can affect PLS effects. However, it is unclear as to which industrial group may lead to stronger strategic partnership or monetary gain. Third, we have also identified that, despite the nationbased nature of judicial systems dealing with patent litigation, the global landscape of PLS effects has emerged as a fundamental matter.

This study has implications for policy-makers and practitioners. Policy-makers have to consider the balance of locals and foreigns in dealing with patent litigation. Countries cannot isolate themselves in making judicial decisions when foreign disputants are involved. The global compliance of national treatment obligates governments to consider equality in treating disputants of different nationalities. The other policy implication is the joint effort to handle similar cases. Administratively, inter-governmental collaboration among patent offices is a reality for handling patent applications effectively. Judicially, most countries are moderate enforcers with little collaboration to deal with patent disputes. Such potential collaboration could enhance case handling efficiency and increase the consistency of judicial judgment for cross-border disputes.

For practitioners, three implications can be considered to deal with patent litigation. Patent litigation strategy effects can be diverse, but practitioners can use the proposed framework to consider which PLS effect may generate the most effective result for them. Case-by-case consideration is helpful for firms in making efficient decisions when they are involved in disputes. First, they have to consider what kind of stakeholders they are: as a disputant (plaintiff, defendant); as to their size (individuals, SMFs and large enterprises). Second, practitioners do have to consider what kind of industrial setting they are in. After all, the characteristics of discrete and complex industries do reveal different degrees of moderation on PLS effects. Third, practitioners also have to consider their situation in a country setting when they get involved with disputes. Despite the global tide for national treatment, judicial variations remain to dictate different outcomes of PLS effects.

There are also two common implications for both policy-makers and practitioners. One is that most cases are settled privately, despite data variations across countries. This implies the strategic power and consideration to settle disputes. Therefore, firms and governments may want to incentivize strategic actions to this direction so that involved parties can enjoy positive collaboration rather than confrontational feud. The other implication to consider is the lack of systematic data available for research. Existing studies are US-centric, partly owing to the corporate and country data availability (e.g. Machina, PWC and US Court of Justice). While we understand the difficulty in compiling such data sets, owing to the difficulty in achieving transparent patent markets, especially for patent monetization, the availability of these data would provide the fundamental requirement for research advancement.

Conclusions

This paper synthesizes and critiques PLS effects on firms, and induces an integrative framework. We define PLS comprehensively, and compare and contrast it with some 'similar' concepts to clarify confusion. Based on our critique, the three process-based PLS tactics – threat, filing and verdict – present detailed though varied effects on firms: market value, monetary gain/loss and strategic collaboration. Patent litigation strategy at different stages generates more negative rather than positive market effects for both parties, although the plaintiff is advantaged overall. We also recognize the contradictory findings in the market effect, the consistent outcomes of monetary effect (private settlement is higher than legal award), and the paucity of examination as to how different litigation tactics lead to particular strategic collaboration. We also identify that three empirical boundaries should be emphasized for the relationship studied: stakeholders, industries and country. The intellectual contributions of this paper are concluded based on empirics and logical arguments, and provide practice implications as to the pros and cons of different effects on firms facing patent litigation.

This study has opened up avenues to advance research in management studies. From theoretical perspective, there is the need to examine ambiguities, under-studies and gaps in PLS effects. To understand the PLS threat on markets, multiple companies and multiple technologies should be studied before any generalization takes place. As for the PLS filing and verdict tactics on the market, new studies need to be conducted to clarify mixed prior findings. Moreover, PLS tactics and the effect on monetary gain/loss and strategic partnership are both barely studied, and future contributions will help explain the theoretical linkagesusingempiricalevidence.Thispaperhasalso given directions to study some empirical boundaries that affect PLS effects. Direct stakeholders such as plaintiffs and defendants are complex because of their varied sizes, and different national identity, therefore, new studies should take place to explain how these complex stakeholders play a role in influencing PLS effects. Moreover, industrial variations matter to PLS effects and require detailed examination to add clarity. Since PLS leads to industrial collaboration and is recognized as a global phenomenon, cross-industrial and cross-country comparative studies will deepen the understanding of PLS effects.

REFERENCES

Agarwal, R., Ganco, M. and Ziedonis, R.H. (2009). Reputations for toughness in patent enforcement: implications for knowledge spillovers via inventor mobility. *Strategic Management Journal*, **30**, pp. 1349–1374.

Alford, W.P. (1995). *To Steal a Book is an Elegant Offense: Intellectual Property Law in Chinese Civilization*. Palo Alto, CA: Stanford University Press.

Allison, J.R., Lemley, M.A., Moore, K.A. and Trunkey, R.D. (2004). Valuable patents. *Georgetown Law Journal*, **92**, pp. 435–479.

Allison, J., Lemley, M. and Walker, J. (2009). Extreme value or trolls on top – the characteristics of the most-litigated patents. *University of Pennsylvania Law Review*, **1**, pp.1–38.

Aoki, R. and Hu, J.L. (1999). Licensing vs. litigation: the effectofthelegalsystemonincentivestoinnovate.*Journal of Economics and Management Strategy*, **8**, pp. 133–160.

Arora, A., Fosfuri, A. and Gambardella, A. (2001). *Markets for Technology: The Economics of Innovation and Corporate Strategy*. Cambridge, MA: MIT Press.

Bagheri, S.K., Minin, A.D., Paraboschi, A. and Piccaluga, A. (2016).It'snotaboutbeinggenerous.*ResearchTechnology Management*, **59**, pp. 28–35.

Ball, G. and Kesan, J. (2009). Transaction costs and trolls: Strategic behavior by individual inventor s, small firms and entrepreneurs in patent litigation. Illinois Law and Economics Research Paper Series No. LE09-005. Available at: https://doi.org/10.2139/ssrn.1337166. Accessed December 23, 2016.

Barry, C., Arad, R., Ansell, L. and Clark, E. (2014). *Patent Litigation Study: As Case Volume Leaps, Damages Continue General Decline*. PwC Consulting.

Bebchuk, L.A. (1984). Litigation and settlement under imperfect information. *Rand Journal of Economics*, **15**, pp. 404–415.

Bellis, J.P. and Gustin, B.H. (1992). Comparing the cost of outside and inside counsel. *Corporate Counsel's Quarterly*, **8**, pp. 80–89.

Berheim, D. and Whinston, M. (1990). Multimarket contact and collusive behavior. *RAND Journal of Economics*, **21**, pp. 1–26.

Bessen, J. and Hunt, R.M. (2007). An empirical look at software patents. *Journal of Economics and Management Strategy*, **16**, pp. 157–189.

Bessen, J.E, and Meurer, M.J. (2006). Patent litigation with endogenous disputes. *American Economic Review*, **96**, pp. 77–81.

Bessen, J.E. and Meurer, M.J. (2008). The Private costs of patent litigation. Boston University School of Law Working Paper No. 07-08. Rochester, NY. Available at:

http://ssrn.com/abstract=983736. Accessed January 21, 2014.

Bhagat, S, Bizjak, J. and Coles, J.L. (1998). The shareholder wealth implications of corporate lawsuits. *Financial Management*, **27**(4), pp. 5−27.

Bhagat, S., Brickley, J.A. and Coles, J.L. (1994). The wealth effects of interfirm lawsuits. *Journal of Financial Economics*, **35**, pp. 221−247.

Bhagat, S. and Romano, R. (2002a). Event studies and the law: Part I: technique and corporate litigation. *American Law and Economics Review*, **4**, pp. 141–168.

Bhagat, S. and Romano, R. (2002b). Event studies and the law: Part II: empirical studies of corporate law. *American Law and Economics Review*, **4**, pp. 380–423.

Bhattacharya, U., Galpin, N. and Haslem, B (2007). The home court advantage in international corporate litigation. *Journal of Law and Economics*, **50**, pp. 625–660.

Bian, R.J. (2017). Many things you know about patent infringement litigation in China are wrong. Available at: https://ssrn.com/abstract=3063566. Accessed April 10, 2018.

Bogers, M., Bekkers, R. and Granstrand, O. (2012). Intellectual property and licensing strategies in open collaborative innovation. In de Pablos Heredero, C. and Lopez, D. (eds),´ *Open Innovation in Firms and Public Administrations: Technologies for Value Creation*, Hershey, PA: IGI Global, pp. 37–58.

Bogers, M. *et al*. (2017). The open innovation research landscape: established perspectives and emerging themes acrossdifferentlevelsofanalysis.*IndustryandInnovation*, **24**, pp. 8–40.

Bosworth, D. and Yang, D. (2000). Intellectual Property Law, Technology Flow and Licensing Opportunities in China. *International Business Review*, **9**, pp. 453–477.

Byrd, O. and Howard, B. (2014). *Lex Machina* 2013 Patent Litigation Year in Review. Menlo Park, CA: Lex Machina.

Chen, Y.M., Ni, Y.T., Liu, H.H. and Teng, Y.M. (2015). Information-and-rivalry-based-perspectives-on-reactive-patent-litigation-strategy. *Journal of Business Research*, **68**, pp. 788–792.

Chesbrough, H. and Bogers, M. (2014). Explicating open innovation: clarifying an emerging paradigm for understanding innovation. In Chesbrough, H., Vanhaverbeke, W. and West, J. (eds), *New Frontiers in Open Innovation*. Oxford: Oxford University Press, pp. 3–28.

Choi, J.P. (1998). Patent litigation as an informationtransmission mechanism. *American Economic Review*, **88**, pp. 1249–1264.

Choi, J.P. (2010). Patent pools and cross-licensing in the shadow of patent litigation. *International Economic Review*, **51**, pp. 441–460.

Clermont, K.M. and Eisenberg, T. (1996). Xenophobia in American courts. *Harvard Law Review*, **109**, p. 1120.

CJA.(2006).*Follow-UpStudyonthePossibleIntroductionof an Insurance against Costs for Litigation in Patent Cases*. Brussels: CJA Consultants.

Cockburn, I.M. and Macgarvie, M.J. (2011). Entry and patenting in the software industry. *Management Science*, **57**, pp. 915–933.

Crampes, C. and Langinier, C. (2002). Litigation and settlement in patent infringement cases. *RAND Journal of Economics*, **33**, pp. 258–274.

Creighton, S.A. and Sher, S.A. (2009). Resolving patent disputes through merger: a comparison of three potential approaches. *Antitrust Law Journal*, **75**, pp. 657–690.

Cremers, K. (2009). Settlement during patent litigation trials: an empirical analysis for Germany, *Journal of Technology Transfer*, **34**, pp. 182–195.

Douglas, C. (2015). *Patent Litigation in China*, 2nd edn. Oxford: Oxford University Press.

Elhauge, E. and Krueger, A. (2013). Solving the patent settlement puzzle, *Texas Law Review*, **91**, pp. 283–330.

Engelmann, K. and Cornell, B. (1988). Measuring the cost of corporate litigation: five case studies. *Journal of Legal Studies*, **17**, pp. 377–399.

Faems, D., De Visser, M., Andries, P. and Van Looy, B. (2010). Technology alliance portfolios and financial performance: value-enhancing and cost-increasing effects of open innovation. *Journal of Product Innovation Management*, **27**, pp. 785–796.

Fournier, G. and Zuehike, T.W. (1989). Litigation and settlement: an empirical approach. *Review of Economics and Statistics*, **7**, pp. 189–195.

Grindley, P.C. and Teece, D.J. (1997). Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics. *California Management Review*, **39**, pp. 8–41.

Harhoff,D.,Hall,B.,Graevenitz,G.,Hoisl,K.andWagner,S. (2007). The strategic use of patents and its implications for enterprise and competition policy. Final Report for Tender No ENTR/05/82. http://ec.europa.eu, accessed August 17, 2018.

Hart,C.(1999).*DoingaLiteratureReview:ReleasingtheSocial Science Research Imagination*. Thousand Oaks, CA: Sage Publications.

Harvey, I. (2012). *Intellectual Property: China in the Global Economy—Myth and Reality*. http://ianharvey-ip.com/china/china-ip-article/, accessed September 17, 2017.

Henry, M.D. (2013). The market effects of patent litigation. *Technology and Investment*, **4**, pp. 57−68.

Henry, M.D and Turner, J.L. (2006). The court of appeals for the federal circuits' impact on litigation. *Journal of Legal Studies*, **35**, pp. 85–118.

Heyman, P.D. (2005). Using a patent portfolio to defend against a patent infringement suit. *Intellectual Property and Technology Law Journal*, **17**, pp. 9–15.

Hoti, S., Mcaleer, M. and Slottje, D. (2006). IP litigation activity in the US. *Journal of Economic Surveys*, **20**, pp. 715–729.

Howard, B.C. and Maples, J. (2016). 2015 Patent litigation Year in Review, Lex Machina.

Ken, Y. and Tsai, T.Y. (2010). The connection between patent litigationandpatentportfolio.pdf.*InternationalJournalof Organizational Innovation*, **3**, pp. 238–279.

Kesan, J.P. and Ball, G.G. (2006). How are patent cases resolved? An empirical examination of the adjudication and settlement of patent disputes. *Washington University Law Review*, **84**, pp. 237–312.

Koku, P.S., Qureshi, A.A. and Akhigbe, A. (2001). Theeffects-of-news-on-initial-corporate-lawsuits. *Journal of Business Research*, **53**, pp. 49–55.

Lanjouw, J.O. (1994). Economic consequences of a changing litigationenvironment:thecaseofpatents.NBERWorking Paper 4835, August.

Lanjouw, J.O. and Lemer, J. (1996). Preliminary injunctive relief: theory and evidence from patent litigation. NBER Working Paper Series 5689.

Lanjouw,J.OandLerner,J.(1998).Theenforcementofintellectua l property rights: a survey of the empirical literature. *Annales d'Economie et de Statistique*, **49/50**, pp. 223–246.

Lanjouw,J.O.andLerner,J.(2001).Tiltingthetable?Theuse ofpreliminaryinjunctions.*JournalofLawandEconomics*, **44**, pp. 573–603.

Lanjouw, J.O. and Schankerman, M. (2001). Characteristics of patent litigation: a window on competition. *Rand Journal of Economics*, **32**, pp. 129–151.

Lanjouw, J.O. and Schankerman, M. (2003). Enforcing patentrights:anempiricalstudy.PaperpresentedatEmpirical Economics of Innovation and Patenting, Mannheim, Germany, 14–15 March.

Lanjouw, J. O. and Schankerman, M. (2004). Protecting intellectual property rights: are small firms handicapped? *Journal of Law and Economics*, **47**, pp. 45–74.

Lerner, J. (1994). The importance of patent scope: an empirical analysis. *Rand Journal of Economics*, **25**, pp. 319.

Lerner J. (1995). Patenting in the shadow of competitors. *Journal of Law and Economics*, **38**, pp. 463–495.

Lerner, J. (2010). The litigation of financial innovations. *Journal of Law and Economics*, **53**, pp. 807–831.

Leubsdorf, J. (1978). The standard for preliminary injunctions. *Harvard Law Review*, **91**, pp. 525–566.

Lo, C.C. (2013). Strategic dimensions of international patent litigation-theexperienceofTaiwanesefirmsintheUSlegal jurisdiction. *Journal of Intellectual Property Rights*, **18**, pp. 534–547.

Marco A.C. (2005). The value of certainty in intellectual property rights: stock market reactions to patent litigation. Vassar College Economics Working Paper #82.

Marco A.C. (2006). Learning by suing: structural estimates of court errors in patent litigation. Vassar College Economics Working Paper #68.

Marco, A.C. and Rausser, G.C. (2008). The role of patent rights in mergers: consolidation in plant biotechnology. *AmericanJournalofAgriculturalEconomics*,**90**,pp.133–151.

Mattioli, M. (2012). Communities of innovation. *Northwestern University Law Review*, **106**, pp. 103–155.

Meurer,M.J.(1989).Thesettlementofpatentlitigation.*Rand Journal of Economics*, **20**, pp. 77–91.

Meurer, M.J. (2003). Controlling opportunistic and anticompetitive intellectual property litigation. *Boston College Law Review*, **44**, pp. 509–544.

Meni´ ere, Y. and Parlane, S. (2008). Innovation in the shadow` of patent litigation. *Review of Industrial Organization*, **32**, pp. 95–111.

Moore, K.A. (2003). Xenophobia in American courts. *Northwestern University Law Review*, **97**, pp. 1497– 1550.

Niesten, E. and Jolink, A. (2015). The impact of alliance management capabilities on alliance attributes and performance: a literature review. *International Journal of Management Reviews*, **17**, pp. 69–100.

Pakes, A. and Simpson, M. (1989). Patent renewal data. *Brookings Papers on Economic Activity*, **20**, pp. 331–410.

Priest, G. and Klein, B. (1984). The selection of disputes for litigation. *Journal of Legal Studies*, **13**, pp. 1–55.

Pykal¨ ainen, T., Yang, D. and Fang, T. (2009). Alleviating¨ piracy through open source strategy: an exploratory study of business software firms in China. *Journal of Strategic Information Systems*, **18**, pp. 165–177.

Raghu, T.S., Woo, W., Mohan, S.B. and Rao, H.R. (2008). Market reaction to patent infringement litigations in the information technology industry. *Information System Front*, **10**, pp. 61–75.

Reitzig M. (2007). How executives can enhance IP strategy and performance. *MIT Sloan Management Review*, **49**, pp. 37–43.

Reitzig, M., Henkel, J., and Schneider, F. (2010). Collateral damage for RandD manufacturers: how patent sharks operate in markets for technology. *Industrial and Corporate Change*, **19**, pp. 947–967.

RotsteinF.andWeatherall,K.(2007).Filingandsettlementof patent disputes in the federal court 1995–2005. *IP Forum*, **68**, pp. 65–74.

Ruckman, K.E. and Mccarthy, I.P. (2017). Licensing speed: its determinants and payoffs. *Journal of Engineering and Technology Management*, **46**, pp. 52–66.

Rudy, B.C. and Black, S.L. (2018). Attack or defend? The role of institutional context on patent litigation strategies. *Journal of Management*, **44**, pp. 1226– 1249.

Schankerman, M. and Noel, M. (2006). Strategic patenting and software innovation, CEPR Working Paper, DP 5701.

Schliessler, P. (2013). The effect of patent litigation on firm performance-evidenceforGermany.WorkingPaper,Center for European Economic Research.

Schweizer, U. (1989). Litigation and settlement under twosided incomplete information. *Review of Economic Studies*, **56**, pp. 163–178.

Shapiro, C. (2000). Navigating the patent thicket: cross licenses, patent pools, and standard setting. In Jaffe, A., Lerner, J. and Stern, S. (eds), *Innovation Policy and the Economy*, Vol. **1.** Cambridge, MA: MIT Press, pp. 1190– 1150.

Shapiro, C. (2003). Antitrust limits to patent settlements. *RAND Journal of Economics*, **34**, pp. 391–411.

Sherry,E.F.andTeece,D.J.(2004).Royalties,evolvingpatent rights, and the value of innovation. *Research Policy*, **33**, pp. 179–191.

Simcoe, T., Graham, S. and Feldman, M. (2009). Competing on standards? Entrepreneurship, intellectual property, and platform technologies. *Journal of Economics and Management Strategy*, **18**, pp. 775–816.

Somaya D. (2012). Patent strategy and management: an integrative review and research agenda. *Journal of Management*, **38**, pp. 1084–1114.

Stuart, T.E. (2000). Interorganizational alliances and the performance of firms: a study of growth and innovation rates inahigh-technologyindustry.*StrategicManagementJournal*, **21**, pp. 791–811.

Tekic,Z.andKukolj,D.(2013).Threatoflitigationandpatent value: what technology managers should know. *Research Technology Management*, **56**, pp. 18–25.

Tuch, C. and O'Sullivan, N. (2007). The impact of acquisitions on firm performance: a review of the evidence. *International Journal of Management Reviews*, **9**, pp. 141– 170.

U.S. Court of Appeals for the Federal Circuit (2006). *NTP v. Research in Motion*. Washington, DC: U.S. Court of Appeals for the Federal Circuit.

Vaughan, F.L. (1948). Patent policy. *American Economic Review*, **38**, pp. 215–234.

Waldfogel, J. (1995). The selection hypothesis and the relationship between trial and plaintiff victory. *Journal of Political Economy*, **103**, pp. 229–260.

Wang, M.J. (2017). The influences of the plaintiffs/ defendants, outcomes, and settlements of patent litigations on the stock market. *Journal of Financial Studies*, **25**, pp. 47–90.

Wang, Y., Shih, K. and Chuang, Y. (2010). Market behavior of patent infringement litigations. *African Journal of Business Management*, **4**, pp. 390–395.

Warshofsky. F. (1994). *The Patent Wars*. New York, NY: Wiley.

Weatherall, K. and Jensen, P. (2005). An empirical investigation into patent enforcement in Australian courts. *Federal Law Review*, **33**, pp. 239–286.

Weatherall, K. and Webster, E. (2010). Patent infringement in Australia: results from a survey. *Federal Law Review*, **38**, pp. 21–70.

Weatherall, K. and Webster, E. (2014). Patent enforcement: a review of the literature. *Journal of Economic Surveys*, **28**, pp. 312–343.

Williams, F.I. and Safiullah R.M. (2012). The smartphone patent wars: a U.S. perspective. *Licensing Journal*, **32**, pp. 16–28.

Yang, D. (2003). *Intellectual Property and Doing Business in China*, Pergamon, Oxford.

Yang, D. (2005). Culture matters to multinationals' intellectual property businesses. *Journal of World Business*, **40**, pp. 281–301.

Yang, D. (2008). *Understanding and Profiting from Intellectual Property: A Guide for IP Practitioners and Analysts*, Palgrave Macmillan, London.

Yang D. (2013). *Understanding and Profiting from Intellectual Property: Strategies Across Borders*, 2nd edn. London: PalgraveMacmillan.

Yang, D. and Sonmez, M. (2014). Is it worth the global vendetta? Investigating the patent litigation and firm value relationship. Paper presented at the Academy of International Business, Vancouver, 23–26 June.

Yu, P.K. (2001). Piracy, prejudice, and perspectives: an attempt to use Shakespeare to reconfigure the U.S.– China intellectual property debate. *Boston University International Law Journal*, https://doi.org/10.2139/ssrn.262530.

Ziedonis, R.H. (2004). Don't fence me in: fragmented markets for technology and the patent acquisition strategies of firms. *Management Science*, **50**, pp. 804–820.