

**The Characteristics of Intellectual Property Rights Regimes: How Formal and Informal Institutions Affect Outward FDI Location**

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**Accepted for publication in International Business Review, DOI**

**10.1016/j.ibusrev.2019.101620**

**Abstract**

This study examines the institutional arrangements that define the characteristics of national legal systems that are used to protect intellectual property (IP) assets embedded in outward FDI. The focus of the study is on how the institutional underpinnings of IPR regimes affect the costs and risk of using legal arenas to enable effective use of IP assets. Following a property rights approach it is postulated that formal and informal institutional arrangements influence how IP regimes affect the transaction costs and risk associated with converting ownership rights over IP into economic rights. Informal institutions are considered to affect the behaviour of agents involved in enforcing legal rights. This behaviour influences how IP law is implemented in legal arenas and thereby impacts on the efficacy of IPR regimes to help secure economic rights from the use of IP assets. Using data on outward FDI from the USA to 42 host countries the results find that the strength of informal institutions connected to the enforcement of IP in a country directly affects outcomes and positively moderates the effect of formal legal aspects of IP law on FDI flows. The results highlight the importance of informal institutional aspects connected to the behaviour of enforcement agents when using national legal systems to protect IP rights in cross-frontier transactions.

**Keywords:**

Economic Rights, Intellectual Property, Formal & Informal Institutions, Legal Arrangements,

FDI

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## **1. Introduction**

Most of the literature that examines how intellectual property rights (IPR) regimes affect foreign direct investment (FDI) focuses on the influence of intellectual property (IP) law on such investments (Branstetter et al., 2007; Khoury & Peng, 2011; Nunnenkamp & Spatz, 2004; Smarzynska-Javorcik, 2004). This literature, either explicitly or implicitly, postulates that comprehensive and well-specified IP law facilitates outward FDI. This expectation stems from the economics of property rights approach that highlights how clear and legally binding property rights are necessary for efficient economic transactions (Hart & Moore, 1990; Grossman & Hart, 1986; Williamson, 1992). This approach postulates that low transaction costs and risk should prevail when extracting economic value (economic rights) from assets when property rights law is well specified, comprehensive, and coherent and can be effectively enforced (Barzel, 1997). The property rights approach implies that the substantial improvements in formal legal institutional frameworks accomplished by the implementation of Trade-Related Aspects of Intellectual Property Rights (TRIPS) should have significantly improved the quality of IPR regimes and thereby reduced the transaction costs and risk of using legal systems to protect IP assets. The implementation of TRIPS should therefore have significantly reduced obstacles to outward FDI stemming from problems with the legal frameworks involved in the protection of IPR. There remain however many complaints of continuing difficulties in protecting IP assets associated with deficiencies in the legal institutional frameworks that underpin IPR regimes (Brander et al., 2017; USCC, 2015). These difficulties sour trade and investment relationships between countries (Office of the United States Trade Representative, 2017) and present firms with serious strategic and operational problems in their cross-frontier economic transactions (Asia Pacific Foundation of Canada,

2015). The existing literature does not however adequately explain why improvements in IPR regimes from the implementation of TRIPS have not led to the results predicted by the property rights approach.

The literature reveals that after the implementation of TRIPS the formal institutional legal arrangements in some IPR regimes continues to display shortcomings in terms of the clarity and coverage of IP law (Beckerman-Rodau, 2011; WTO, 2011). The more serious obstacles appear however to relate to the way agents enforce the law (Brander et al, 2017; Peng et al., 2017a, 2017b; Seyoum, 2011). Enforcement agents operate in court cases, trade and investment regulation compliance cases and other policing connected to IPR regimes. Enforcement agents include judges, prosecutors, customs officials and the police (Ostergard, 2000). In this paper enforcement issues related to informal institutions centre on the behaviour of agents that implement the formal legal rights granted to IP owners. The literature often conflates the formal and informal institutional contexts of enforcement, making it difficult to understand what aspects of enforcement cause problems for IP asset owners. The major issue considered in this study is therefore how the formal and informal institutional contexts connected to enforcement affect the efficacy of IPR regimes.

The rules of the game approach of North (1990) provides the foundation for the analysis of how institutional systems affect economic transactions and supplies the means to investigate the costs and risk of using legal systems to help to secure economic rights from legal rights. North (1990) postulates that transaction costs and risk are associated with the rules of the game and these rules are determined by the formal and informal institutional contexts that prevail in a country. In the case of IPR, formal institutions provide legislation that delivers law that confers rights, obligations, and regulatory requirements for the use of IP assets. These rights include the formal legal processes to defend IPR. This aspect covers the specification of the courts and other formal legal arenas that can be used by asset owners seeking clarification and

enforcement of IPR and recompense for infringement of legal rights. The role of informal institutions in this process is considered by using an approach that views these institutions as determining the unwritten rules used by agents conducting economic transactions (Helmke & Levitsky, 2004, 2006; Hayo & Voigt, 2007). In the case of IPR regimes, informal institutions influence the unwritten rules used by enforcement agents when they work on court cases and other legal arrangements when IP asset owners seek to use legal arenas to defend their rights.

This study uses a framework based on these concepts of formal and informal institutions to examine how institutional contexts impacts on the effectiveness of IPR regimes. This approach provides a means to consider the effects of formal legal rights and the behaviour of enforcement agents that implement IP law. Both of these institutional aspects affect the rules of the game in IPR regimes thereby influences the costs and risk to IP asset owners of using legal arenas to secure economic rights from legal rights. This approach therefore provides a comprehensive means of analysing how the institutional contexts underpinning IPR regimes affect the costs and risk faced by IP asset owners. The main differences from previous approaches is to separate the formal and informal institutional factors that affect enforcement and to connect this to how outcomes from using legal arenas to protect IPR affect the process of converting legal rights into economic rights.

The study makes two contributions to the international business literature. First, the paper incorporates the formal and informal institutional underpinnings of the IPR regimes to provide a framework to analyse how using legal arenas affects the securing economic rights from legal rights. This approach highlights the role of enforcement connected to informal institutions that influence the unwritten rules used by agents operating in legal arenas. This aspect of enforcement is not properly incorporated into existing studies on how IPR regimes operate. The study finds that the characteristics of informal institutions related to the enforcement of IP in a country has a direct effect on outcomes and also a moderating role on

the effect of formal legal aspects of IP law on FDI. This contribution highlights that consideration of informal as well as formal institutional aspects of enforcement in IPR regimes is necessary to understand the impact on cross-frontier economic transactions such as outward FDI. Second, the study responds to calls to develop understanding on the institutional contexts that influence the efficacy of IPR regimes (Peng et al., 2017a). This study develops the literature by considering the implications for outward FDI of the configuration of formal and informal institutions that are directly connected to how IPR regimes operate in legal arenas. This approach responds to calls for focusing more accurately on institutions that are specifically and directly related to particular types of economic transactions (Shirley, 2013; Voigt, 2013 & 2018). This study does this by specifying the formal and informal institutions that are explicitly involved in IPR matters rather than using national concepts and measures of institutions.

## **2. Economic Rights and IPR Systems**

In the economics of property rights approach it is normally assumed that enforcing contracts is ‘costless and efficacious’, while in the transaction costs economics (TCE) approach the assumption is that contract enforcement is ‘reasonably well defined and secure’ (Williamson, 1998, p. 40). These assumptions imply that securing effective property rights in legal arenas is not a serious problem other than in cases of countries that have significant institutional voids (Doh et al., 2017; Khanna & Palepu, 1997, 2010). According to the TCE view, the main requirement for firms in locations with no significant institutional voids is to establish governance systems that permit the securing of value from the property rights granted to them (Williamson, 1992). Legal rights are assumed to be clear, comprehensive and enforceable, suggesting that the use of legal systems to protect against infringements of property rights is available at low costs and risk. The TCE view is that if institutional voids lead to significant missing or unclear legal rights, then the governance systems of firms need to be geared towards

the management of serious incomplete contracts problems that arise from such voids (Williamson, 1998). While contracts are generally expected to be incomplete due to bounded rationality and information asymmetries, institutional voids are expected to make the problems from incomplete contracts more severe.

Studies researching the context of cross-border economic transactions rarely consider explicitly the problems of enforcing contracts when using legal systems. Such problems can however arise when firms attempt to defend their legal rights but face high transaction costs and risk due to ineffective enforceability of the rights in a specific legal system. These problems are not necessarily linked to incomplete contracts caused by institutional voids. In some cases, law connected to property rights may not be effectively enforced in courts and other legal arenas because informal institutions may lead to behaviour by enforcement agents that is not supportive of effectual implementation of law.

Property rights embody a bundle of attributes. These include rights to allocate property to desired uses, to transfer property, to financially exploit ownership of property and to enforce ownership rights over property (Eggertsson, 1990). Problems with property rights in relation to the first three attributes can arise from institutional voids. The last attribute is linked to the ability to defend against the infringement of the bundle of rights granted to asset owners by IPR law. Barzel (1997) lists several legal rights necessary to enable asset owners to convert property rights into economic rights (the ability to use legal rights to obtain economic value from ownership of assets). An appropriate bundle of formal legal rights, for example, the ability to use or trade property, is crucial to enable converting legal rights over property into economic rights. To obtain economic rights at low costs and risk it is therefore necessary that formal (normally written) legal rights are well defined, comprehensive, coherent, and effectively enforceable by use of legal systems. No matter how well developed formal legal rights are, if they are not supported by appropriate informal institutional systems connected to the behaviour

of enforcement agents, problems will emerge in converting legal rights into economic rights (Barzel, 1997). This issue relates to the social protocols and conventions that influence the behaviour of enforcement agents working on legal cases that involve property rights enforcement. Being able to convert legal rights into economic rights requires institutional conditions that provide appropriate formal legal rights to be legitimized and supported by informal institutions (Hodgson, 2006; Williamson & Kerekes, 2011). Informal institutions provide the rules (normally unwritten) that are used by agents when they are engaged in the process of governing economic transactions that involve property rights (Helmsky & Levitsky, 2004, 2006). Institutional voids can lead to problems for effectively defining property rights, enforcement difficulties due to informal institutional issues can however lead to challenging conditions when seeking to defend property rights in legal arenas.

Institutional systems deliver the ‘rules of the game’ under which legal rights are defined, allocated and their infringements policed and prosecuted. Following North (1990), the rules of the game relate to the way that formal and informal institutional systems interact thereby providing the governance processes for economic transactions. The rules of the game can undermine efficient economic transactions if it is difficult to use legal systems to defend property rights due to unclear or missing legal rights, the institutional void problem. Informal institutions that do not legitimize and support legal rights or that substitute for legal rights can also present problems for asset owners seeking to use legal systems to defend their property rights (Hodgson, 2006). The behaviour of agents responsible for enforcing property rights in legal systems is shaped by social protocols and conventions that lead to unwritten rules used to frame how they go about their enforcement work (Hayo & Voigt, 2007; Helmke & Levitsky, 2004, 2006). The use of these unwritten rules can exert considerable influence on how legal systems work in cases involving the defence of property rights. The rules of the game in some institutional contexts can therefore lead to unsuitable formal legal rights and/or informal



institutional systems that lead to ineffective enforcement of legal rights in courts or other legal arenas. The latter problem relates to difficulties of dealing with infringements of IPR by using legal systems. This affects the costs and risk of using legal systems to defend property rights. This is disincentive for firms aiming to engage in cross-frontier economic transactions in locations with these enforcement problems because of the difficulties this presents in converting legal rights into economic rights.

The importance of informal institutions for the protection of IPR is underlined by the views of policy makers. A review by the US government on IPR issues in FDI in China highlights the importance of unwritten rules used by enforcement agents. As special Counsel of the US Patent and Trademark Office Mr Cohen commented (USCC, 2015, p. 5-6): “...experience has also shown that both the courts and administrative agencies are not yet independent. Interference from Communist Party organs, local government, and the courts’ own adjudication committees have been concerns in IP matters”. Evidence given to the hearing also highlighted that the application of IP law by judges and prosecutors in China poses serious concerns in areas such as the time taken to reach decisions, the limited rationale provided to support court decisions and the level of damages awarded.

Different institutional contexts for IPR regimes arise depending on the characteristics of the configurations of national formal and informal institutions associated with creating and enforcing IP law (Papageorgiadis & McDonald, 2019). A country may have clear and comprehensive formal legal conditions for IPR, including formal court procedures for enforcement (law on the books), but have poor enforcement in legal arenas (law in practice). Poor enforcement in these terms arises because of the way agents implement the law. In these societies, enforcement agents may be influenced by an understanding of social realities that places low emphasis on the rights of owners (as specified by IP law) compared to the rights of the ‘community’. Agents may also be swayed by the wishes of powerful political and economic

actors in their societies. In these IPR regimes the unwritten rules governing the behaviour of enforcement agents may lead to problems with using legal systems to deal with infringements of property rights. The costs and risk associated with dealing with infringements increase the difficulties of converting property rights into economic rights. In other institutional contexts, IPR regimes may have substantial institutional voids affecting law on the books, which in practice means IPR are largely govern by informal institutions. In such institutional contexts, infringements of IPR are largely dealt with using the unwritten rules used by enforcement agents. These types of societies are likely to operate under a ‘commons’ type of property relationship governed mainly by social conventions that are largely unconnected to legal arenas (Ostrom, 1990). Other economies may have poor law on the books, but good law in practice (Papageorgiadis & McDonald, 2019). Such economies can have large new technology sectors that have yet to determine detailed formal legal conditions, but where informal institutions work effectively by unwritten rules to protect IP. This type of institutional context is a type of ‘commons’ system of rules of the game (Ostrom & Hess, 2007). Many advanced economies have effective law on the books and law in practice. In these types of economies, the unwritten rules used by enforcement agents in legal arenas legitimize and complement clear and developed IP law. This provides low costs and risk when using legal systems to defend IPR. This reduces the difficulties associated with converting property rights into economic rights.

Converting legal rights over IP property into economic rights involves many issues that need to be considered by firms engaging in cross-frontier activities such as FDI. Many of these issues relate to hierarchical organizational requirements that deal with incomplete contracts, including problems posed by institutional voids. There is a substantial literature connected to these issues in the context of IPR and FDI (Branstetter et al., 2007; Keupp et al., 2010; Khoury & Peng, 2011). This literature and others (Brander et al., 2017; Seyoum, 2011; Smarzynska-Javorcik, 2004; Yang & Sonmez, 2013) also hints at issues connected to the informal

institutional context of IPR regimes as having important implications for the ability of foreign firms to defend their IP. The institutional context of IPR regimes in terms of the way formal and informal institutions determine the rules of the game influences the costs and risk of using legal systems to protect IPR. This affects the ability of firms to convert IPR into economic rights and thereby affects FDI location. Some studies imply that the major problems are generally located in the behaviour of agents charged with enforcing IP law (Seyoum, 2011; Yang & Sonmez, 2013). The institutional context of IPR regimes that lead to these difficulties are however not explicitly considered in this literature. It is therefore unclear how the configuration of formal and informal institutional factors affects the securing of economic rights and thereby influence FDI location. This study seeks to shed light on this issue.

### **3.0 Hypotheses Development**

#### *Formal IP Institutions and Outward FDI*

There are a number of studies on the effects of the quality of the formal legal institutional aspects of IPR systems on FDI location. Most empirical studies find some evidence for positive relationships between the quality of formal legal arrangements of IPR systems and FDI flows (Branstetter et al., 2007; Nunnenkamp & Spatz, 2004; Smarzynska-Javorcik, 2004). Some studies however report results from their empirical models where proxies for formal institutional legal arrangements are sometimes negatively and in other models positively related to FDI. The evidence on the influence of formal legal institutional systems is therefore somewhat mixed.

The analysis outlined in the section 2.0 of the paper indicates that good quality formal legal rights providing clear and coherent bundles of IPR should help to secure economic rights from legal rights. This follows from the clear, comprehensive and coherent legislative arrangements that provide low costs and risk when using formal legal arrangements to protect

IPR. Such formal legal rights (good law on the books) provides effective ways by using legal systems such as court orders and legal injunctions to stop infringements of IPR and to seek compensation for theft of IP. This should encourage outward FDI due to the favourable conditions in formal legal arrangements that can be used to protect IPR. Conversely, IPR regimes with institutional contexts that lead to significant institutional voids are likely to deliver unsuitable bundles of IPR due to inconsistent, unclear or missing rights. This will lead to high costs and risks when using legal arenas to defend IPR due to problems of identifying what the bundle of rights means when seeking to defend against infringements of IPR or seeking compensation for the theft of IP.

Using only formal legal rights to capture all the components of enforcement underplays the influence of the behaviour of agents involved in enforcing IPR (Papageorgiadis & McDonald, 2019; Peng 2017a). The failure to properly identify and separate important components of institutional systems involved in governing economic transactions leads to problems of misrepresenting how these systems influence outcomes (Shirley, 2013; Voigt, 2013 & 2018). This study therefore separates the two major institutional components that underpin IPR regimes. Hypothesis 1 explicitly refers to formal legal rights (law on the books) and the influence of informal institutions (law in practice) is considered in hypothesis 2. The property rights approach suggests that formal legal rights that are clear, comprehensive and coherent lead to low transaction costs and risk when using legal arenas to defend IPR, implying a positive relationship to FDI. Some studies have however found both negative and positive relationships between formal legal rights and FDI (Khoury & Peng, 2011; Ushijima, 2013). The empirical evidence from previous studies therefore provides some indications that a positive relationship is not always detectable. Nevertheless, the theory suggests that clear, consistent and comprehensive formal legal rights should reduce the costs and risk of defending IPR. The

property rights approach assumes that enforcing contracts is effective and can be achieved at very low cost. This view of how formal legal rights work is reflected in H1.

*H1: Countries with stronger formal legal rights underpinning IPR systems attract higher levels of outward FDI.*

### *Informal IP Institutions and Outward FDI*

There are only a few studies relating to IPR regimes that explicitly consider the influence of informal institutions (Seyoum, 1996, 2006; Smarzynska-Jajvorcik, 2004). These studies find some evidence that poor quality informal institutions are detrimental for FDI. Some literature attributes the major detrimental effects to the behaviour of enforcement agents (Yang & Sonmez, 2013). None of these studies links these effects to theoretical explanations as to how informal institutions influence the costs and risk of using legal rights over IP assets to secure economic rights.

The economic rights approach connected to using legal arenas to protect IPR suggests that good quality informal institutions should have a positive effect on FDI. This follows from informal institutions providing unwritten rules used by enforcement agents that are supportive of the property rights of IP asset owners. In these circumstances, recourse to legal arrangements such as courts and legal measures to stop infringements of IPR are likely to be helped by the behaviour of enforcement agents that is supportive of the rights of IP asset owners. This helps to reduce costs and risk in converting legal rights into economic rights. Informal institutions that do not encourage the development of unwritten rules used by enforcement agents that are supportive of IP law are likely to lead to costly and risky use of legal systems. Such costs and risk can arise from delays in making decisions, judgments that are biased towards the defendants in infringement and theft cases and inadequate policing of breaches of IP law.

Outcomes such as this make it difficult to use legal systems to help to convert property rights into economic rights. This reasoning leads to the second hypothesis.

*H<sub>2</sub>: Countries with stronger informal institutional aspects associated with enforcement in IPR systems attract higher levels of outward FDI*

### *The Moderating Effect of Informal Institutions*

To the best of our knowledge, there are no studies in the literature researching the effects of the interaction between formal legal institutions related to IPR and informal institutions related to the behaviour of enforcement agents. Formal legal rights normally stem from legislative declarations of intent to achieve specified outcomes, but the achieving of these depends on how informal institutions affect the legitimacy and support the effective implementation of the law in economic transactions (Hodgson, 2006). The costs and risks incurred in using legal arenas to protect IPR depends therefore not only on the quality of formal legal rights but also on whether the informal institutions that influence the unwritten rules used by enforcement agents legitimize and support the formal IP law.

Following the recommendations of Andersson et al., (2014) when using models with moderating variables it is necessary to develop a causal chain to justify the choice of the moderating variable. The direction of causation proposed in this study is that formal legal rights provide law that is the declared and written rights governing ownership rights over property (Hodgson, 2006). When these written rights are used to defend IPR in legal arenas the interpretation and application of the law is influenced by the informal institutions that shape the unwritten rules used by enforcement agents (Helmke & Levitsky, 2004, 2006). The effects of formal legal rights are therefore moderated by the unwritten rules used by the agents that enforce law. The possibility of co-evolution of formal and informal institutions may however call into question this causal chain. A co-evolutionary process can emerge from significant

historical events that lead to changes in political, social, cultural and economic environments. These very long-run historically driven changes lead to interactions between formal and informal institutions that result in complex and multidirectional causal relationships (Alesina & Giuliano, 2015; Mantzavinos et al., 2004). This co-evolutionary process may be considered to question the direction of moderating effects proposed in this study. The informal institutions connected to the rules of the game are however normally stable and they evolve slowly. In most cases informal institutional conventions normally prevail until the costs of retaining informal institutional norms becomes prohibitively high. This process can take many decades before significant changes are made (North, 1990 & 2005; Pejovich, 1999). This implies that in the short and medium-run the effect of formal institutions in IPR regimes (including any changes to formal legal rights) is likely to be moderated by the ways informal institutions influence the behaviour of agents involved with enforcing IP law. This causal relationship is therefore used in this study.

When enforcement agents engage in legal arenas to stop misuse of IPR or compensate for theft of IP, or when policing infringements, they apply the existing law. A court case for example may be brought by an IP asset owner claiming that there had been breach of a patent in a host location. The enforcement agents are guided by the applicability of the patent in IP law in the host location. Formal legal rights therefore guide the legal proceedings. The unwritten rules used by enforcement agents however shape how these formal legal rights are understood and applied to the case at hand. The unwritten rules used by enforcement agents therefore moderate the effect that formal legal rights exert on the outcome of the case.

In institutional contexts where formal and informal institutions connected to IPR regimes work in harmony, the unwritten rules used by enforcement agents legitimize and support the formal legal rights. Informal institutions therefore will positively moderate the impact of formal legal rights. In cases where informal rules are not supportive of the formal

legal rights, the moderating effect is likely to be negative. This outcome arises because the behaviour of enforcement agents would not support IPR granted by formal legal rights. Good quality unwritten rules may however be unable to positively moderate legal rights if these rights are not clear and comprehensive. In this case, the ability of good informal institutions to exercise a positive effect on outcomes is hampered due to the poor formal legal rights with which enforcement agents must work. The institutional context most likely to deliver low cost and low risk to IP asset owners is when formal legal institutional rights are clear and coherent and are legitimized and supported by the informal institutional aspects connected to enforcement. In these circumstances, informal institutions connected to enforcement exercise a positive moderating effect on the formal legal institutional aspects of IPR regimes. Such a positive effect would lead to low costs and risk from using legal systems to defend IPR. This will help to reduce obstacles to converting legal rights into economic rights and thereby will encourage FDI. This reasoning leads to H3.

*H3: Countries with stronger informal institutional aspects connected to enforcement that are supportive of clear and comprehensive IPR law have a positive moderating effect on the relationship between the formal legal aspects of IPR systems and outward FDI.*

#### **4. Data and Methods**

The dependent variable is US manufacturing outward FDI and comes from data from the US Bureau of Economic Analysis. This data provides a means of considering FDI outflows from the country with the largest outward manufacturing FDI among developed countries. Outward FDI from the US also has widespread industry coverage and in the geographical distribution of host countries. In addition, the level and complexity of technology involved in US investments is higher than most countries. In 2016, US firms accounted for almost 43% of all patents in foreign countries and “U.S. applicants accounted for more than half of all non-resident



applications in Norway (72.4%), Turkey (57.4%), Canada (52.8%), Mexico (51.3%) and Australia (50.1%)” (WIPO, 2017, p. 34). This suggests that there are normally high levels of IP assets embedded in US outward FDI, thereby making such investment sensitive to issues of being able to defend effectively IPR (Jackson, 2017). Using US outward FDI data as the dependent variable enables consideration of one of the largest sources of outward FDI in the world that has one of the highest levels of IP assets embedded in such investments. Moreover, concern about loss of IP embedded in outward FDI is a major area of dispute between developed and developing countries, especially for the US (USCC, 2015). Examination of how the qualities of IPR systems affects outward FDI is therefore of interest, especially to policy makers. Another advantage of using US outward FDI data is that a large amount of empirical work on the qualities of IPR systems has centred on the effects on outward FDI. Using this measure as the dependent variable permits comparisons of the results of this study with the findings of the existing literature.

The preference for FDI flows over FDI stocks is due to two reasons. Stocks capture FDI flows accumulated over a long period therefore FDI stocks in a particular year do not necessarily reflect the attractiveness of a particular location in that particular year. Most of our explanatory variables are yearly-changing variables and FDI stocks would not necessarily reflect the effect of these yearly changes of these explanatory variables. The second reason is that the method with which FDI stocks are calculated varies across countries (Medvedev, 2012). FDI flows also have a better fit with the focus of our study since other measures such as US affiliates’ sales or value-added as such measures relate to post-investment activities or a proxy for FDI performance and are not necessarily a good proxy that reflects the location choice of US firms.

The sample covers outward FDI flows from USA to 42 host countries, of which 23 are developed countries and 19 are developing countries (see Table 1) for the years 1998-2011. The

sample of countries selected is restricted to those countries that provided data that permits use of both the Park (2008) and Papageorgiadis et al. (2014) indices on IPR to proxy for the formal and informal institutional aspects of IPR systems. The Papageorgiadis et al (2014) index (to our knowledge) covers the largest number of countries and uses the most comprehensive methods of any index that seeks to capture informal institutional factors in IPR systems. Using this index allowed us to consider the largest possible number of countries given the alternative indices available to proxy the effects of informal institutional aspects in IPR systems. Our sample covers 14 years, 8 sectors and 42 countries. Because it is an unbalanced panel, the number of observations – 3636 is lower than the number of maximum observations in the balanced panel - 4704. The 42 countries covered include most of the significant destinations for US outward FDI.

-----**Table 1 goes about here**-----

The model tested follows the recommendations of Andersson et al., (2014) when using moderating variables. This approach advocates testing all the direct effects of the explanatory variables and of moderating variables. The causal relationship between the direct and moderating variables is based on the theory used to establish the hypotheses (see section 3). In the case of this study this requires estimation of the direct effects of formal and informal institutions and the moderating influence of informal institutions on formal institutions.

#### *Explanatory Variables*

The index of Park (2008) is used to proxy for the formal legal aspects of IPR systems. The index used is an update of the Ginarte and Park (1997) index. The index measures the extent of legal statutory protection for patents, duration of protection, loss of protection, availability of legal enforcement mechanisms, and compatibility of administrative procedures across countries (Ginarte & Park, 1997). The enforcement mechanisms aspect of the Park index considers only the formal legal procedures for enforcement of patent rights. The index does not consider the

effectiveness of patent enforcement in practice in courts and other areas of policing the law (Brander et al., 2017). This index closely approximates the concept of the formal legal aspects of IPR systems as defined in this study.

Using business cultural dimensions measures may be considered a good proxy for informal institutions (Hofstede et al, 2010; House et al., 2004). The literature indicates that there is a relationship between culture and informal institutions (North, 1990 & 2005; Pejovich, 1999). This relationship is multidirectional and has complex causal links that normally unfold over long periods (Alesina & Giuliano, 2015). The links between culture and informal institutions are therefore complex and unlikely to be adequately captured by national generic business cultural dimensions. Culture and informal institutions are related by the complex interplay between various agents in a host of political, economic and social arenas (Pejovich, 1999; Tabellini, 2008 & 2010). From this complex interplay, over the very long-run, informal institutions emerge that are the foundation of the unwritten rules that are used by agents involved in economic transactions (Hayo & Voigt, 2007; Helmke & Levitsky, 2004 & 2006; Ostrom & Hess, 2007). Unwritten rules emerging from informal institutions in this view are not shared cultural values, but shared expectations of what agents can expect from other agents engaging in specific economic transactions (Helmke & Levitsky, 2004). There is a connection between shared cultural values and shared expectations, but this is not a straightforward relationship (Alesina & Giuliano, 2015; Tabellini, 2010; Voigt, 2018). National business culture dimensions measures capture shared cultural values that affect perceptions on norms for engaging in interaction with other agents. These shared values are however average and generic and do not adequately capture the rules used by agents engaged in specific economic transactions. Shared expectations are perceptions about the presumed behavior of agents involved in specific economic transactions. Agents involved in political, social, business and legal institutional settings within the same country cultural setting may have different shared

expectations about how they should behave in their setting because of the social obligations, ethical mores and power structures that prevail in their particular institutional setting (Helmke & Levitsky, 2004 & 2006; Voigt, 2018). Shared expectations may differ in the same cultural milieu depending upon the institutional context of the setting of the transactions (Helmke & Levitsky, 2004; Voigt, 2018). Agents involved in legal arenas connected to enforcing IPR may have different shared expectations from agents involved in political institutional settings concerned with formulating and developing IPR legislation. In these circumstances, shared generic cultural values give a misleading impression of how agents in particular institutional settings behave (Voigt, 2018). This line of reasoning leads us to select a proxy for informal institutions that is closely connected to the institutional setting that underpins IPR regimes and is therefore more likely to capture the shared expectations of the agents involved in enforcing IPR.

The composite index by Papageorgiadis et al. (2014) covering the period 1998-2011 is provides such a proxy. A review of forty available indices measuring the strength of IP regimes highlights that this index is the most comprehensive index measuring the strength of IP enforcement. The index has the most proxies used to calculate an index of informal institutions associated with the enforcement of IPR and is an annual longitudinal measure (Papageorgiadis & McDonald, 2019). The calculation of the index uses a transaction costs framework that enables measurement of “...perceived levels of patent enforcement in a country” (Papageorgiadis et al., 2014, p. 587). The transactions cost framework measures three types of transactions cost that patent owners encounter in their dealings with enforcement agents in a host country. These are monitoring costs, property rights protection costs and servicing costs. Each of the transactions cost forms an index using ten secondary data sources that proxy for eight components of national patent systems, such as “judicial enforcement” and the “effectiveness of police enforcement” (Papageorgiadis et al., 2014, p. 590). To reduce the

measurement error potential when calculating the index, Papageorgiadis et al. (2014, p. 587) used “a number of uniform techniques recommended by the Organization for Economic Co-operation and Development in their Handbook on Constructing Composite Indicators (OECD, 2008)”. The data used to quantify the components of an IP system include items such as the effectiveness of judicial and police enforcement and the level of corruption in the judiciary that measure the perceptions of IP asset owners of how enforcement agents behave in IPR regimes. These perceptions capture the unwritten rules that influence how enforcement agents operate in legal arenas. The index therefore provides an appropriate proxy for the strength of the informal institutional underpinnings of national IP regimes and a good proxy for capturing the unwritten rules used by enforcement agents in legal arenas.<sup>1</sup>

#### *Control Variables*

The control variables include proxies for the host country economic and business environment conditions. Following the recommendation of Chakrabarti, (2001) and on examining FDI determinants, two variables are used to proxy for the size of the market: i) GDP, which reflects the size of the economy, ii) host country GDP per capita, which reflects the average income level of the country. Following Blonigen & Piger (2014), four other control variables are included: i) the degree of political stability in the host country (Brada et al., 2006; Suliman & Mollick, 2009); ii) geographical distance between the USA and the host country (Campos & Kinoshita, 2008; Oh et al., 2011); iii) regulative distance (Bénassy-Quéré et al., 2007; Estrin et al., 2009); iv) cultural distance between the USA and a host country (Estrin et al., 2009; Habib & Zurawicki, 2002; Grosse & Trevion, 1996; Loree & Guisinger, 1995; Xu & Shenkar, 2002). The regulative distance variable uses nine dimensions taken from the Economic Freedom Index: business freedom, fiscal freedom, government spending, monetary freedom, investment

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<sup>1</sup> The Papageorgiadis et al. (2014) version of the index used in this study, unlike the earlier version found in Papageorgiadis, et al. (2013), does not contain any data that relates to the formal legal aspects of IPR systems. Use of the 2014 version of the index ensures that the index is free of links to formal legal aspects of IPR regimes.

freedom, financial freedom, property rights protection, freedom from corruption, and labour freedom.<sup>2</sup> The cultural distance variable uses Hofstede’s four cultural dimensions of power distance, individualism, masculinity/femininity and uncertainty avoidance (Hofstede et al., 2010).

We use the Mahalanobis method for calculating the regulative distance and cultural distance variables rather than the Euclidean method. Although the Euclidean method is widely used for calculating distance, this approach has several limitations and may not be the ideal method for constructing composite distance measures. All three of the composite distance measures (RDIST, NDIST and CDIST) are multiple, but partially overlapping dimensions. The Euclidean method ignores the correlation among the dimensions, thereby giving more importance to characteristics represented by correlated dimensions (Berry et al., 2010). The measurements of the dimensions are also on different scales and this can have significant variance, both cross-sectionally and over time. The Euclidean method is sensitive to the scale of measurement and does not account for the variance of the variables. The Mahalanobis method takes into consideration the variance of each dimension and co-variance between dimensions by using information in variance–covariance matrix and produces scale-invariant distance measures. In essence, Mahalanobis distance is equivalent to the Euclidean distance computed in the normalized principle components space. The calculation of the regulative distance variable uses yearly data to construct separate covariance matrices for each year. As data on cultural distance is time invariant, our cultural distance variable is constant over the sample period. The detailed information on variable measurement and data source is available in Table 2 and the summary of the explanatory variables including means, standard deviations, and correlations in Table 3.

-----**Table 2 goes about here**-----

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<sup>2</sup> The Economic Freedom Index reports 10 dimensions, but due to unavailability of data for trade freedom for the 1998-2004 period, we were constrained to the use of the remaining nine measures.

-----Table 3 goes about here-----

### *Estimation Method*

Examination of the impact of formal and informal institutions on FDI flows involves use of panel data estimation methods. Some econometric concerns require attention before proceeding to the empirical results. The correlation between GDP per capita (LGDPPC) and informal institutions index (INFORMAL) and the correlation between LGDPPC and the formal index (FORMAL) are above 70% (see Table 3), indicating high level of collinearity. Although the presence of high collinearity should not affect tests of significance, tests using the orthogonalized INFORMAL and INFORMAL measures revealed that the presence of collinearity does not affect the significance of the variables concerned. The characteristics of the sample influenced the choice of the estimation method, as there a number of zero observations for US bilateral industry level FDI. We follow a number of recent FDI studies in the literature and use the fixed-effects Poisson Pseudo Maximum Likelihood (PPML) estimation method to address this issue (Berger et al., 2013; Busse et al., 2010; Paniagua & Sapena, 2014). This estimation method is effective in mitigating the bias resulted from zero observations in the sample and is robust to different patterns of heteroscedasticity (Silva & Tenreyro, 2006). The model used is akin to a semi-gravity model. This approach is used because there is only one home country (USA) with distance control measures for multiple host country economic and business environment conditions. Regressions using the lagged time variant host country specific control variables also produced similar to the results reported in Table 4.

## **5. Results**

Table 4 presents the results of the regressions. The first specification (Model 1) includes only the control variables to derive a baseline model. The second specification (Model 2) adds the

explanatory and control variables. The last specification (Model 3) includes year dummies to control for time specific effects not captured by the independent variables. The discussion focuses on the results of model 3 since this is the full model.

-----**Table 4 goes about here**-----

Hypothesis 1 argues that stronger formal IP institutions in a country will attract higher levels of US outward FDI. The results do not support hypothesis 1 (Table 4) as although the coefficient of FORMAL is significant at the 1% level, it is negative. The findings support Hypothesis 2 as the coefficient is significant and positive at the 1% level. This suggests that informal institutions connected to effective enforcement exercise a positive effect on FDI due to their beneficial effect on defending IPR in legal systems. Hypothesis 3 relates to the main premise of the study, that informal institutional aspects of enforcement positively moderate the effect of the formal institutional legal aspects on FDI. The findings support hypotheses 3, with a positive effect at the 1% significance level. The marginal effect of INFORMAL = 0.0928 + 0.0966 x FORMAL; INFORMAL coefficient = 0.0928, p<0.01; FORMAL x INFORMAL interaction term coefficient = 0.0966, p<0.01. The results support the view that countries with informal IP institutional aspects of enforcement that effectively legitimize and complement the formal legal aspects of IP law generate lower cost and risk to secure economic rights than countries that do not have such IPR systems.

The results regarding the control variables are generally consistent with the findings from previous empirical studies on FDI flows. The results suggest that US FDI outflows are influenced positively by host country GDP per capita, GDP growth and GDP (e.g. Loree & Guisinger, 1995; Resmini, 2000) and negatively by geographical distance, regulative distance (e.g. Campos & Kinoshita, 2004; Oh et al., 2011) and cultural distance (e.g. Loree & Guisinger, 1995; Xu & Shenkar, 2002).



## 6. Discussion

The significant but negative sign for FORMAL does not support H1 and at first inspection is an unexpected result. Some studies have found significant but negative signs for some versions of the models that tested for the effect formal legal rights (Branstetter et al., 2007; Nunnenkamp & Spatz, 2004; Smarzynska-Javorcik, 2004). A few studies find consistent support for a positive and significant relationship between formal legal rights and FDI only when variables connected to industry or technology contexts moderated the relationship (Khoury & Peng, 2011; Ushijima, 2013). The findings of these studies suggest that moderating factors are important for understanding how formal legal rights affect FDI. Sense can be made of the negative result found in this study by considering the influence of the moderating variable used in this study, that is, informal institutions. Using informal institutions as a moderator, like using industry and technology as moderators, helps to make sense of the conditions under which formal legal rights affect FDI. The discussion on hypothesis 3 focuses on this issue.

With regards to H2, the findings support the view that using informal institutional measures specifically related to the phenomenon under examination (Shirley, 2013; Voigt, 2013 & 2018) enables the identification of a significant positive relationship. This finding illustrates that the behaviour of IP enforcement agents in legal systems used to defend IPR influences FDI location. The findings accord with the economic rights approach (outlined in section 2), that the use of unwritten rules by enforcement agents affect the costs and risk of securing economic rights when recourse to courts is necessary. This result supports the view that the incorporation of informal institutional considerations connected to the behaviour of enforcement agents is helpful to better understand how IPR regimes affect FDI (Peng et al., 2017a, Seyoum, 2011).

The results for H3 show that the marginal effects on the formal legal aspects of IP law (FORMAL) on FDI range from -0.20 to 0.51 (Figure 1). The marginal results show that the strength of formal IP institutions has a positive or negative effect in attracting US outward FDI,

depending on the strength of the informal institutional aspects of enforcement (INFORMAL). The strength of FORMAL has a positive effect on US outward FDI in countries where the strength of INFORMAL is greater than 4.6 (the marginal effect of  $\text{FORMAL} = -0.450 + 0.966 * \text{INFORMAL}$ ; setting this equation equal to zero gives  $\text{INFORMAL} = 4.6$ ). There is, however, a negative effect in countries where INFORMAL is less than 4.6. In other words, “legal” or “formal” institutions that do not have strong “informal” support do not provide the means for effective protection of IPR. Such formal institutions are in effect not sufficient to provide foreign firms with the means to secure economic rights with low costs and risk. They are in effect ‘unsupported legislative declarations’ (Hodgson, 2006, p18) that often lack the ability to provide the protection of IPR sought by asset owners. Strengthening IP laws signals a country’s willingness to provide a favourable environment for IP owners including foreign investors, but in the absence of adequate supporting informal institutions, such signalling can be ineffective for attracting FDI. This is because countries with strong IP laws, but with weak informal institutions connected to IP enforcement can experience a high volume of IP infringements that are not deterred and/or adequately compensated by courts and other agencies. The findings support the view (discussed in section 3) that positive effects from formal legal rights that provide clear and comprehensive IPR depend on informal institutions that legitimize and support these rights and thereby effectively enforce IP law.

-----**Figure 1 goes about here**-----

The findings reported in this paper are the first to show a moderating effect from informal institutions on formal institutional legal aspects of IP law on FDI flows. The findings support the economic rights view that the costs and risk associated with using legal arrangements to protect IP assets in economic transactions will be lower if the informal institutions influencing the behaviour of enforcement agents legitimize and complement good quality formal institutional legal arrangements (Helmke & Levitisky, 2006; Hodgson, 2006).

The results of our study vindicate the use of institutional measures that relate specifically to the use of legal arenas to protect IP assets. This supports the view that it is important to use institutional proxies that are derived from institutional contexts that are directly related to the phenomenon to be investigated rather than general proxies for institutional conditions in countries (Cantwell et al., 2010, Shirley, 2013; Voigt, 2013 & 2018).

The results of this study also help to understand the views expressed by governmental and other agencies about the costs and risk incurred by MNCs due to the behaviour of enforcement agents in different countries (Asia Pacific Foundations of Canada, 2015; USCC, 2015. WTO, 2011). The findings provide insights into why, despite the implementation of TRIPS, continuing problems persist associated with the legal arrangements for protecting ownership rights for IP assets. While a number of studies in the literature identified that enforcement issues are at the core of this problem (Brander et al., 2017; Khoury & Peng, 2011; Seyoum, 2011; Ushijima, 2013, Yang & Sonmez, 2013), the results of our study expand the current understanding in the literature by clearly locating the nature of the problems in the institutional context of IPR regimes.

### *Implications for Theory*

The findings of this study enable a better understanding of issues in relation to how the legal arrangements connected to protecting IP assets in economic transactions affect costs and risk that arise from seeking to secure economic rights in cross-frontier transactions. The results highlight the importance of considering the institutional contexts when using legal arenas to protect IP assets. This goes beyond the problem of incomplete contracts and institutional voids that require the design and implementation of hierarchical organizational forms to deal with this issue (Williamson 1992, 2000; Doh et al., 2017). The literature has a well-developed understanding of how institutional voids and issues connected to incomplete contracts lead to

problems with converting legal rights into economic rights. Our study highlights that a further issue when using legal systems to defend IPR, that is often implicitly assumed to not be a problem, may in fact present obstacles to securing economic rights and thereby discourage FDI. This is not only a problem of assessing the cost and risks arising from formal institutional legal arrangements, but also those that emerge from informal institutional aspects associated with the enforcement of IPR. The findings further highlight that it is important to consider how the informal aspects influence the implementation of the formal institutional aspects. The results therefore reinforce the view that informal institutions can exercise a significant influence on economic transactions (Webb et al., 2009; Williamson & Kerekes, 2011) including those involving cross-frontier transactions (Estrin et al., 2009; Khoury & Peng, 2011; Khoury et al., 2014; Papageorgiadis et al., 2013; Seyoum, 2011).

The findings of this study indicate that the interaction of formal and informal institutions in IPR regimes are important when using legal systems to defend IPR. The costs and risks of using legal arenas to defend IPR are not normally considered to be a problem other than in cases with significant institutional voids. The literature that considers the importance of enforcement (e.g. Keupp et al., 2009, 2010; Khoury & Peng, 2011) normally does not consider this issue in the context of the behaviour of enforcement agents. The limited literature that does explicitly consider the behaviour of enforcement agents does not examine the importance of the rules of the game emerging from the interaction between formal and informal institutions (Seyoum, 2011; Yang & Sonmez, 2013). The findings help to explain how the institutional context of IPR regimes affects location of FDI by highlighting how the informal institutional aspects of the enforcement of IPR influences the ability to convert legal rights into economic rights. The results of this study illustrate that IPR regimes that have good quality formal and informal institutional legal arrangements that work in harmony reduce the transaction costs and risk for firms seeking to use legal arenas to defend IPR.

The economic rights approach used in this study to examine how the institutional context of IPR regimes affects FDI location has possible applications to other types of economic transactions. The costs and risk of using legal arenas to protect property rights may also apply to cross-frontier economic transactions such as merger and acquisition agreements, international joint venture agreements, and innovation partnerships. Problems associated with contexts may render it costly and risky to use legal systems to defend property rights in these types of agreements. Future research seeking to examine these kinds of agreements using the approach taken in this paper would require proxies for the formal and informal institutional aspects that underpin the legal rights associated with these types of economic transactions. Investigation, for example, of the institutional context for securing economic rights from technology development partnerships would require proxies for the formal legal aspects of law affecting such agreements and for the informal institutions that shape the unwritten rules used by the agents that enforce the relevant law. Such studies could highlight the importance of the institutional context for using legal systems to defend legal rights and would help to identify locations with low costs and risk in this area. In cases where investment was to be undertaken in institutional systems that presented costly and risky use of legal arenas, the resulting obstacles to securing economic rights would focus attention on the need for using appropriability regimes to mitigate the costs and risk.

### *Policy Implications*

Countries with IPR regimes that continue to face problems with providing effective protection to IP owners need to consider removing obstacles arising from formal and, importantly, informal institutions. Countries facing problems with formal legal arrangements stemming from institutional voids (Doh et al., 2017; Khanna & Palepu, 2010) connected to IPR need to correct them. This is not normally expected to be a major problem for policy makers if correcting such

institutional voids is enabled by access to sufficient legal expertise and that there is the will to design and enact the necessary legislation. The largely successful implementation of TRIPS shows that securing good quality IP law is possible but requires considerable legislative activity that needs to be updated and developed to resolve emerging and continuing inadequacies in IP law (WTO, 2011). Correcting defects in formal legal rights for IP due to institutional voids are likely to encourage FDI but correcting such defects may not lead to significant improvement if the new IP laws are not legitimized and supported by appropriate informal institutions.

Changing the social protocols and conventions of a society that underpin informal IP institutions to induce change in behaviour is however a difficult task. This is because cultural evolution is normally very slow and path-determined by history (Alesina & Giuliano, 2015; Mantzavinos et al., 2004; North, 2005). As however the unwritten rules used by enforcement agents are usually particular to the institutional setting that implements the law, it may only be necessary to change the informal institutional norms of those involved in that setting (Voigt, 2018). The possibility of rapid change in social conventions and norms by a cascading of information through particular sections of society (Bikhchandani et al., 1992) may make it possible to change the social protocols used by enforcement agents by cascading information about good practice. Such an approach in policy making offers the prospect of change in the behaviour of enforcement agents that does not require countrywide changes in social protocols.

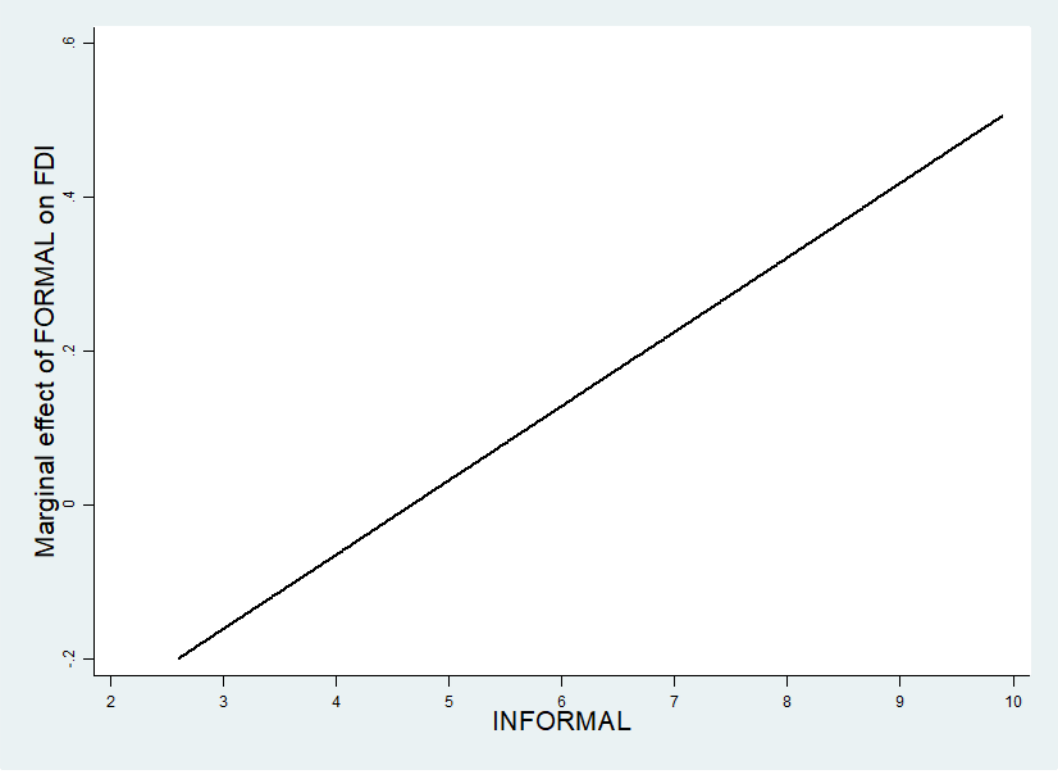
## **6. Conclusions**

This study examined the institutional context of IPR regimes in influencing the costs and risk of using legal arenas to protect IPR by considering how these contexts affect the ability of IP owners to transform legal rights into economic rights. Of central importance is the role of enforcement connected to informal institutions that shape the unwritten rules used by agents operating in the legal arenas. The interaction of the behaviour of enforcement agents with the

quality of the formal legal rights is important since it affects the costs and risk of using legal arenas to protect property rights and thereby the capability to convert legal rights into economic rights. The approach followed in this study of using legal systems to help secure economic rights from property rights can be applicable to other types of economic transactions such as mergers and acquisitions, international joint ventures and innovation partnerships. Furthermore, the findings of our study highlight that examination of the institutional contexts specifically related to the use of legal arenas to protect IP assets can provide a better understanding on how IPR regimes affect cross-frontier economic transactions such as outward FDI. This helps to contribute to a better understand how institutional contexts effect cross-frontier economic transactions.

With regards to the limitations of this work and future research, the findings suggest three possible areas of focus. First, this study used industry level outward FDI flows from only one home country. Future studies should consider multiple home and host countries using firm level data. Second, future research can focus on further developing the proxies for formal and informal institutions associated with legal arrangements. More and improved measures of the formal and informal institutional aspects of IPR regimes would permit more robustness tests of the postulated relationships. A range of proxies that minimize measurement errors of the formal and informal institutional aspects of legal arrangements could involve using different data collection methods as well as sophisticated statistical techniques to assigning weights to the components of indices (Becker et al., 2017). Third, future studies can consider following a similar approach to this paper but focus on testing the effects of formal and informal institutions on other types of international business activities such as the influence of protecting legal rights in cross-frontier arrangements to enhance the innovation performance of firms. This will enable future research to obtain more evidence about how the legal aspects of IPR regimes influence the use of IP assets in a variety of cross-frontier economic transactions.

**Figure 1.** Plot of marginal effect of FORMAL on FDI across the observed values of INFORMAL





**Table 1:** List of host countries represented in the study

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Australia	Mexico
Argentina	Israel
Austria	Philippines
Brazil	Italy
Belgium	Poland
Chile	Japan
Canada	Romania
China	Netherlands
Denmark	Russia
Colombia	New Zealand
Finland	Slovakia
Czech Republic	Norway
France	South Africa
Hungary	Portugal
Germany	Thailand
India	Singapore
Greece	Turkey
Indonesia	Spain
Hong Kong	Sweden
Malaysia	Switzerland
Ireland	UK

**Table 2:** Variable description, measurement, and sources

Variable	Description/Measurement	Data Source
LFDI	Natural log of FDI flow from USA to host country (Current US \$)	Bureau of Economic Analysis: U.S. direct investment abroad: balance of payments and direct investment position data
FORMAL	Index by Park (2008)	Park (2018)
INFORMAL	Index by Papageorgiadis et al. (2014)	Papageorgiadis et al. (2014)
LPOP	Natural log of Population of the host country	World Development Indicators, The World Bank
LGDP	Natural log of GDP per capita of the host country (Current US \$)	
GDPG	GDP growth rate of the host country	
STAB	Degree of political stability of the host country	International Country Risk Guide, PRS Group
LDIST	Natural log of geographical distance between USA and the host country	Geobytes.com
RDIST	Regulative distance between USA and the host country constructed using nine measures: business freedom, fiscal freedom, government spending, monetary freedom, investment freedom, financial freedom, property rights protection, freedom from corruption, and labour freedom.	Index of Economic Freedom, The Heritage Foundation.
CDIST	Cultural distance between USA and the host country constructed using four measures: power distance, individualism, masculinity/femininity, and uncertainty avoidance.	The Hofstede Centre

**Table 3:** Descriptive statistics and correlation coefficients

Variable	Mean	S.D.	Min	Max	Correlation coefficients										
					1	2	3	4	5	6	7	8	9	10	
1 FDI	1351.44	2925.8	0	47694											
2 LDIST	8.95	0.56	6.63	9.7	-0.36										
3 RDIST	3.41	0.85	0.84	6.45	-0.17	0.21									
4 CDIST	2.46	0.9	0.34	3.72	-0.31	0.27	0.34								
5 STAB	8.64	1.49	4.04	12	0.05	0.09	0.04	0.05							
6 LGDPPC	9.5	1.2	2.62	11.49	0.18	-0.31	-0.37	-0.25	-0.09						
7 LGDP	26.72	1.14	23.37	29.62	0.31	-0.23	0.06	-0.3	-0.03	0.25					
8 GDPG	3.12	3.46	-13.13	14.76	-0.04	0.16	0.26	0.13	0.24	-0.34	-0.04				
9 FORMAL	4.05	0.63	1.23	4.67	0.16	-0.36	-0.23	-0.32	-0.13	0.74	0.3	-0.2			
10 INFORMAL	6.52	2.1	2.6	9.9	0.2	-0.19	-0.33	-0.3	0.13	0.8	0.07	-0.23	0.58		
11 FORMALxINFORMAL	0.09	0.95	-4.24	5.76	0.18	-0.29	0.04	-0.11	-0.02	-0.01	0.26	-0.11	0.01	0.09	

Note: The number of observations for all variables is 3636

**Table 4:** Effects of formal and informal IP institutions on US outward FDI

	PPML (1)	PPML (2)	PPML (3)
LDIST	-0.450*** [0.0452]	-0.453*** [0.0414]	-0.427*** [0.0415]
RDISTT	-0.153*** [0.0370]	-0.139*** [0.0333]	-0.131*** [0.0272]
CDIST	-0.252*** [0.0199]	-0.211*** [0.0218]	-0.223*** [0.0199]
STAB	0.103*** [0.0278]	0.0746*** [0.0245]	0.0545*** [0.0182]
LGDP	0.485*** [0.0185]	0.545*** [0.0167]	0.530*** [0.0205]
LGPPC	0.126*** [0.0405]	0.151*** [0.0429]	0.209*** [0.0684]
GDPG	0.0275*** [0.00745]	0.0296*** [0.00644]	0.0528*** [0.0173]
FORMAL		-0.528*** [0.0532]	-0.450*** [0.0712]
INFORMAL		0.122*** [0.0143]	0.0928*** [0.0226]
FORMALxINFORMAL		0.0567*** [0.0165]	0.0966*** [0.0237]
Constant	-3.231*** [0.479]	-3.632*** [0.557]	-3.979*** [0.765]
Industry dummies	Included	Included	Included
Year dummies	Not Included	Not Included	Included
Pseudo R <sup>2</sup>	0.4725	0.4885	0.4981
LR $\chi^2$	5444544***	5577013***	5686524***
N	3636	3636	3636

Note: Robust standard errors in brackets; \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

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