

The impact of trust on intellectual property right protection: a cross-national study

Impact of trust
on IPR

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Abstract

Purpose – This study aims to empirically investigate how difference in social trust explains the heterogeneity of intellectual property right (IPR) protection (proxied by software piracy rate) across countries. Specifically, the authors also examine whether this effect is complementary or substitute to legal and economic factors.

Design/methodology/approach – The authors use both ordinary least square and two-stage least square regressions to investigate this effect.

Findings – The authors find that there is also a complementary effect between trust and rule of law in reducing the violation of IPRs.

Originality/value – Although the literature by now has documented the solid relationship between trust and the quality of formal institutions, only few studies have explored more specific measures of institutional consequences. Thus, this study is the first study investigating the role of trust, a valuable social capital dimension, on IPR protection.

Keywords Trust, Intellectual property right protection, Software piracy rates, National culture, Rule of law

Paper type Research paper

1. Introduction

According to [Business Software Alliance \(2018\)](#), national software piracy rates (SPRs) range from 17 to 90%, with an average of worldwide rates reaching more than 56%. Between 2015 and 2017, software companies' revenue loss has reached as much as \$46.3bn, while malware from unlicensed software costs companies worldwide nearly \$359bn a year. Given the global extent and economic loss of software piracy, our paper adopts a cross-national study to investigate the determinants of intellectual property right (IPR) protection based on this phenomenon. The findings would be critical for policymakers to address the infringement challenges and strengthen IPR protection.

Starting from the study of [Ginarte and Park \(1997\)](#), many scholars have empirically investigated the difference of IPR violation among nations ([Gopal and Sanders, 1998](#); [Husted, 2000](#); [Chang et al., 2017](#); [Andres and Kaur, 2020](#)). As the implementation of the WTO agreement on trade-related aspects of intellectual property rights (TRIPS) agreement has a negligible effect on the levels of enforcement strength of IPR law in practice ([Brander et al., 2017](#)), this research strand has been revisited by scholars in recent years to figure out

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potential factors contributing to IPR protection (Brandl *et al.*, 2019; Papageorgiadis and McDonald, 2019; Papageorgiadis and Sofka, 2020; Papageorgiadis *et al.*, 2019). Numerous studies emphasize the strength of formal institutions as key determinants to securing IPR; however, informal institutions' impact is also crucial but largely unexplored (Papageorgiadis and McDonald, 2019). Being outside-of-government rules that shape human conduct, informal institutions encompass private mechanisms to secure property (Williamson and Kerekes, 2011). In the existing literature, national culture and social capital are frequently used as elements to represent informal institutions of nations (Cruz-García and Peiró-Palomino, 2019). Many extant studies have progressively shed light on national culture to validate the relationship between informal institutions and software piracy perceptions (Bagchi *et al.*, 2006; Chang *et al.*, 2017; Husted, 2000; Kovačić, 2007; Moores, 2008); however, no attention has been paid to the role of social capital (henceforth generalized trust) on securing IPR.

A large body of empirical works finds evidence suggesting that trusting societies experience higher economic growth (Algan and Cahuc, 2013; Bowles and Polania-Reyes, 2012; Guiso *et al.*, 2008). Recent studies also highlight the influence of trust on economic transactions, such as the provision of private credit (Cruz-García and Peiró-Palomino, 2019); peer-to-peer lending (Hasan *et al.*, 2020). Trust facilitates the preservation of property rights (Knack and Keefer, 1997); therefore, it is an essential aspect of economic progress. As a result, in this paper, we expand the literature by providing evidence for how trust relates to protection toward IPR across countries.

Furthermore, our research aims to respond to calls for a better understanding of the institutional circumstances that determine IPR regime efficacy (Papageorgiadis and McDonald, 2019; Peng *et al.*, 2017). Indeed, we address the question of whether the informal aspect (trust) and formal institutions (rule of law) are complementary or substitute for IPR. On the one hand, advantageous norms may address the shortcomings of legal rules, for example, trust is shown to complement productivity (Bjørnskov and Méon, 2015), contract enforcement (McCannon *et al.*, 2018). On the other hand, in trusting societies, trust may assume to substitute formal self-dealing regulation (Cline and Williamson, 2016). Therefore, our study also adds empirical evidence to the ambiguous literature regarding the interaction between informal and formal institutions underpinning economic transactions. Besides, economic development as GNI per capita is an important outcome to measure the strength of formal institutions, thus following Cruz-García and Peiró-Palomino (2019), our study also proposes economic development as a moderator in the relationship between trust and IPR. In this study, trust is argued to be a key component in deterring violations in poor nations but turns out to be not as crucial in developed nations where intellectual products are more affordable to citizens.

Our paper attempts to make a twofold contribution. First, to our knowledge, this is the first study to explore the role of social capital in reducing software piracy behaviors. Second, the paper delves into the specific mechanisms for how trust exerts an effect on IPR via rule of law and economic development. As a result, we confirm the complementary effect between trust and rule of law, implying that trust-to-IPR are channeled through enhanced formal institutions. The findings produce insights for policymakers to secure IPR through acknowledging the significance of trust as an inherent factor and consolidating the quality of formal institutions simultaneously.

Accordingly, in this study, ordinary least squares (OLS) regressions are initially used to test the impact of informal institutions, economic development, legal institutions and technological environment on software piracy across 56 countries. We also employ two-stage least square (2SLS) regressions to control the endogeneity problem by using the average temperature of the coldest month in the year and the pronoun-drop dummy variables as two instruments for social trust. The results are qualitatively similar to those obtained by OLS regressions. The results also hold when a variety of robustness tests are performed.

2. Hypothesis development

Generalized trust can be defined as “the subjective probability individuals attribute to the possibility of being cheated” (Guiso *et al.*, 2008). Generalized trust indicates expectation toward people’s trustworthiness even beyond the boundaries of face-to-face interaction and including people who are not personally known (Stolle, 2002). Numerous studies document that trust motivates economic prosperity and growth in society (Knack and Keefer, 1997; Whiteley, 2000; Uslaner, 2002; Algan and Cahuc, 2013; Guiso *et al.*, 2008). Whiteley (2000) claims that generalized trust is a factor of production which is of greater importance than human capital.

2.1 *The link between trust and intellectual property right protection*

Generalized trust is linked to trustful behaviors (Rotter, 1980; Wollebaek *et al.*, 2012) and thus consolidating confidence and moral behaviors in society (Cline and Williamson, 2016; Good, 2000). Trust is built on a foundation of moral behavior, so a society with a higher level of trust likely more prevents opportunistic behaviors generally and illegal replication of software specifically (Rose, 2011). Based on the institutional theory, people tend to conform to the moral standards of the society where they live (Rothstein and Stolle, 2008), and it is likely that people also expect their peers to comply with the regulations. Under the view, trust is the belief that an exchange partner is honest and does not engage in opportunistic behavior (Geyskens *et al.*, 1998; Bradach and Eccles, 1989), trust shapes the expectations of individuals about the behavior of others (Boix and Posner, 1998). According to Rotter (1980), those who are willing to trust other people are also trustworthy and so, they are possibly less likely to lie, cheat or steal as well, and thus, it is argued that they are more likely to respect the law or the rights of others. Thus, instead of violating IPRs such as copying, people with a high level of trust will tend to respect others’ IPRs. As a result, trust tends to strengthen IPR protection. Thus, we propose a hypothesis that:

H1. The higher trust is the higher level of IPR protection in a country.

2.2 *The moderation of formal institutions on the link between trust and IPR*

According to Beck *et al.* (2008) and Cruz-García and Peiró-Palomino (2019), formal institutions are measured by economic-judicial institutions, including rules of law, regulatory protections or legal policies that established by the states. Previous studies have empirically validated the clear relationship between rules of law and property right protection (Chang *et al.*, 2017; Christopoulou *et al.*, 2021; Papageorgiadis and Sofka, 2020; Peng *et al.*, 2017). Based on these studies, it is acknowledged that the higher level of law protection of a country, the lower its rate of software piracy.

Numerous literatures have provided evidence for the moderating role of formal institutions in the effect of trust, yet the results are far from conclusive. One vein of the literature highlights a substitutive interaction (Knack and Keefer, 1997; Ahlerup *et al.*, 2009; Guiso *et al.*, 2004). Boix and Posner (1998) suggesting that citizens are more likely to be trustworthy in a country where trust is high, so there is no need to supervise or maintain the legal system. Similarly, trust is considered a significant element to enforce contracts if the law system cannot guarantee them (Guiso *et al.*, 2004). When parties trust together, they possibly decide not to contain safeguarding articles in their contract, which means trust substitutes for contracts (Woolthuis *et al.*, 2005). On the other hand, it is argued that “formal rules can complement and increase the effectiveness of informal constraints” (North, 1990); thus, trust and legal institutions are also found to be a complement in numerous studies (Bjornskov and Méon, 2015; Mccannon *et al.*, 2018). Mccannon *et al.* (2018) argued that a country with stronger contract enforcement and a greater level of trust would increase the higher rates of contract

information and a larger investment. Similar arguments were put forward by [Lazzarini et al. \(2004\)](#) for contract transactions, indicating that formal contracts complement social norms by facilitating their self-enforcement.

While literature is controversial in the moderating effect of social norms against opportunistic behaviors, we expect that formal institutions and informal institutions (herein trust) play a significant role in protecting IP. While trusting in people's goodness and integrity is essential to moral behaviors, it is impossible to determine that trustworthy people are not violating IPRs. Indeed, trust alone is insufficient to protect IPR, since the complexity of IPR requires specific guidelines for people to secure it properly. To this extent, without clear regulations that foster understanding versus respect on IP and educate people toward proper IPR implementation, even trustworthy people may unintentionally resort to IPR violations in various ways. Indeed, while trust diminishes the desire to commit the act of infringement, robust formal institutions help people ensure the correctness of their behaviors, thus reducing inadvertent violations toward IPR. Based on the above arguments, a high degree of trust and a robust law enforcement mechanism simultaneously contribute to deterring violation behaviors. As to be expected, countries with more vital formal institutions have lower SPRs. Therefore, this study proposed the following hypothesis:

- H2.* The impact of trust on IPR protection is stronger in countries with high-level law enforcement.

2.3 The moderation of economic development on the link between trust and IPR

Most of the previous studies investigate how the level of economic development affects intellectual property piracy ([Burke, 1996](#); [Chang et al., 2017](#); [Kigerl, 2013](#)). Through examining the relationship between income and software piracy, a variety of papers ([Andrés, 2006](#); [Kigerl, 2013](#)) concur that intellectual properties receive stronger protection in developed countries. [Burke \(1996\)](#) also asserts that GDP per capita has a negative impact on the music piracy rate. Based on this literature, it is empirically found that intellectual property is better secured in countries with a high level of economic development.

While trust makes it morally unacceptable for people to violate IPRs, increasing income enables them to pay for IP products. Indeed, securing IPR may require a combination of trust and economic development. Previous literature found varied effect of trust in disparate economic conditions. While [James \(2015\)](#) asserts that trust becomes more likely important in a country that has weak economic institutions, [Peiró-Palomino and Tortosa-Ausina \(2013\)](#) find evidence for the positive effect of trust on development in the middle and middle-high income countries yet nonsignificant effect in the poorest countries. In this study, we argue that in high-developed countries, most individuals are more likely to afford authorized software packages; hence, trust seems to play only a minor role in protecting IPRs. Meanwhile, in less developed countries where affordability for IP is hard to achieve, trust becomes a motto in guideline people to follow IPR smoothly and reduce violation behaviors. In other words, trust would be less critical in more affluent countries and more substantial in countries with a lower level of economic development toward IPRs. As such, we expect that there is a moderating effect between economic development and trust toward IPR protection, in which we propose a substitution effect between trust and economic development toward IPR in the following hypothesis:

- H3.* The impact of trust on IPR protection is stronger in countries with a low level of economic development.

3. Methodology

3.1 Collecting data and measuring variables

Most of the previous studies examined factors that impact IPR protection with a fragmented approach. Van Kranenburg and Hogenbirk (2005) divide independent factors into four groups: economic development and stability, penetration of related products, trade relations and legal factors. Goel and Nelson (2009) classify determinants of software piracy with the following three categories: economics, institutions and technology. Based on previous literature, we collect data to analyze the relationship between trust and IPR protection including SPR, the cultural factors, the economic factors, the technological factor and the legal factor. A short description of the instruments for generalized trust is also included.

3.1.1 *Intellectual property right protection (software piracy rate)*. Following (Andrés and Asongu, 2013; Shadlen *et al.*, 2005; Husted, 2000), this study employs global SPRs data extracted from Business Software Alliance study for 2015 as a proxy for IPR protection. This index represents the number of illegally used software packages without authorization out of the total number of software units installed in a specific country. The piracy rates thus range from 0 to 100% with 0% indicating no piracy, and 100% indicating all software installed is pirated [1].

3.1.2 *Social trust*. Trust variable is created at the country level using data from the World Value Survey (WVS). Trust value based on generalized trust is measured by the percentage of individuals answering “yes” to the question “Generally speaking, would you say that most people can be trusted?” This question has become an important indicator of trust used in such diverse topics as a social network (Edric and Kochen, 1987), cross-national differences in the social structure (Yamagishi and Yamagishi, 1994) and economic development (Tabellini, 2010). Özcan and Bjørnskov (2011) assert that the WVS generalized trust is a valid and powerful indicator of trust value.

3.1.3 *Cultural factor (individualism [IDV], masculinity [MAS], uncertainty avoidance [UAI] and power distance [PD])*. Data of Hofstede’s national culture indices are extracted from the website <https://geerthofstede.com/>. Higher scores respectively imply a stronger individualistic culture, a greater separation of gender role, a higher level of anxiety perceived by the society and a more unequally-distributed power culture.

3.1.4 *Economic and social factors (GNI per capita [GNIpercapita], economic openness [openness], GINI coefficients [GINI]) and technological factor (research and development [R&D])*. The main source of data for these variables is the World Bank data bank. We extracted the statistics for the year 2015 to be consistent with the collection year of data of the BSA report used in this study.

3.1.5 *Legal factor (rule of Law [RLE])*. A commonly included legal variable as a determinant of cross-national piracy rates in previous studies is the rule of law index. This index is provided based on the database constructed by Kaufmann *et al.* (2010). According to the World Bank, the rule of law index captures the perceptions of the extent to which agents have confidence in and abide by the rules of society. Better governance, characterized by a stronger rule of law, is theorized to lessen national software piracy.

3.1.6 *Instrument variables (pronoun-drop and temperature)*. To account for possible endogeneity concerns, the study follows recent literature by employing a set of instruments for trust value which is the average temperature of the coldest month in the year and a dummy for whether the predominant language in the country allows a drop of the personal pronoun such as “I” or “You”. These instruments are identified in several trust studies including but not limited to Bjørnskov (2012), Bjørnskov and Méon (2013) and Cruz-García and Peiró-Palomino (2019)

Regarding the language feature, the dummy equals 1 if the predominant language in the country drops the personal pronoun; 0 otherwise. The idea is that keeping the subjective pronoun in the language is interpreted as an emphasis on individuals as well as

individual rights respect. Particularly, speakers of a non-pronoun-drop language are generally likely to show their respect toward others, which results in a culture exhibiting stronger trust norms. The reverse is true in a culture wherein the language has the pronoun-drop characteristic. Based on the above arguments, the coefficient of this variable is expected to be negative.

As for the climatic instrument, Bjørnskov and Méon (2013) are of the belief that social trust may be influenced by the extreme cold weather. Specifically, when it comes to the case of relatively cold climates, it is necessary for individuals to closely collaborate and place great trust in strangers to survive through such severe weather. The average temperature variable should, therefore, exhibit a negative relationship with trust variable.

3.2 Model specification

To test the impact of trust on SPR and to examine whether there are complementary or substitute effects between trust and legal factor and between trust and level of economic development, we utilize the OLS method for the estimation of piracy rate regression models. Our models are as below:

$$SPR_i = a + \beta Trust_i + \varepsilon_i \quad (1)$$

$$SPR_i = a + \beta Trust_i + \gamma C_i + \varepsilon_i \quad (2)$$

$$SPR_i = a + \beta Trust_i + \phi Interaction_terms + \gamma C_i + \varepsilon_i \quad (3)$$

Note:

SPR denotes the rate of software piracy; the index i denotes country;

C_i is the vector of control variables;

Interaction_terms are either $Trust_i * Rule\ of\ law_i$ or $Trust_i * GNI\ per\ capita_i$;

ε_i is the error term.

The first two equations are to test the relationships between trust and SPR (with and without control variables), whereas the remainder is used to study how the effect of trust on intellectual property protection changes in different legal systems and/or the wealth of a nation.

2SLS regression analysis are subsequently performed to deal with endogeneity issues and to track the impact of trust on SPR channeled through formal institutions. As mentioned in the previous section, trust is treated as endogenous and is instrumented by the pronoun-drop feature and the average temperature in both 2SLS. Our first- and second-stage models are as below:

$$Trust_i = a + \beta Avg.Temperature_i + \gamma Pronoun - drop_i + \phi_i \quad (4)$$

$$SPR_i = \rho + \theta Trust_fitted + \phi Interaction_terms + \nu C_i + \varepsilon_i \quad (5)$$

4. Empirical result analysis

4.1 Data description

Table 1 displays descriptive statistics for all variables of interest. The BSA software piracy study in 2016 lists 110 countries, but data of only 77 countries were used for the estimation due to deficiency in longitudinal data. The SPR at the national level ranges from 17 to 90%, with an average rate of 56.55% and a large standard deviation of 22.32%, which indicates a

Variable	Obs.	Mean	Sd	Min.	Max.
SPR	77	56.65	22.32	17	90
Trust	77	27.58	15.42	5.71	74.17
R&D	69	1.12	1.07	0.03	4.28
Openness	74	85.45	59.11	21.45	389.41
GINI	64	37.71	8.23	25.40	63.00
GNIpercapita	77	9.87	0.82	7.79	11.70
RLE	76	0.24	1.05	-2.03	2.06
PD	65	64.45	20.51	13	104
IDV	65	41.88	23.53	6	91
MAS	65	49.08	16.92	5	95
UAI	65	66.69	21.09	8	101
Avg.Temp	77	8.18	10.00	-16.6	27.4
Pro-drop	77	0.79	0.41	0	1

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Table 1.

Descriptive statistics

notable disparity in the piracy rates between countries. There is also a high variability for trust indexes of countries with the Philippines exhibiting the highest degree of trusting behaviors (74.17%) and Norway recording the lowest figure (5.71%).

A correlation analysis was performed on all variables for the purpose of checking for multicollinearity issues and examining the relationships between variables [2]. As anticipated, SPR is significantly correlated with Trust, which supports our hypothesis that the higher trust is, the lower the piracy rate. RLE and GNIpercapita are found to moderately correlate with Trust; hence, intuitively, one may assume that a transmission mechanism from formal institutions to trust would seem probable and that if formal institutions improve, trust would follow a similar trend. However, extant studies have consistently provided evidence that even if governance quality improves, the social trust may remain stable. Trust, like other cultural values, is time-constant, and they are relatively insensitive to transitory phenomena such as policy changes (Bjørnskov, 2010). Thus, under rare circumstances could laws enforcement or formal institutions have a substantial influence on social trust. Moreover, we have considered the possible causal relationship between trust and law enforcement that may lead to incorrect estimation results by conducting the 2SLS regression analysis, which would be discussed further in Section 4.3.

4.2 Multiple regression result and discussion

Initially, the effect of trust on SPR is tested using cross-sectional OLS regressions, and the results are documented in Table 2. In Model 1, the coefficient of trust value in the first equation is -0.655 and significant, confirming a strong negative relationship between piracy level and trust value.

Model 2 adds a series of control variables to check whether the observed relationship between trust and software piracy would vanish when potential influences are introduced in the models. The sign of coefficients of control variables is consistent with previous literature (Shadlen *et al.*, 2005; Gomes *et al.*, 2018; Andrés, 2006). However, trust value exhibits no significant relationship with software piracy, which are also similar to Model 3 when other cultural variables taken into consideration. This indicates that this coefficient partly captured the indirect effect of trust on rule of law and GNI per capita in Models 1 and 2. This alteration of trust coefficient is similar to those of previous studies (Cruz-García and Peiró-Palomino, 2019; Bjørnskov and Méon, 2013) who revealed that once it is controlled by certain types of formal institutions, the relationship between trust and GDP becomes statistically weak or insignificant, suggesting that the effect of trust on output is channeled through the quality of legal systems. Such the case also seems to be valid for SPRs where rule of law and economic

Table 2.
Trust and software
piracy rate: OLS
regressions

Variables	(1) spr	(2) spr	(3) Spr	(4) spr	(5) spr
Trust	-0.655*** (-4.74)	-0.010 (-0.12)	-0.042 (-0.33)	0.078 (0.65)	1.272 (1.24)
Trust*RLE				-0.174*** (-2.98)	-0.130 (-1.34)
Trust*GNPercapita				-5.508*** (-3.76)	-5.176*** (-3.01)
R&D		-4.733** (-2.65)	-4.902*** (-2.74)	0.017 (0.72)	0.021 (0.81)
Openness		0.047** (2.56)	0.024 (0.98)	-0.426* (-1.72)	-0.464* (-1.94)
GINI		-0.554*** (-3.21)	-0.498** (-2.29)	-5.846*** (-2.26)	-3.038 (-0.72)
GNPercapita		-9.052*** (-4.27)	-7.170*** (-2.73)	-5.349* (-1.71)	-10.101*** (-3.64)
RLE		-12.090*** (-4.70)	-10.341*** (-3.54)	-0.012 (-0.17)	0.023 (0.29)
PD			0.030 (0.38)	-0.092 (-0.97)	-0.091 (-0.92)
MAS			-0.101 (-0.99)	-0.144** (-2.43)	-0.117* (-1.94)
IDV			-0.096 (-1.64)	-0.050 (-0.80)	-0.039 (-0.60)
UAI			-0.037 (-0.57)	55	55
Observations	77	59	55	55	55
Adjusted R ²	0.1944	0.8662	0.8676	0.8820	0.8689

Note(s): *t* statistics in parentheses; *, **, *** denote that variables are statistically significant at 10%, 5 and 1% regressions

growth is correlated with the dependent variable at the 1% level, while trust variable loses its significance.

In sum, the value of trust determines software piracy, but only when economic, legal and other indicators are not accounted for in the model. These results reaffirm our conjecture about the moderation of formal institutions in the relationship between trust and IPR protection.

Models 4 and 5 present the results for testing the [hypotheses 2](#) and [3](#). The coefficient of interaction term between trust and rule of law in Model 4 is negative and significant, supporting [hypothesis 2](#) that legal frameworks do act as a moderator in the relationship between trust and piracy rate. That is, higher trust is associated with lower software piracy and this impact is relatively more profound in countries where the regulatory protection is decently enforced by the legal system. Similar to conclusions of [Mccannon et al. \(2018\)](#) in the case of contracts, [Bjørnskov and Méon \(2013\)](#) in the case of productivity and growth, our result, regarding SPR, confirms the notable role of institutional frameworks in the positive effect of trust on protecting IPRs. Legal provisions are a legitimate necessity for better control of piracy if individuals in that country exhibit a high degree of trusting behaviors.

Model 5 introduces an interaction term Trust*GNIpercapita, which has a negative yet insignificant interaction coefficient. Unlike what had been found in the studies of [Knack and Keefer \(1997\)](#), [Ahlerup et al. \(2009\)](#) and [Peiró-Palomino and Tortosa-Ausina \(2013\)](#), in the case of SPR, economic prosperity is not convincingly found to play a moderating role between trust and piracy level, which, therefore, does not provide support for [hypothesis 3](#).

4.3 Endogeneity

The negative relationship between trust and SPR reported above potentially suffers from bias estimation. The result of 2SLS regression for four models is reported in [Table 3](#).

To reaffirm the complementary effect between trust and legal frameworks, we use the fitted value of trust, which is regressed on two instrumental variables and a set of control

Variables	(1) 2sls trust_g	(2) 2sls Spr	(3) 2sls spr	(4) 2sls spr
Avg.Tem	-7.039* (-1.90)			
Pro-drop	-0.421* (-1.87)			
Predicted trust		2.289 (1.58)	-0.087 (-0.32)	-2.424 (-1.15)
Predicted trust*GNIpercapita		-0.254* (-1.81)		0.242 (1.13)
Predicted trust*RLE			-0.236** (-2.27)	-0.378** (-2.41)
R&D	-1.448 (-0.73)	-5.075*** (-3.15)	-5.403*** (-3.70)	-5.609*** (-3.92)
Openness	-0.025 (-0.72)	0.010 (0.41)	0.006 (0.28)	0.006 (0.28)
GINI	-0.658*** (-2.83)	-0.621* (-1.80)	-0.593 (-1.65)	-0.617 (-1.67)
GNIpercapita	4.574 (1.00)	1.755 (0.40)	-4.337 (-1.54)	-10.574 (-1.58)
RLE	0.661 (0.20)	-9.698*** (-3.63)	-3.723 (-0.98)	-0.347 (-0.08)
PD	-0.257** (-2.07)	-0.006 (-0.07)	-0.031 (-0.35)	-0.055 (-0.58)
MAS	-0.267** (-2.03)	-0.108 (-1.08)	-0.099 (-0.98)	-0.103 (-0.99)
IDV	-0.078 (-0.74)	-0.178** (-2.32)	-0.201*** (-2.73)	-0.199*** (-2.76)
UAI	-0.376*** (-3.62)	-0.138 (-1.36)	-0.139 (-1.37)	-0.137 (-1.33)
Observations	55	55	55	55
Adjusted R ²	0.5811	0.8771	0.8854	0.8846

Note(s): *t* statistics in parentheses; *, **, *** denote that variables are statistically significant at 10%, 5 and 1%

Table 3. Trust and software piracy rate: 2SLS regressions

variables, to replace the original trust variable. Table 3 shows the similar signs and significance of the interaction terms as obtained in Table 2. Specifically, while the variable Predicted trust*GNIpercapita yields inconsistent sign and significance, the interaction term between predicted trust and rule of law has significantly negative coefficients in both Models 3 and 4. As such, the result confirms that the impact of trust on protecting property rights is greater in countries where the regulatory protection is decently enforced by the legal system.

4.4 Robustness test

To justify our law enforcement measure, an estimation using specification with the average value of six Worldwide Governance Indicators as an alternative proxy for legal quality is conducted. Six indicators including voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption are extracted from Kaufmann *et al.* (2010). However, several researchers demonstrate that six indexes of WGIs have high intercorrelations; hence, they are not measuring disparate dimensions of governance within each nation (Langbein and Knack, 2010; Al-Marhubi, 2004). Therefore, in this robustness test, we average six WGI indexes together instead of rule of law data which is taken from the WGI independently. Most of the coefficients of the variables remain unchanged compared to those attained with the initial variable of law enforcement.

We also employ another measurement of IPRs protection to reaffirm the use of SPR. In the regression, the SPR is replaced by the Intellectual Property Rights Index, one of the three main components of the International Property Rights Index reported by Property Rights Alliance. While the latter provides a comprehensive overview of the status of property rights across countries, the former is conceptualized by three core items, including Perception of Intellectual Property Protection, Patent Protection and Copyright Piracy, thus reflect the strength and defense of IPRs of a country. As anticipated, the estimation with Intellectual Property Rights Index as the dependent variable is consistent with our initial results [3].

5. Conclusion

As discussed earlier, it is critical to address unsolved concerns in the literature review of IPR, such as whether informal institution – trust can explain intellectual property protection and what the mechanisms might be. As a result, in line with other macroeconomic spheres to acknowledge the indirect impact of trust, this paper confirms that trust influences IPR through the moderation of formal institutions. Specifically, trust can reduce software piracy in countries with stronger law enforcement, implying that formal institutions and informal institutions have complementary effects on the SPR. The findings are consistent with several recent studies (Cline and Williamson, 2020; Mccannon *et al.*, 2018) and add empirical data to the current inconclusive literature on the role of trust in economic transactions.

As the role of trust is highlighted in providing IPR protection, our findings have several implications. First, this implies that countries exhibiting a higher level of trust are in a more favorable condition to deter intellectual property piracy than low-trust countries in countries with a strong legal system. Second, it is of note that trust is reinforced by cultural norms – of which the transition is occurring slowly from generation to generation (Uslaner, 2002); indeed, low-trust countries might opt to foster quality of formal institution frameworks such as increasing the legitimacy of IPR law, stimulating economic development as well as economic openness, and promoting investment in R&D to facilitate their IPR protection. Overall, this study provides a grasp of understanding for policymakers to establish well-functioning institutions where informal aspect like trust accompanies legal frameworks to secure IPR. Also, our findings can assist intellectual-property-related enterprises in selecting country markets to ensure a favorable business environment.

There are two major study areas, in our opinion, where future contributions will be highly appreciated. First of all, future studies could concentrate on refining the trust proxies. Better trust measures would allow for more robust assessments of the proposed relationships, so they can provide further insights. Second, our research focuses on demonstrating the link between trust and IPRs. Future researches might take a similar approach to this one but focus on the effects of trust and other types of intellectual property assets, specifically such as patents, copyrights and trademarks.

Notes

1. Note that a lower software piracy rate reflects a higher level of IPRs protection.
2. The result is provided upon request.
3. All the results of robustness tests are available upon request.

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