Securing Private Property: Formal versus Informal Institutions

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Abstract

Property rights are one of the most fundamental and highly robust institutions supporting economic performance. However, the channels through which property rights are achieved are not adequately identified. This paper is a first step toward unbundling the black box of property rights into a formal and an informal component. We empirically determine the significance of both informal and formal rules in securing property rights. We find that when both components are included in the analysis, the impact of formal constraints is greatly diminished, while informal constraints are highly significant in explaining the security of property. These results are robust to a variety of model specifications, multiple instrumental variables, and a range of control variables.

1. Introduction

What makes property rights secure? Although there is little consensus on the answer to this question, recent studies illustrate how secure property rights institutions lead to economic development (Scully 1988; Boettke 1994; Leblang 1996; de Soto 2000; Acemoglu, Johnson, and Robinson 2001, 2002; Landau 2003; Kerekes and Williamson 2008). Given this link between economic performance and well-defined, secure property, it is of critical importance to understand how to achieve secure property. This is particularly true for the significant number of countries in the developing world that fail to maintain secure property rights institutions. This paper attempts to identify the specific channels that lead to the establishment of secure property rights. To do so, we analyze two potential

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mechanisms to promote property rights: informal institutions and formal institutions. We define formal institutions as political constraints on government behavior and informal institutions as private constraints, such as norms or customs.[1]

This paper is a first step toward opening the black box of property rights institutions and understanding the relative importance of which mechanisms are more productive in securing property rights. We argue that both a formal and an informal component need to be included in an analysis attempting to understand what underpins property rights institutions. Our analysis seeks to separate out the direct causal effects of both types of constraints and empirically determine the significance of each.[2] We do so by controlling for measures of both formal and informal institutions in regressions in which the dependent variable is a measure of the overall security of property. We focus on the separate effects of each type of institution for several reasons. Most studies up to this point largely focused on the role of formal rules in securing property rights. We believe that these studies have contributed greatly to our understanding of property rights institutions but are missing an important element—namely, the potential role of informal rules. We recognize the possibility and, in some instances, the higher probability that different institutional relationships run in various directions to affect the development of the overall institutional environment. Thus, formal and informal rules often develop a feedback loop or interaction effect between one another. While we believe that this effect may be important, how formal and informal institutions interact is not necessarily a clearly defined relationship. Instead, a first step toward understanding the security of property rights is to understand the direct effect of each type of institutional constraint. Therefore, the evolution, or interaction effects, of formal and informal institutions is beyond the scope of this analysis.

Although we do not quantify the interaction between formal and informal institutions, this interaction does add to the empirical problems that must be overcome as we attempt to separate out the individual effects. Multiple instrumental variables are utilized to overcome the possible endogeneity concerns and reverse-causality issues present in this type of analysis. The use of instruments serves to isolate the channels through which both informal and formal institutions affect property rights. We find that any impact from formal constraints disappears once we control for informal institutions, while the informal constraints significantly lead to more secure property.

This paper challenges conventional beliefs that formal institutions are the driving force establishing property rights. Instead, we contend that informal mechanisms are crucially important but are often underestimated (as are the costs of government codification), while the benefits of codification are typically

[1] We define and discuss our measurement of each of these mechanisms in detail in Section 2.

[2] For a comprehensive analysis of the time-series effects of changes in major institutions, see Sobel and Coyne (2010).

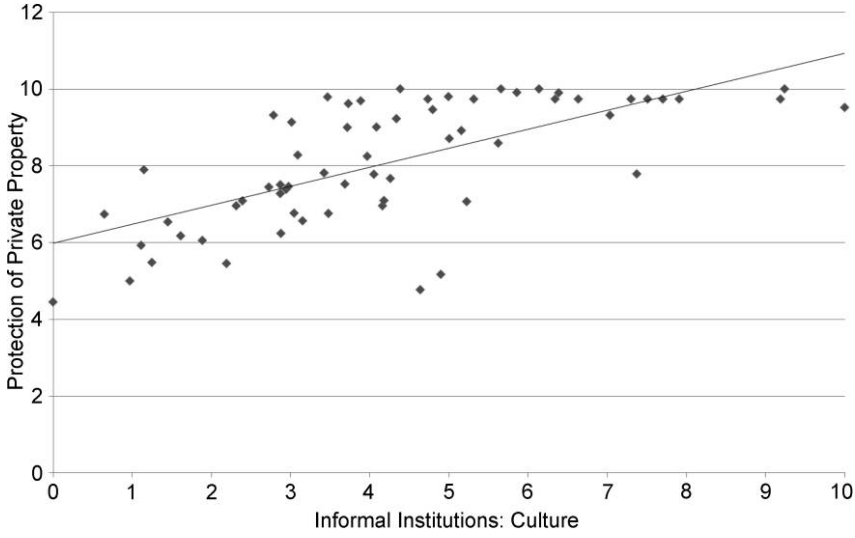

Figure 1. Property protection and culture

overstated. In addition, we argue that criticisms of the empirical link between property rights institutions and economic development (for example, Sachs 2001, 2003; Glaeser et al. 2004) stem from incorrect measurement of institutions. Our paper seeks to rectify these criticisms and contribute to the new institutional literature by empirically identifying the determinants that underlie secure property rights institutions and contribute to economic development. To our knowledge, no other study has undertaken this investigation. Although we view our results as robust, we do want to caution the reader against drawing strong implications because of empirical concerns that we attempt to address throughout the paper. Before turning to our conceptual explanation or to more sophisticated empirical techniques, an examination of the raw data provides insight into the relationships between formal and informal institutions and the security of property.

Figure 1 shows the relationship between our measure of informal institutions, culture, and the average protection against risk of expropriation, our measure of the overall protection of private property. As the level or quality of informal institutions increases, so does the security of property rights. A visible upward trend highlights an important role for informal institutions in securing property, which suggests that the importance of informal institutions is underestimated.

Figures 2, 3, 4, and 5 show the relationships between the protection of private property and our four measures of formal institutions: judicial independence, proportional representation, constitutional review, and plurality. A similar relationship emerges between each measure of formal political constraints and the

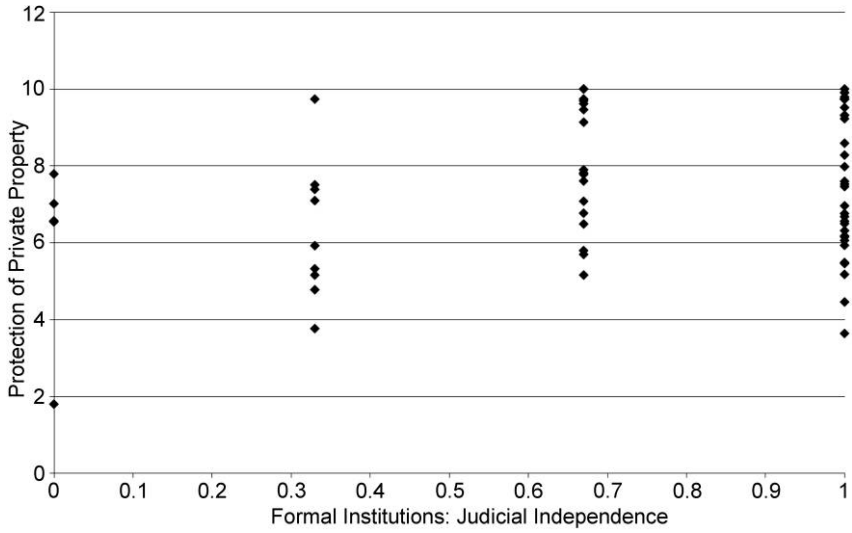

Figure 2. Property protection and judicial independence

protection of private property. Figure 2 indicates that judicial independence does not affect the security of property. For any level of judicial independence, there exists a wide range of protection against expropriation. Figure 3 indicates that proportional representation also appears not to affect the level of secure property rights. Achieving the highest score for proportional representation does not improve the security of property. Figures 4 and 5 plot constitutional review and plurality, respectively. These figures support the previous result that formal institutions do not play a significant role in protecting property rights. This suggests that formal constraints on government are not necessarily driving the protection of property. The raw data show a clear relationship between informal and formal institutions and the level of secure property rights: informal institutions exert an effect on securing property, while formal institutions do not. We employ more sophisticated techniques to substantiate these results below, including controlling for both institutions simultaneously and isolating exogenous impacts.

2. Theoretical Background

Property rights are one of the more fundamental and highly robust institutions; however, the institution itself is a black box. To understand the determinants of secure property rights, we must distinguish between different types of predation and different enforcement and protection mechanisms. In other words, we must identify sources of insecurity. Two types of predation exist that undermine the security of property. The first is public predation or expropriation from the

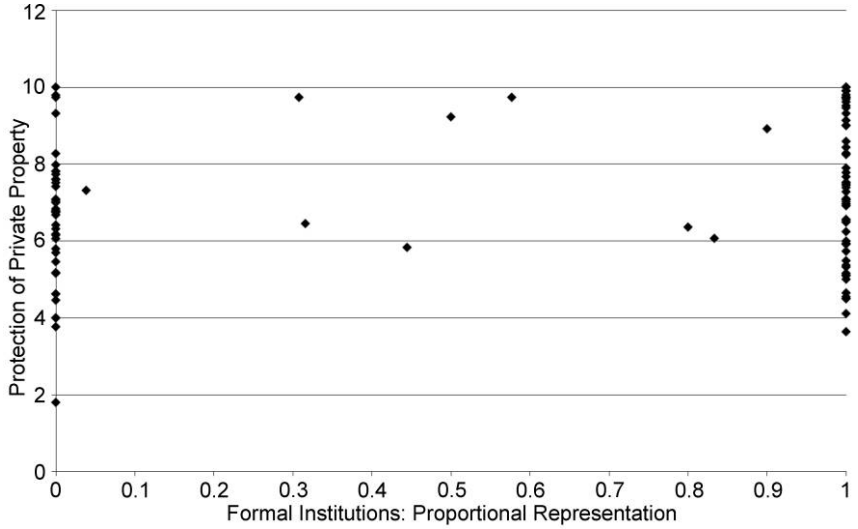

Figure 3. Property protection and proportional representation

government. This implies direct confiscation of property, such as land or capital, by government officials. The second is private predation, in which other citizens expropriate, or attempt to seize, another individual's property. This can also take a variety of forms, such as not honoring a contract or seizing someone's land or physical capital. In order to establish secure property rights institutions, both types of predation must be prevented (North 1981).

In addition to differentiating between types of predation, we must also parse the various forms of protecting or enforcing someone's right to his or her property. In theory, government is capable of protecting individuals against both types of predation: expropriation from government and expropriation from other citizens.[3] Protection against the state typically involves rules that establish constraints on government behavior, such as constitutional constraints (see, for instance, Hayek 1960; La Porta et al. 2004). To protect against other citizens, government can establish rules to govern individual behavior that are enforceable in a court system, including contract and debt enforcement (see, for example, Djankov et al. 2003; La Porta, Lopez-de-Silanes, and Shleifer 2006; Djankov et al. 2008). A more specific example of government protection against private

[3] Contract theory recognizes formal institutions as a means of protecting against private and public predation (Buchanan and Tullock 1962).

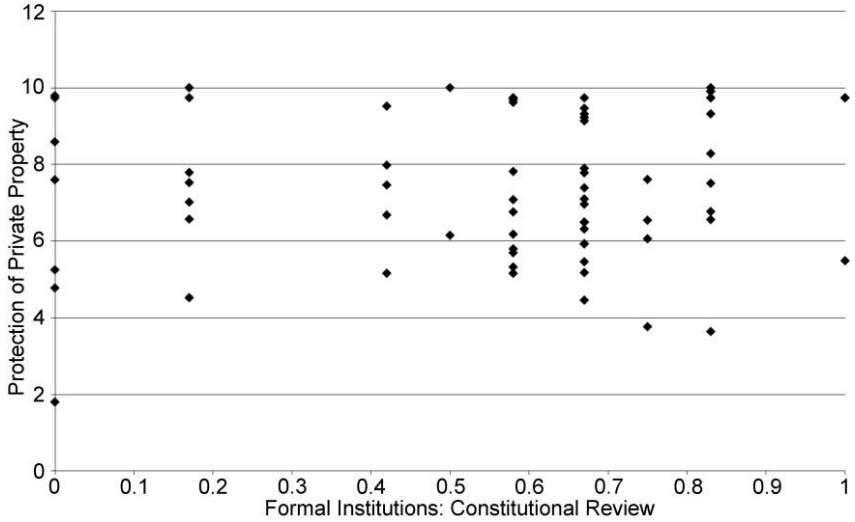

Figure 4. Property protection and constitutional review

predation is government land titling (Binswanger, Deninger, and Feder 1995; de Soto 2000; Baharoglu 2002).[4]

Another possibility is to rely on private mechanisms. These private mechanisms can range from attitudes, beliefs, customs, norms, and traditions that guide everyday individual behavior to privately established and enforced court systems. For instance, the Medieval Law Merchant provides an example of how private mechanisms can spontaneously emerge based on custom to establish and enforce informal rules (Benson 1989a). The existing literature on self-enforcing cooperation and exchange argues that public production of law and formal legal systems are not necessary to establish and enforce property rights (Benson 1989a, 1989b; Greif 1993; Greif, Milgrom, and Weingast 1994; Nenova and Harford 2004; Leeson 2005, 2007a, 2007b, 2007c). Benson (1989b) shows that customary law successfully defined and enforced property rights in primitive societies. This enforcement mechanism arose through voluntary cooperation as individuals realized the value of respecting one another's property. The threat of boycott or

[4] The effect of land titling is mixed. For studies that find positive effects associated with government land titling, see Feder et al. (1988), Banerjee, Gertler, and Ghatak (2002), Do and Iyer (2003), and Field (2005). However, other scholars do not find any benefit from government land titling (Atwood 1990; Kimuyu 1994; Place and Migot-Adholla 1998; Firmin-Sellers and Sellers 1999; Place and Otsuka 2001; Brasselle, Gaspart, and Platteau 2002; Kerekes and Williamson 2009).

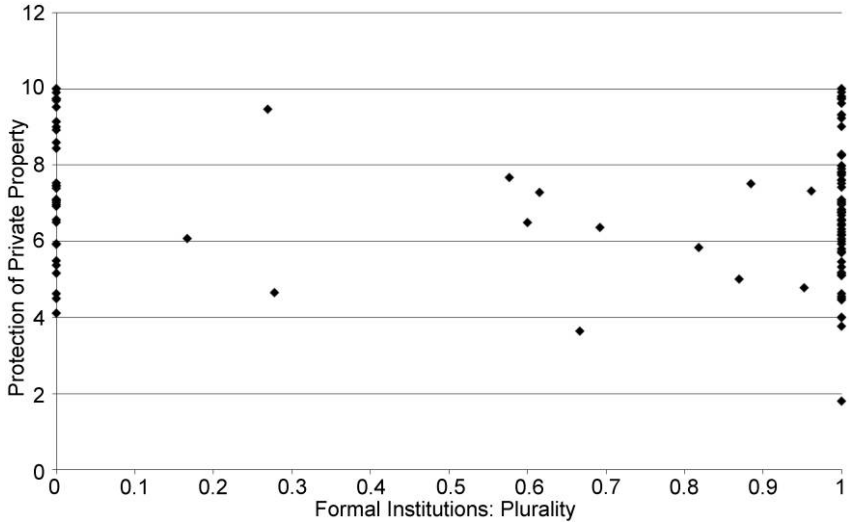

Figure 5. Property protection and plurality

ostracism was sufficient to promote cooperation in primitive societies and to protect property.[5]

Until recently, most papers empirically analyzing institutions and economic development did not distinguish between different types of predation or enforcement mechanisms. Acemoglu and Johnson (2005) provide a first step toward unbundling institutions by investigating government's role in protecting against both public and private predation. They find that property rights institutions, defined as rules constraining government behavior, have a positive and significant long-run effect on investment, financial development, and economic growth. Government's provision of protection against private predation (contracting institutions) only weakly affects financial development. We view this finding as suggesting that government's primary role in establishing secure property rights institutions is to create rules that limit public predation or government expropriation.

Therefore, the first component of our analysis centers on this link between property rights and formal rules constraining government behavior, what we define as formal institutions. The second component of our analysis focuses on the private mechanisms available to protect against predation (either public or

[5] Other articles that demonstrate that private enforcement mechanisms, such as bilateral and multilateral punishment, can successfully define and protect property rights are Anderson and Hill (1979), McChesney (1990), and Kaffine (2009). Also, Leeson (2007d, 2009) illustrates how seventeenth-century pirates relied on private means to promote social cooperation and secure their assets.

private), a link that is not previously explored in the applied institutional literature. We call these private mechanisms, such as attitudes and norms, informal institutions. The key difference between formal and informal institutions is that informal rules emerge spontaneously and are not part of a government mandated and enforced legal system, whereas formal institutions capture those rules to constrain government that are created and enforced by government. Informal institutions remain in the private sphere. Formal constraints are centrally designed and enforced. In summary, our analysis separates property rights institutions into two components: a formal component that captures political constraints on government behavior to protect against public predation and an informal component that captures private mechanisms that may secure property rights.

3. Data and Empirical Methodology

The empirical strategy is to isolate the channels through which formal and informal institutions affect property rights. The basic economic relationship that we attempt to capture can be expressed as

$$Y_i = \mu + \beta C_i + \alpha F + \boldsymbol{Z}_i'\delta + \varepsilon_i,$$

where Y is the property rights institution, C is the informal institutions, F captures the formal institutions, and $\boldsymbol{Z}$ is a vector of other control variables. Because of limited data availability (for example, our measure of formal institutions is available at only one point in time), we are capable of performing cross-sectional analyses only. However, this is common in the institutional literature (Acemoglu, Johnson, and Robinson 2001, 2002; La Porta et al. 2004). This paper describes exactly why these proxies of the different types of institutions are appropriate and how they are measured and analyzed.

3.1. Property Rights Institutions

In order to unbundle the institution of private property, we must first identify an appropriate measure of property rights institutions. Current literature employs the International Country Risk Guide's (ICRG) average protection against risk of expropriation as the best measure of formal property rights institutions (Acemoglu, Johnson, and Robinson 2001, 2002; Glaeser et al. 2004; Acemoglu and Johnson 2005; Tabellini 2010). However, Glaeser et al. (2004) show that this measure is actually an outcome measure of institutions and policy choices. This measurement does not reflect permanent political constraints because it rises with per capita income and is highly volatile. For example, if a dictator of a country happens to not expropriate its citizens' property, this is reflected in the index with a higher score. However, this does not reflect government constraints that serve to protect property rights. We argue that ICRG's measure of property rights does not pass a series of rigorous tests to qualify as formal political

institutions.[6] It does capture the overall security of property that is the outcome of the country's institutional environment, policies, and culture. Therefore, the ICRG index is an outcome, a de facto measure reflecting both the informal and formal components protecting one's property, not just the political environment. We view this variable as capturing both the formal and informal aspects of property rights institutions, as defined above.

Given the nature of the ICRG variable, it is appropriate in the analysis to employ this index as a general snapshot capturing actual protection of property rights. Instead of following conventional analysis, we move this index from the right-hand side to the left-hand side of the regression. In other words, we do not use this measure as an explanatory variable. Instead, we use it as the dependent variable in order to decipher what underlies secure property rights—formal rules on government or informal constraints on individual behavior. Our empirical strategy tests for the significance of the formal and informal institutions. Average protection against risk of expropriation is available only for the years 1982–97. We use the average of the variable over this period for our analysis.

3.2. Formal Institutions

Continuing to follow the argument in Glaeser et al. (2004) for defining and measuring institutions, we assert that for a political constraint to be classified as a formal institution, the rule must show depth and durability. For example, constitutions and electoral rules satisfy this criterion, but policies chosen by a dictator do not. In order to qualify, the institution must be reasonably permanent and act as a focal point. Following this argument, most of the current literature neglects to correctly define a political or formal institution. The proxies used to measure institutions are survey indicators of institutional quality (for example, the ICRG) and reflect a mix of institutions and policies. These de facto outcome variables are not appropriate measures of formal institutions. This mis-measurement of formal political institutions may partially explain some of the recent criticisms of the institutional literature.

In order to correctly measure formal institutions, we rely on four constitutional constraints identified in Glaeser et al. (2004) that are intended to constrain government predation. These constraints are plurality, proportional representation, judicial independence, and constitutional review and can be classified as either electoral rules or judicial constraints. Electoral rules, as argued by Persson and Tabellini (2003), are important constitutional rules that place constraints on legislative behavior by increasing competition among legislators and creating incentives to pursue either individual or the public interest. This is captured by two measures: plurality and proportional representation. Plurality represents the election of a legislator by a winner-take-all strategy. Proportional representation

[6] Glaeser et al. (2004) show that not only the ICRG index but also Polity IV's Constraint on Executives and a government effectiveness index collected by Kaufmann, Kraay, and Mastruzzi (2003) are susceptible to these concerns.

captures whether a candidate is elected on the basis of the percentage of votes received by his or her party (Beck et al. 2001).[7] Both measures are annual dummy variables that are equal to either zero or one in each year that this is the electoral rule used in a country. These variables are averaged over the period 1975–2000 to expand the sample size.

Judicial constraints, measured by judicial independence and constitutional review, capture the constraint on the executive issued by the judiciary. Judicial independence measures the term length of Supreme Court judges. Constitutional review captures both the extent of judicial review and the rigidity of the constitution. Judicial review is measured by whether judges have the power to review the constitutionality of laws. The rigidity of the constitution quantifies how difficult it is to change the constitution by counting the number of steps necessary to do so (La Porta et al. 2004). Both judicial independence and constitutional review are available in 1995 and are normalized to range between zero and one. All four formal constraints are defined as objective constitutional measures of political rules constraining government. Therefore, higher scores for each measure necessarily imply stronger formal institutions. Although these measures do not capture all possible existing constraints on government, we believe that they serve as appropriate proxies to capture constitutional restrictions on expropriation.

3.3. Informal Institutions

Informal institutions are those rules that shape human behavior but are outside of government and are not part of a written legal framework. These private mechanisms that guide everyday interactions and shape a way of life in a given region include social norms, customs, attitudes, beliefs about right and wrong, and rules of enforcement (North 1990). Defined in this manner, informal institutions include the private mechanisms that exist to secure property.

Recall that, to qualify as an institution, constraints need to be persistent over time and show depth and durability. Therefore, we rely on a previously established measure of culture (see, for example, Tabellini 2008; Coyne and Williamson 2009; Tabellini 2010; Williamson 2009) to proxy for informal institutions because it is persistent and does not change quickly.[8] Our measure of culture is constructed by identifying several key traits that are relevant for economic interaction and exchange—in other words, economic culture. Porter (2000, p. 14) defines economic culture as "the beliefs, attitudes, and values that bear on economic activities of individuals, organizations, and other institutions." We follow Porter's terminology to narrow the concept of culture so that we can focus our analysis on how economic cultural traits may support property rights institutions.

[7] Countries are not restricted to one system or the other. It is possible for a country to have both types of systems in place (for example, Australia and Brazil).

[8] For studies empirically investigating the direct association between culture and economic development and growth, see Guiso, Sapienza, and Zingales (2006), Licht, Chanan, and Schwartz (2007), Tabellini (2008, 2009), and Williamson and Mathers (2011).

Our economic culture variable is constructed by identifying four distinct categories of culture that should constrain behavior related to social and economic interaction and, thus, property rights protection. These four components are trust, respect, individual self-determination (called control), and obedience. These components serve as rules governing interaction between individuals. In general, trust, respect, and individual self-determination are thought to promote secure property rights, whereas obedience may lead to higher rates of expropriation, as explained in detail below. We follow the methodology of Tabellini (2010) in measuring culture and its components. To maximize sample size, we use two waves of the World Values Surveys and the European Values Surveys, 1995–97 and 1999–2000, consisting of more than 119,000 individual responses. These surveys capture individual beliefs and values that reflect local norms and customs. Each section of culture has a corresponding question from the survey and a different aggregation process that is discussed in more detail below.

Trust is argued to reduce transactions costs, to lead to efficient outcomes more quickly, and to further market exchange (Fukuyama 1996; La Porta et al. 1997; Woolcock 1998; Zak and Knack 2001; Dixit 2004; Francois and Zabojnik 2005). Therefore, it is argued that higher trust societies will experience higher levels of economic development and growth (Knack and Keefer 1995). We argue that this same logic holds between trust and property rights institutions. The more you trust your neighbor, the less likely you are to expropriate his or her property (and vice versa). Trust reduces the cost of monitoring and lowers transactions costs; thus, promoting mutual trust in individuals leads to less private predation. A lack of trust between individuals increases the cost of monitoring and transactions costs, resulting in individuals trading among small networks rather than expanding into anonymous market participation. By not engaging in wider trading networks, individuals may view expropriation as an appropriate means of obtaining what they want.

The following question from the survey is used to measure the trust component of culture: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" The level of trust is captured in each country by summing the number of respondents that answered "Most people can be trusted" as opposed to "Can't be too careful" and "Don't know."

The second component of culture captures how determined individuals are in their efforts to succeed. Individual motivation depends on the level of self-control that individuals believe they have over their choices. This is influenced by whether individuals reap the benefits or consequences of their actions. The more likely it is that economic success is determined by one's own will, the more likely individuals are to work harder, invest in the future, and engage in entrepreneurial activities (Banfield 1958). An extension of this argument is that individual choice depends on how much control a person feels that he or she has over his or her life. When individuals think that they have control over their lives, they will be more likely to find ways that improve their economic welfare,

including finding solutions to problems surrounding property rights. As individuals feel that more of their choices determine their success, they will be more likely to respect others' property and not engage in plunder, resulting in higher levels of secure private property. However, if individuals view the likelihood of succeeding as a product of luck or political connections, they will tend not to engage in productive activities, such as investing in securing property rights.

To identify and capture this cultural component (which we call control), we use the following survey question: "Some people feel they have completely free choice and control over their lives, while other people feel that what we do has no real effect on what happens to them. Please use this scale (from 1 to 10) where 1 means 'none at all' and 10 means 'a great deal' to indicate how much freedom of choice and control in life you have over the way your life turns out." We determine an aggregate control component by averaging all the individual responses and multiplying by 10.

The third cultural trait is defined as respect. In some societies, engaging in highly opportunistic behavior outside of your small group or network is accepted, whereas other societies promote social interactions beyond small groups (Platteau 2000). This can be defined as the amount of respect present in different societies. The differing attitudes about respect have economic consequences or benefits that range from the provision of public goods in a local community and the monitoring of political representatives (Banfield 1958; Putnam 1993). We argue that respect for property rights is another economic consequence or benefit that can emerge from these different mentalities. For example, the lower the respect among individuals in general, the more likely that property will not be respected, leading to more property expropriation.

The following survey question is analyzed to determine the importance of respect in a society: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five." Respect is defined as the percentage of respondents in each country who mentioned that the quality "tolerance and respect for other people" is important.

The fourth and final cultural trait captures the importance of obedience in a society. Tabellini (2010) argues that some societies teach that individualism can be destructive. It is the role of the state to suppress these instincts through coercion to achieve good outcomes. Therefore, a strong emphasis is placed on the role of the state as a coercive unit. Likewise, this translates into the parental unit also suppressing individual instincts in their children. This type of attitude stifles economic development by discouraging innovation, entrepreneurship, and cooperation among other members of society. Higher obedience may lead to lower rates of innovation and entrepreneurship, because individuals have less incentive to be entrepreneurial. As a result, individuals may not invest resources to invent ways to define and enforce property rights, resulting in more property expropriation. In addition, more obedience may also lead to less widespread cooperation across groups, as individuals do only what they are told versus

Table 1
Summary Statistics

Variable	Observations	Mean	SD	Min	Max
Average protection against risk of expropriation	121	7.11	1.81	1.81	10.00
Culture	63	4.27	2.20	.00	10.00
Judicial independence	67	.75	.32	.00	1.00
Proportional representation	112	.60	.48	.00	1.00
Constitutional review	69	.56	.27	.00	1.00
Plurality	116	.66	.46	.00	1.00
GDP growth rate, %	117	2.79	2.50	−6.27	10.56
Log educational attainment in 1960	96	3.66	.95	.41	4.58
Urban population, %	119	53.69	23.34	10.77	100.00
Government consumption, %	117	16.30	6.20	4.41	36.09
Latitude	119	.28	.19	.01	.72
English legal origin	119	.31	.46	.00	1.00
Culture index PCA	63	4.10	2.15	.00	10.00
Formal index PCA	63	4.96	3.82	.00	10.00
Embeddedness	45	3.75	.36	3.04	4.50
Harmony	45	4.22	.37	3.35	4.91
Hierarchy	45	2.23	.47	1.41	3.63
Individualism	63	4.49	2.89	.00	10.00
Power distance	63	4.82	2.37	.00	10.00
Uncertainty avoidance	63	4.28	2.31	.00	10.00
Pronoun drop	40	.55	.50	.00	1.00

Note. GDP = gross domestic product; PCA = principle component analysis.

cooperating with one another in productive endeavors and to solve problems. This also potentially leads to higher rates of property expropriation. Our measure for obedience comes from the aforementioned question that asks individuals to rank which qualities are important to teach children. This cultural trait is defined by the percentage of respondents that identified obedience as an important quality.

Combining all four traits, we achieve one comprehensive measure for culture for each country by summing trust, control, and respect and then subtracting the obedience score. We then convert this comprehensive variable to a relative scale ranging from 0 to 10, with 0 representing the country with the culture least conducive to securing property rights and 10 representing the country with the culture most conducive to securing property rights. Table A1 in the Appendix describes the culture data including each country's index score and relative rank. Detailed data descriptions and sources for all variables used in the empirical analysis are provided in Table A2 in the Appendix.

4. Benchmark Specifications and Results

Summary statistics for all of the variables used in the analysis are provided in Table 1. Recall that average protection against risk of expropriation, culture, and all four measures of formal institutions are measured where a higher score

implies more secure property rights. Due to the nature and construction of our variables of interest, we do not place much weight on the interpretation of the coefficients; instead, we are mainly interested in the sign and significance of the variable, although we do attempt to provide some economic interpretation of the main variables.

We show the basic relationship between formal and informal institutions and property rights by employing univariate and bivariate ordinary least squares (OLS) regressions. The univariate regression is identified as

$$Y_i = \mu + \beta I_i + \varepsilon_i,$$

where Y equals average protection against risk of expropriation and where I is either the formal institution or the informal institution. The bivariate regression is identified as

$$Y_i = \mu + \beta C_i + \alpha F + \varepsilon_i,$$

where C equals the informal institution measured by culture and F represents the formal measures. Next, we build on these initial results and include additional control variables. This regression is identified as

$$Y_i = \mu + \beta C_i + \alpha F + \boldsymbol{Z}_i'\delta + \varepsilon_i,$$

where $\boldsymbol{Z}$ represents the vector of additional control variables. The control variables include gross domestic product (GDP) growth (percentage), educational attainment in 1960 (log form), urban population (percentage), and government consumption (percentage). Here GDP growth is averaged for the period 1982–97. Educational attainment refers to the amount of schooling received by 1960. Urban population and government consumption are measured as percentages averaged for the years 1982–97. We follow previous literature (Acemoglu et al. 2001, 2002; Glaeser et al. 2004; Acemoglu and Johnson 2005; Tabellini 2010) in determining which control variables to include. All control variables are taken from World Development Indicators (World Bank 2006). Detailed data descriptions and summary statistics are presented in Table A2 in the Appendix and in Table 1, respectively.

Before presenting the OLS regression results with our aggregate culture variable, we first present the baseline relationship between property protection and the four individual components used to construct the culture index. We do so as a way to check our basic intuition surrounding each variable. These results are presented in Table A3 in the Appendix. Columns 1–4 are the univariate regressions for each component and show that each variable has the expected sign. Trust, respect, and individual self-control positively affect property protection, whereas obedience has a negative effect. With the exception of individual control, all variables are significant at the 1 percent level. Column 5 reruns the regression, controlling only for the cultural values with a positive effect. Trust and respect remain positive and highly significant, whereas control is positive but insignificant. Column 6 controls for all four variables simultaneously. Trust

is positive but loses its significance. Control is also insignificant. Respect remains positive and highly significant as obedience remains negative and highly significant. The moderately high R^2 values from these regressions (except when only control is included) suggest that culture may explain a significant amount of property rights variation, especially when controlling for all four culture variables ($R^2 = .54$). We view this last result as supporting our assumption that all four components should be included in the analysis to more accurately capture a country's overall cultural environment. Therefore, the remainder of our analysis focuses on the aggregate culture index, not on individual components.[9]

The benchmark OLS regression results are presented in Table 2. Columns 1–5 show the univariate results. Column 1 shows the effect of culture (the informal measure) on average protection against risk of expropriation (the dependent variable). Culture has a positive effect on the protection of property and is significant at the 99 percent level. A 1-unit increase in the culture index increases property protection by .5 units. An increase of 1 standard deviation (SD) in the culture score increases property protection by approximately 1 unit. This also suggests that a country that moves from the lowest rank (Uganda) on the culture scale to the highest rank (Sweden) will increase property protection by 5 units on a 10-point scale, a rather dramatic increase. Also, the adjusted R^2 value (.45) suggests that culture is explaining almost one-half of the variation in the dependent variable.

Columns 2–5 show the effects of the formal measures on the security of property. Judicial independence and proportional representation have a positive effect on property rights and are significant at the 95 percent level. This result suggests that a country moving from no to full judicial independence will increase property protection by 1.75 units, which is less than half of the increase in protection as the culture index increases from lowest to highest rank. An increase of 1 SD in proportional representation increases property protection by .38 units, which again, is less than half of the increase resulting from an increase of 1 SD in the culture index. Plurality displays a negative effect on property rights, suggesting that a 1-unit increase in plurality will reduce protection by .66 units. Constitutional review has a positive effect on property rights but is insignificant. These results also suggest that the formal institutions, even when significant, are not explaining much variation in the security of property according to the low adjusted R^2 values.

Columns 6–9 of Table 2 show the bivariate results. Each column represents a regression in which culture enters with one of the four formal measures. Column 6 shows the effect of culture and judicial independence on the protection of property rights. Culture is positive and remains significant at the 99 percent level, while judicial independence is positive but now insignificant. For the re-

[9] Pryor (2008) illustrates that individual cultural components do not display a strong relationship with particular economic systems; rather, groups of values functioning together have a causal and significant effect in determining economic systems.

Table 2

Ordinary Least Squares Regressions of Formal versus Informal Protection of Private Property: Benchmark Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Culture	.500**	. . .	. . .	. . .	. . .	.474**	.500**	.492**	.510**	.174*	.201*	.183*	.187*
	(.068)	. . .	. . .	. . .	. . .	(.078)	(.067)	(.079)	(.072)	(.082)	(.088)	(.085)	(.087)
Judicial independence	. . .	1.745*	. . .	. . .	. . .	.569	. . .	. . .	. . .	−1.169+	. . .	. . .	. . .
	. . .	(.718)	. . .	. . .	. . .	(.605)	. . .	. . .	. . .	(.667)	. . .	. . .	. . .
Proportional representation	. . .	. . .	. . .	.797*	. . .	. . .	. . .	.331	. . .	. . .	. . .	.584	. . .
	. . .	. . .	(.359)	. . .	. . .	. . .	(.345)	. . .	. . .	. . .	(.357)	. . .	. . .
Constitutional review	. . .	. . .	. . .	.843	. . .	. . .	. . .	.665	. . .	. . .	. . .	.414	. . .
	. . .	. . .	. . .	(1.036)	. . .	. . .	. . .	(.676)	. . .	. . .	. . .	(.584)	. . .
Plurality	. . .	. . .	. . .	. . .	−.658+	. . .	. . .	. . .	−.095	. . .	. . .	. . .	−.026
	. . .	. . .	. . .	. . .	(.368)	. . .	. . .	. . .	(.331)	. . .	. . .	. . .	(.327)
GDP growth	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	.212	.191	.132	.152
	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(.135)	(.128)	(.130)	(.131)
Schooling in 1960 (log)	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.580**	1.141**	1.280**	1.350**
	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(.349)	(.374)	(.329)	(.334)
Urban population	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	−.007	−.001	.002	−.003
	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(.012)	(.011)	(.011)	(.011)
Government consumption	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	.044	.053+	.035	.048
	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(.033)	(.031)	(.034)	(.033)
Constant	5.982**	6.207**	6.667**	6.965**	7.559**	5.611**	5.822**	5.585**	6.001**	5.476**	3.965**	4.424**	4.524**
	(.328)	(.582)	(.359)	(.655)	(.294)	(.597)	(.356)	(.601)	(.430)	(.887)	(.848)	(.997)	(.914)
Adjusted R^2	.45	.07	.03	.01	.01	.45	.52	.45	.47	.71	.70	.69	.69
Observations	63	67	112	69	116	47	59	47	61	40	42	40	43

Note. SEs are shown in parentheses.

+ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

maining regressions, culture continues to have a positive effect on property rights, and its coefficient is similar to the univariate result presented above (range = .47–.51). Proportional representation and constitutional review are positive and insignificant, while plurality is negative and insignificant. The R^2 value for each of these regressions is .45 or greater.

We compare the univariate and bivariate regressions and see that all formal measures lose significance with the inclusion of culture. Also, the adjusted R^2 value in the bivariate regressions is almost identical to that noted in the univariate regression with only culture. This suggests that the inclusion of any of the formal measures does not explain any additional variation in the dependent variable. These preliminary results indicate that informal institutions play a significant role in protecting property rights, while formal constraints may not be as important.

Columns 10–13 present OLS regressions with the inclusion of additional control variables: GDP growth, educational attainment in 1960, urban population, and government consumption. In each regression, culture has a positive effect on the protection of property rights and is significant at the 95 percent level. The coefficient is smaller than before, ranging from .17 to .20. The formal measures are insignificant in three of four regressions, and judicial independence actually switches to a negative sign (this could be due to endogeneity among the regressors). Educational attainment in 1960 enters into all four regressions with a positive sign and is significant at the 99 percent level, as could be expected. Government consumption is positive and significant in the regression including proportional representation. The R^2 value in all four regressions is .69 or greater, suggesting that the inclusion of our controls explains additional variation in property protection.

5. Formal versus Informal Property Rights Institutions

Here we present our main model specification, where we employ multiple instrumental variable (IV) analysis to control for reverse causality, endogeneity, and measurement error. We also present several robustness checks, including a semireduced form of the main model, and we reestimate our results with alternative formal and informal indices and an alternative instrument for culture.

5.1. Instrumental Variables

We want to establish causal relationships, not just correlations, between formal and informal institutions and the security of private property. It is possible that many relationships run in various directions that affect the development of institutional environments; thus, the interaction between formal and informal institutions is not necessarily clear, and we must isolate the effect of each institution. For example, formal constraints may be codification of informal mechanisms. Hence, the formal measure would capture both formal and informal

institutions. If this is the case, the OLS regressions may not capture the causal relationship between the types of institutions and the protection of property.

Multiple instrumental variables are used to isolate the channels through which informal and formal institutions affect property rights. To use instrumental variables, each instrument must be correlated with the specified type of institution but not with the other type. In other words, the instrument for informal institutions must have a strong effect on culture today but cannot be correlated with current formal constraints. Also, the instrument for political constraints can work only through these formal measures, not through the informal, cultural environment. In addition, property rights institutions cannot be determining either one of the instruments.

The major challenge is to find appropriate instruments for formal and informal institutions. Fortunately, the development literature provides valid proxies for each. For formal institutions, we rely on legal origin as an appropriate instrument. Informal institutions are instrumented with latitude, a geography variable. A deeper explanation and analysis of the validity of these instruments are provided later.[10]

In the complete model specification, we employ two-stage least squares analysis and follow the same format as in the previous section. First, we run univariate and bivariate regressions. We then include additional control variables in the final specification. The two first stages in the two-stage least squares analysis model specification are identified as

$$C_i = \alpha G_i + \upsilon_i \tag{1}$$

and

$$F_i = \beta L_i + u_i, \tag{2}$$

where C_i is culture, G_i is the instrument for culture, F_i is the formal measure, and L_i is the instrument for formal institutions. The primary second-stage regression is expressed as

[10] Several historical measures are identified as valid instruments for current institutions. Acemoglu, Johnson, and Robinson (2001, 2002) argue that settler mortality and population density in 1500 affect settlement patterns that determined past institutions. These institutions shaped current ones that now influence economic performance. Acemoglu and Johnson (2005) "unbundle institutions" into property rights institutions and contracting institutions. They argue that settler mortality and population density in 1500 largely affected property rights institutions but not contracting institutions. In contrast, they identify the effects of legal origin on contracting institutions, noting that legal origin has a minor effect on property rights institutions. However, Glaeser et al. (2004) argue that Acemoglu, Johnson, and Robinson (2001, 2002) incorrectly assert that colonizers affect current institutions. Glaeser et al. show that the Europeans brought their human capital, not their institutions, affecting current economic performance. They show that settler mortality today is more correlated with human capital than with institutional measures, suggesting that colonizers brought their knowledge instead of their political constraints. Therefore, settler mortality and population density in 1500 are not valid instruments for formal institutions. Tabellini (2010) uses historical political institutions and educational attainment in 1880 as instruments for culture. However, it is possible to argue that these two instruments are choice variables and not completely exogenous. Therefore, they may not be valid instruments for informal institutions.

$$Y_i = \mu + \beta I_i + \alpha S + \mathbf{Z}_i'\delta + \varepsilon_i,$$

where Y again equals average protection against risk of expropriation, I is the instrumented culture variable, S is the instrumented formal measure, and $\mathbf{Z}$ represents the vector of additional control variables. We use the same control variables as in the previous model.

5.1.1. Legal Origin

We rely on legal origin as an exogenous variable to explain the variation across formal institutions. The idea that many countries have a distinct legal origin is identified by La Porta et al. (1997, 1998). Legal origin is shown to shape financial, legal, and economic institutions and outcomes (Djankov et al. 2003). Different legal traditions, imposed during colonization, affect current legal systems. These legal traditions are classified as common-law and civil-law systems. Common law, imposed during British colonization, is referred to as English legal origin. The French, Scandanavian, and German colonizers imposed civil-law systems. Acemoglu and Johnson (2005) show that legal origin has an exogenous effect on current political institutions and argue for its validity as an instrument. Also, because legal origin is a historical variable, today's property rights institutions do not determine a country's legal origin. Therefore, we use a country's legal origin, measured as English common law, as the instrument for formal institutions.[11]

English legal origin is strongly correlated with judicial independence and proportional representation; therefore, we rely on these measures for the remainder of the analysis. The correlations between English legal origin and judicial independence and proportional representation are .54 and −.39, respectively, and English legal origin is not strongly associated with current culture (−.16). This suggests that legal origin may perform as a valid instrument.[12] The first-stage results, presented in Table 3, also suggest that legal origin may be a valid instrument for both measures of formal institutions. The univariate and bivariate regressions for judicial independence have F-statistics greater than 10 and R^2 values close to .30. For proportional representation, the univariate regression easily clears the benchmark of an F-statistic of 10, whereas the bivariate regression is close, with an F-statistic of 9.7. The R^2 values are slightly lower than preferred (on average, .19), suggesting that legal origin may be a somewhat weaker instrument for proportional representation than judicial independence. We recognize this possibility and interpret the results with caution.

[11] By implementing legal origin as an instrument, we are claiming that legal origin exhibits only a secondary effect on the security of property through its effecy on formal institutions.

[12] A robust literature has emerged that discusses potential concerns when excluded instruments are only weakly correlated with endogenous variables (see Bound, Jaeger, and Baker 1993, 1995; Chao and Swanson 2005). To informally test for weak instruments, Staiger and Stock (1997), Stock, Wright, and Yogo (2002), and Stock and Yogo (2005) suggest that, as a rule of thumb, the F-statistic in the first stage should be greater than 10 and the R^2 value should be .30 or greater.

Table 3

First-Stage Regressions on Formal versus Informal Protection of Private Property

	Culture					Judicial Independence			Proportional Representation		
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(4)	(1)	(3)	(5)
Latitude	6.707**	7.181**	6.700**	3.310+	2.907	. . .	.383+	.268	. . .	.288	−.241
	(1.192)	(1.421)	(1.260)	(1.873)	(1.797)	. . .	(.191)	(.229)	. . .	(.256)	(.411)
English legal origin	. . .	−.503	−.051	−1.035	−.973	.363**	.355**	.194*	−.398**	−.445**	−.496**
	. . .	(.608)	(.555)	(.698)	(.656)	(.071)	(.082)	(.085)	(.091)	(.114)	(.161)
F-statistic	31.66	13.93	15.1	6.58	8.54	26.33	10.42	4.43	19.17	9.7	2.57
Adjusted R^2	.33	.37	.33	.46	.52	.28	.30	.35	.14	.23	.19
Observations	62	46	58	40	42	66	46	40	110	58	42

Note. SEs are shown in parentheses. Columns 1 shows univariate regressions; column 2, bivariate regressions using judicial independence as the formal measure; column 3, bivariate regressions using proportional representation as the formal measure; column 4, regressions using judicial independence as the formal measure with the inclusion of control variables; and column 5, regressions using proportional representation as the formal measure with the inclusion of control variables. All exogenous control variables also enter into the first stage but are omitted to save space.

+ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

5.1.2. Latitude

Geography is used to isolate the effect of informal institutions on property rights. Specifically, latitude, measured as distance from the equator, is implemented to identify the channel through which culture affects property rights. Because latitude is completely exogenous, it may be an appropriate instrument because today's security of property cannot influence a country's latitude. Diamond (1997), Gallup, Sachs, and Mellinger (1999), and Sachs (2001, 2003) argue that geography has a direct effect on economic development as a result of climate, the disease environment, endowment of resources, and transactions costs. However, Engerman and Sokoloff (1997), Sala-i-Martin and Subramanian (2003), Easterly and Levine (2003), and Rodrik, Subramanian, and Trebbi (2004) show that geography exhibits only an indirect effect on development by affecting the quality of current institutions. The argument is that certain factor endowments permit extreme inequalities and the dominance of a small group of elites. These differences in endowments have stunted institutional development. Hall and Jones (1999) invoke a similar argument and use latitude as an instrument for ICRG's measure of property rights protection.

Sowell (1998, 2008) offers a slightly different theoretical explanation as to how geography influences, shapes, and determines a specific institution: culture. He argues that the cultural progress of any society largely depends on the ability to interact and learn of advances made by others. Geography can impede or facilitate these interactions between groups. Hence, geography plays a critical role in determining, at any given time, cross-cultural exchange. Groups that live in isolation because of geographic conditions do not advance as much culturally as do other societies in which the costs of interacting are much lower.[13]

We build from these arguments to utilize geography as an instrument for informal institutions. We recognize the direct/indirect effect debate surrounding the role of geography in development and the potential biases this could create in our results. As a robustness check later, we utilize language instead of geography as an instrument for culture and find support that our results do not suffer from such biases. In our sample of countries, latitude has a strong effect on culture and little effect on the formal institutions. This is demonstrated by the correlation between latitude and culture (.59), suggesting that latitude may perform as a valid instrument. Latitude explains current informal institutions but not current formal institutions (correlations are .07 for judicial independence and .18 for proportional representation). Table 3 shows that the first-stage results lend credibility for latitude as a valid instrument. In the univariate and both

[13] See Coyne and Williamson (2009) for an empirical investigation of how trade positively influences culture.

Table 4
Instrumental Variable Regressions on Formal versus Informal Protection of Private Property

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Culture	.792**	. . .	. . .	.707**	.807**	.579*	.777*
	(.136)	. . .	. . .	(.144)	(.148)	(.226)	(.399)
Judicial independence	. . .	.038	. . .	.875	. . .	1.001	. . .
	. . .	(1.389)	. . .	(1.134)	. . .	(1.614)	. . .
Proportional representation	. . .	. . .	−.070	. . .	−.365	. . .	−.712
	. . .	. . .	(.926)	. . .	(.914)	. . .	(1.023)
GDP growth	. . .	. . .	. . .	. . .	. . .	.155	.022
	. . .	. . .	. . .	. . .	. . .	(.164)	(.105)
Schooling in 1960 (log)	. . .	. . .	. . .	. . .	. . .	1.046	.498
	. . .	. . .	. . .	. . .	. . .	(.641)	(.948)
Urban population	. . .	. . .	. . .	. . .	. . .	.011	.009
	. . .	. . .	. . .	. . .	. . .	(.012)	(.012)
Government consumption	. . .	. . .	. . .	. . .	. . .	−.043	−.043
	. . .	. . .	. . .	. . .	. . .	(.051)	(.072)
Constant	4.698**	7.456	7.180**	4.305**	5.027**	.134	3.387
	(.596)	(1.060)	(.574)	(.923)	(.744)	(2.306)	(3.739)
Adjusted R^2	.30	.004	.00	.36	.36	.57	.38
Observations	62	66	110	46	58	42	51

Note. SEs are shown in parentheses. GDP = gross domestic product.
* Significant at the 5% level.
** Significant at the 1% level.

bivariate regressions, the *F*-statistic is greater than 10, and the R^2 values are greater than .30.[14]

5.2. Main Results

Table 4 shows multiple IV regression results. Columns 1–3 present univariate results. Culture positively affects the protection of property and is significant at the 99 percent level. After controlling for endogeneity, both formal measures lose significance. Columns 4 and 5 show the bivariate results. Once again, culture is positive and significant at the 99 percent level in regressions 4 and 5. Judicial independence and proportional representation maintain their respective signs and are again insignificant. After controlling for potential reverse causality, informal institutions have an even stronger effect on the protection of property than do formal measures. In fact, the coefficient for culture actually increases in magnitude ranging from .70 to .81, suggesting that an increase of 1 SD in the culture index will increase property protection by an average of 1.51 units. This implies that moving from 0 to 10 on the culture index leads to an average increase in property protection of 7.55 units.

[14] By using geography, measured by latitude, as an instrument, we are also claiming that geography has only a secondary effect on development through its influence on informal institutions. Thus, geography does not directly determine security of property and, therefore, economic performance. Other proxies for geography are available; however, we use latitude as the measure of geography to maximize the sample size.

Columns 6 and 7 present the IV regression results with the inclusion of control variables. The basic relationship between informal and formal institutions and the security of property rights still holds. Informal institutions positively affect property rights, whereas formal institutions do not. In both regressions, all of the control variables (GDP growth, educational attainment in 1960, urban population, and government consumption) lose significance after controlling for endogeneity. These results suggest that not only is there a role for informal institutions in protecting property; they may in fact serve as a primary mechanism securing property rights.[15]

5.3. *Semireduced Form*

One potential concern is the possibility that English legal origin affects the security of property rights through channels other than its effect on formal constraints (for example, see La Porta et al. 2008). To address this concern, a semireduced specification of the model including the control variables is implemented in which informal institutions are still instrumented with latitude, but English legal origin now enters directly into the second stage to proxy for formal institutions.[16]

The positive and significant relationship between informal institutions, culture, and secure property rights remains. English legal origin is insignificant. The main result presented earlier is supported from this analysis. Not only does this result support the importance of informal institutions, but it also supports English legal origin as an appropriate instrument. There is no evidence of English legal origin affecting property rights institutions through channels other than its positive effect on formal property institutions.

5.4. *Alternative Indices*

Another possible critique of this analysis is the concern of measurement error with the institutional variables. To combat this, we utilize principle component analysis (PCA) to create a new culture index and an overall formal index variable. In addition, we rely on two alternative measures of culture available in the literature (Hofstede 1980, 2001; Schwartz 1994, 1999). We also reestimate our main IV results using a language dummy variable to instrument for culture. These robustness checks are presented in Table 5 and discussed below.

Principle component analysis can be implemented to reduce several indepen-

[15] Because of the importance of controlling for a country's current level of development, we attempt to reestimate the regressions by using subsamples based on varying income groups. Because most countries in the same income group exhibit similar characteristics, such as institutions, the results were that all variables were insignificant. Also, due to the possibility that GDP growth is endogenous, we reestimate the original regressions without GDP growth and find the same results. Again, because of high correlations between GDP and institutions (both formal and informal), any measure that captures levels of development can bias results and should not directly enter into the regressions.

[16] English legal origin obviously enters into the first stage as well. Therefore, the first-stage results are basically the same as before and are not reported to save space. In addition, we omit the second-stage regression to save space; however, these results are available by request from the authors.

Table 5

Robustness Checks of Formal versus Informal Protection of Private Property, Using Alternative Indices and Instruments

	OLS Regressions							IV Regressions					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Culture index PCA	.254**	. . .	. . .	. . .	. . .	. . .	. . .	.756*	.438+	. . .	. . .	. . .	. . .
	(.076)	. . .	. . .	. . .	. . .	. . .	. . .	(.354)	(.217)	. . .	. . .	. . .	. . .
Embeddedness	. . .	−2.009**	−2.281**	−2.266	. . .	. . .	. . .	. . .	. . .	−4.833+	−4.239*	. . .	. . .
	. . .	(.412)	(.511)	(.972)	. . .	. . .	. . .	. . .	. . .	(2.523)	(1.621)	. . .	. . .
Harmony	. . .	.332	−.271	.297	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	. . .	(.668)	(.538)	(.707)	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Hierarchy	. . .	−.410	−.313	−.159	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	. . .	(.359)	(.389)	(.409)	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Individualism	. . .	. . .	. . .	. . .	.282**	.274**	.305**	. . .	. . .	. . .	. . .	.494+	.656+
	. . .	. . .	. . .	. . .	(.057)	(.075)	(.073)	. . .	. . .	. . .	. . .	(.260)	(.349)
Power distance	. . .	. . .	. . .	. . .	.137+	.139	.029	. . .	. . .	. . .	. . .	. . .	. . .
	. . .	. . .	. . .	. . .	(.073)	(.088)	(.072)	. . .	. . .	. . .	. . .	. . .	. . .
Uncertainty avoidance	. . .	. . .	. . .	. . .	.054	.008	−.035	. . .	. . .	. . .	. . .	. . .	. . .
	. . .	. . .	. . .	. . .	(.068)	(.090)	(.085)	. . .	. . .	. . .	. . .	. . .	. . .
Formal index PCA	−.014	. . .	.019	.004	. . .	.006	−.032	.035	.134	.146	.099	−.228	−.372
	(.040)	. . .	(.052)	(.049)	. . .	(.045)	(.037)	(.125)	(.098)	(.087)	(.080)	(.174)	(.313)
GDP growth	.207+	. . .	. . .	.357+	. . .	. . .	.326**	.137	.137	.536+	.504*	.361+	.596+
	(.110)	. . .	. . .	(.179)	. . .	. . .	(.103)	(.152)	(.168)	(.270)	(.180)	(.190)	(.328)
Schooling in 1960 (log)	1.300**	. . .	. . .	.632	. . .	. . .	.916*	.487	.583	−.348	−.157	.308	.163
	(.363)	. . .	. . .	(.543)	. . .	. . .	(.417)	(.881)	(1.032)	(1.099)	(.677)	(1.152)	(.938)
Urban population	.013	. . .	. . .	−.007	. . .	. . .	.005	.014	−.007	−.003	.005	.011	.011
	(.009)	. . .	. . .	(.016)	. . .	. . .	(.011)	(.011)	(.015)	(.013)	(.010)	(.020)	(.017)
Government consumption	.021	. . .	. . .	.051	. . .	. . .	.020	−.060	.013	.055	.046	−.042	−.094
	(.034)	. . .	. . .	(.048)	. . .	. . .	.053	(.066)	(.047)	(.040)	(.036)	(.086)	(.142)
Constant	.209	15.601	18.895**	13.663*	5.949**	6.317	1.560	2.592	3.523	24.861+	21.772*	4.481	4.842
	(1.354)	(4.018)	(3.664)	(6.187)	(.386)	(.417)	(1.247)	(3.346)	(3.554)	(12.633)	(7.817)	(3.751)	(3.802)
Adjusted R^2	.76	.42	.44	.72	.47	.57	.74	.46	.41	.41	.54	.10	.03
Observations	41	46	35	32	64	42	41	41	30	33	34	32	41

Note. SEs are shown in parentheses. Regressions 8, 10, and 12 instrument culture with latitude and formal index with English legal origin. Regressions 9, 11, and 13 instrument culture with pronoun drop and formal index with English legal origin. OLS = ordinary least squares; IV = instrument variables; PCA = principle component analysis; GDP = gross domestic product.

+ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

dent variables into a more coherent index while still capturing most of the information from the original variables. The PCA technique is especially applicable when there are theoretical ambiguities regarding construction of an index or when multicollinearity is a concern (Dunteman 1989). For both the informal and formal indices, PCA extracts the common variation between all four factors, creating an overall net measure of either informal or formal institutions.

To create the new culture index, instead of summing trust, respect, and individual self-determination and subtracting obedience, we extract the first principle components and normalize the index to range between 0 and 10.[17] A high score on the PCA culture index indicates that private mechanisms exist that should promote the security of property. To construct one comprehensive measure of formal institutions, we extract the first principle components from the original four measures of formal constraints (judicial independence, constitutional review, proportional representation, and plurality) to create an overall formal institutional index. The index is normalized to range between 0 and 10, with a score of 10 representing a country that exhibits high formality and a score of 0 representing low formality. A high score on the formal index indicates that governments in these countries should be more constrained via formal rules than those countries with low scores.

Column 1, the OLS regression, and regression 8, the IV regression using the same instruments mentioned previously,[18] show that after creating new formal and informal indices on the basis of PCA, the results support the previous findings and suggest that the main results are not sensitive to institutional measurement error. The positive and significant effect of culture on securing property persists, as does the insignificance of formal institutions.

As another robustness check, we proxy informal institutions with two different measures of culture found in the literature, to influence different measures of political and economic performance (for example, see Smith, Bond, and Kagitcibasi 2006; Licht, Chanan, and Schwartz 2007; Licht 2008). The first is taken from Schwartz (1994, 1999), who define three main cultural dimensions. The first dimension is embeddedness/autonomy, which is designed to capture respect for tradition, social order, and obedience. Embeddedness places emphasis on the individual's place within a group, centers on maintaining the status quo, and resists breaking group solidarity. Autonomy refers to the opposite of embeddedness, where a culture places emphasis on individual uniqueness and encourages individuals to pursue their own ideas, directions, and plans. Greater embeddedness, instead of autonomy, is similar to our measure of obedience and

[17] Tabellini (2010) employs the same two methods to construct two different culture indices and finds no significant difference in his results.

[18] The same instruments remain valid for the formal and informal indices on the basis of principle component analysis. Latitude is correlated with the new culture index (.56) and is not correlated with the formal index (−.19), while English legal origin is correlated with the formal index (.40) and is not correlated with the new culture index (−.11). The results are basically the same in the first stage as previously presented and are therefore omitted to save space.

may exert a negative effect on the security of property rights for similar arguments presented earlier. The second dimension captures the relationship between mankind and the natural and social world. This is called mastery/harmony, where mastery refers to cultural emphasis on altering and changing the natural world as a means to improving an individual's well-being. Harmony emphasizes accepting the world as it is instead of trying to change it. Greater cultural emphasis on harmony instead of mastery could hamper the ability of individuals to secure property rights because of the lack of acceptance of altering the physical world as needed. For example, a more harmonious culture could resist adopting an advance in technology (such as barbed wire) that could make it easier to define property. The last cultural dimension, hierarchy/egalitarianism, captures how societies generate group cooperation and productive activities. Hierarchy refers to a cultural acceptance of an unequal power structure, whereas egalitarianism emphasizes social justice and equality among all group members. Individuals in a hierarchical society may find it more difficult to secure property rights because of the unequal power distribution among group members.

To measure each dimension, a survey with a series of questions related to the above distinct values was administered. Respondents were asked to rate each of the value items as "a guiding principle in MY life." Mean ratings of each of the items were computed to create country-level indices. Following the regression specification in Licht et al. (2007), we control for all three dimensions simultaneously; therefore, we include the indices capturing embeddedness, harmony, and hierarchy in the regression to proxy for informal institutions.

The OLS regressions are presented in columns 2–4 of Table 5. Embeddedness is negative, as expected, and significant in all three regression specifications. Harmony and hierarchy are insignificant in all three regressions.[19] Following Licht et al. (2007), we drop harmony and hierarchy and focus on embeddedness to instrument for culture. In regression 10, we instrument embeddedness with latitude and the formal index with English legal origin (the first-stage results support this specification with an F-statistic of 16 and an R^2 value of .74). Culture, measured by embeddedness, remains significant, and the formal index is insignificant, supporting our previous findings.

Our second culture measure is taken from Hofstede (1980, 2001) and is a dimensional framework constructed from surveys administered to various IBM employees across a number of countries. The surveys were conducted twice, in 1968 and 1972, and produced more than 116,000 responses. We focus on three cultural dimensions outlined by Hofstede: individualism, power distance, and uncertainty avoidance. Individualism measures the degree to which individuals are integrated into groups. It assumes weak ties among group members and places responsibility for one's life on the individual. This culture dimension is similar to our World Values Survey measure of individual self-control and

[19] This is similar to the results found in Licht, Chanan, and Schwartz (2007), where embeddedness is significant in most regression specifications and harmony and hierarchy are not.

Schwartz's embeddedness/autonomy measure. Following these arguments, greater individualism should lead to greater protection of property rights. The index is scaled between 0 and 10, with 10 representing strong individualism. Power distance measures the degree to which less powerful group members accept or expect power to be distributed unevenly. This measure is similar to Schwartz's hierarchy/egalitarianism dimension. It is scaled between 0 and 10, with 10 representing greater power distance among different levels of society. The last cultural component, uncertainty avoidance, measures the degree to which a society tolerates uncertainty, capturing how much a society tries to control the uncontrollable. It is also scaled between 0 and 10, with 10 representing a society with a lower tolerance of uncertainty.

We control for all three Hofstede cultural dimensions simultaneously, to proxy for informal institutions. Regressions 5–7 in Table 5 report the OLS results. Individualism is positive and highly significant in all three regression specifications. Power distance loses its significance once we control for the formal index and uncertainty avoidance, and the formal index is never significant, supporting previous findings. In column 12, we focus on individualism and instrument with latitude (first-stage results support this specification, with an F-statistic of 19 and an R^2 value of .74), and we find results similar to those noted before. Replacing our main variables of interest with the PCA indices and replacing culture with either the Schwartz cultural dimensions or the Hofstede culture variables suggest that our main result is not sensitive to the measurement of the variables.

As a final robustness check, we employ a different instrument for culture. Instead of using a geography measure, we instrument with a language variable from Licht, Chanan, and Schwartz (2007). We also experimented with a variety of potential cultural instruments, such as religion, ethnic fractionalization, and settler mortality. However, religion and settler mortality are not strongly correlated with culture, and ethic fractionalization is correlated with both culture and formal institutions, thus not satisfying the exclusion restrictions.

The basic intuition is that language affects social inferences and value judgments, transmitting cultural norms and values across generations. Kashima and Kashima (1998) present evidence that pronoun usage in language represents psychological differences between the speaker and the social context. Specifically, the use of "I" or "you" signals that the individual is the center of the context. On the contrary, a grammatical rule licensing pronoun drop suggests a reduction between the individual and the group. The pronoun drop dummy variable (with one denoting grammatical rule for pronoun drop and zero otherwise) constitutes a link between language and culture. Pronoun usage should be prevalent in societies that emphasize the individual over group solidarity. Pronoun drop will exist in cultures where social embeddedness is emphasized.

As expected, and also shown in Licht et al. (2007), pronoun drop is strongly correlated with Schwartz's embeddedness (.54) and Hofstede's individualism (−.81). It is also strongly correlated with our World Values Survey culture PCA

index (−.61). It is equally important for the exclusion restriction that pronoun drop is not related to formal institutions (−.03), and there is no reason to believe that current property rights protection is reverse causing this grammatical rule.[20] We reestimate our main IV regression specification with a measure of culture and the additional control variables. Instead of latitude, we now instrument each measure of culture with the pronoun drop dummy variable and continue to instrument the formal index with English legal origin. These results are presented in columns 9, 11, and 13 in Table 5. In all three regressions, culture is positive and significant, and the formal institutions remain insignificant, providing additional support to our main findings.

6. Conclusion

The beginning of this paper posed the question "What makes property rights secure?" Our empirical analysis suggests that informal institutions are the underlying channels that establish secure, well-defined property rights. Even after controlling for reverse causality, the empirical results show that culture, our measure of informal institutions, has a positive and highly significant effect on property rights. However, formal institutions have no significant effect on securing property. These results are robust to the inclusion of control variables, different model specifications, and sensitivity analysis.

Our results imply that the current trend toward formalization overstates the importance of formal institutions. In fact, these formal mechanisms may not be sufficient to achieve property rights institutions because of potentially high costs that are often understated or completely ignored. These results have especially important implications for developing countries with highly predatory governments. To achieve secure property rights, the role of informal institutions inherent in a particular society may be more imperative than previously believed. These results support the literature indicating that institutions matter for economic development and highlight the need for more research on understanding the role of both informal and formal institutions in the development process.

[20] The exclusion restrictions are satisfied by the first-stage results where the *F*-statistics are greater than 10 and the R^2 values are greater than .30.

Appendix

Table A1
Culture Index and Country Rank

Country	Culture Index	Rank	Country	Culture Index	Rank
Albania	4.16	36	Latvia	3.86	42
Algeria	1.45	74	Lithuania	4.02	39
Armenia	3.29	54	Luxembourg	4.39	30
Australia	7.04	9	Macedonia	5.49	18
Austria	6.64	10	Malta	2.73	66
Azerbaijan	3.43	51	Mexico	2.87	63
Bangladesh	4.90	25	Moldova	3.37	53
Belarus	5.80	15	Montenegro	3.58	47
Belgium	3.89	41	Morocco	2.39	67
Bosnia and Herzegovina	3.55	48	Netherlands	9.24	2
Brazil	1.15	76	New Zealand	7.51	6
Bulgaria	5.16	21	Nigeria	1.25	75
Canada	6.34	12	North Ireland	4.53	29
Chili	3.42	52	Norway	6.39	11
China	7.37	7	Pakistan	1.89	72
Colombia	2.94	61	Peru	1.11	77
Croatia	2.16	71	Philippines	2.19	70
Czech Republic	5.00	23	Poland	4.26	32
Denmark	9.19	3	Portugal	3.01	59
Dominican Republic	2.88	62	Puerto Rico	2.26	69
Egypt	3.05	58	Romania	2.87	64
El Salvador	.97	78	Russia	3.97	40
Estonia	4.92	24	Serbia	3.29	55
Finland	7.91	4	Singapore	2.79	65
France	5.32	19	Slovakia	3.72	45
Georgia	3.75	43	Slovenia	4.19	34
Germany	5.86	14	South Africa	2.31	68
Great Britain	3.47	50	Spain	3.73	44
Greece	4.05	38	Sweden	10.00	1
Hungary	4.09	37	Switzerland	6.14	13
Iceland	7.30	8	Taiwan	4.34	31
India	3.09	57	Tanzania	0.65	79
Indonesia	3.69	46	Turkey	2.98	60
Iran	4.64	28	Uganda	0.00	80
Ireland	4.74	27	Ukraine	4.25	33
Israel	5.62	17	United States	5.66	16
Italy	4.80	26	Uruguay	5.23	20
Japan	7.70	5	Venezuela	4.18	35
Jordan	3.48	49	Vietnam	3.15	56
Korea	5.01	22	Zimbabwe	1.61	73

Table A2
Data Description and Sources

Variable	Data Description	Data Source
Average protection against risk of expropriation	Measures protection from "outright confiscation and forced nationalization" of property; the index ranges from 0 to 10, where higher values are equal to a lower probability of government expropriation; data are averaged for the years 1982–97	International Country Risk Guide (various years)
Culture	The sum of three positive beliefs (control, respect, trust) minus the negative belief (obedience); control is measured as the unconditional average response (multiplied by 10) to the question asking the extent to which you have freedom of choice and control in your life you have over the way your life turns out (scaled from 1 to 10); respect is measured as the percentage of respondents who mentioned the quality "tolerance and respect for other people" as being important; trust is measured as the percentage of respondents who answered that "most people can be trusted"; obedience is the percentage of respondents who mentioned obedience as being important; the index is scaled from 0 to 10	World Values Surveys (1995–97, 1999–2000)
Judicial independence	Judicial independence is computed as the sum of three variables; the first measures the tenure of Supreme Court judges (highest court in any country), the second measures the tenure of highest ranked judges ruling on administrative cases, and the third measures the existence of a case law; the variable is normalized from 0 to 1, where higher values equal a higher degree of judicial independence; this variable is measured as of 1995	La Porta et al. (2004)
Proportional representation	This variable equals 1 for each year in which candidates were elected using a proportional representation system and equals 0 otherwise; data are averaged for the years 1975–2000	Beck et al. (2001)
Constitutional review	Constitutional review is commuted as the sum of two variables; the first measures the extent to which judges have the power to review the constitutionality of laws in a given country; the second measures how hard it is to change the constitution in a given country; this variable is normalized from 0 to 1, where higher values equal a higher degree of constitutional review by the courts. This variable is measured as of 1995	La Porta et al. (2004)
Plurality	This variable equals 1 for each year in which legislators were elected using a winner-take-all rule and 0 otherwise; data are averaged for the years 1975–2000	Beck et al. (2001)
GDP growth	Growth of GDP per capita, PPP basis, constant 2000 international dollars; data are averaged for the years 1982–97	World Bank (2006)

Log educational attainment in 1960	Measured as the number of years of schooling of the total population older than 25 years by 1960	Glaeser et al. (2004)
Urban population	Percentage of the population living in an urban area; data are averaged for the years 1982–97	World Bank (2006)
Government consumption	Real government consumption expenditure, measured as a percentage of GDP; data are averaged for the years 1982–97	World Bank (2006)
Latitude	Measured as the absolute value of the latitude of the country, scaled to values between 0 and 1 (0 is the equator)	La Porta et al. (1999)
English legal origin	Dummy variable coded 0 or 1, where 1 indicates that a country was colonized by Britain and that English legal code was transferred	La Porta et al. (1999)
Embeddedness	Captures the emphasis on the individual as part of a group and commits to maintaining group solidarity and traditional order; a higher score implies greater group embeddedness instead of individual autonomy	Schwartz (1994, 1999)
Harmony	Refers to the relationship between mankind and the natural and social world; a higher score suggests an emphasis on accepting the world as is, instead of trying to change it	Schwartz (1994, 1999)
Hierarchy	Measures cultural emphasis on obeying rules and traditional roles in society; a higher score suggests a great hierarchical society	Schwartz (1994, 1999)
Individualism	Measures the degree to which individuals are integrated into groups; individualism assumes weak ties among group members; scaled between 0 and 10, with 10 representing strong individualism	Hofstede (1980, 2001)
Power distance	Measures the degree to which less powerful group members accept or expect power to be distributed unevenly; scaled between 0 and 10, with 10 representing greater power distance among different levels of society	Hofstede (1980, 2001)
Uncertainty avoidance	Measures the degree to which a society tolerates uncertainty; captures how comfortable a group member is with unstructured situations; scaled between 0 and 10, with 10 representing a society with a lower tolerance of uncertainty	Hofstede (1980, 2001)
Pronoun drop	Dummy variable coded 0 or 1, where 1 indicates that grammatical rules allow pronoun drop	Licht, Chanan, and Schwartz (2007)

Note. GDP = gross domestic product; PPP = purchasing power parity.

Table A3

Individual Components Regressions on Formal versus Informal Protection of Private Property

Individual Component	(1)	(2)	(3)	(4)	(5)	(6)
Trust	.050**	. . .	. . .	. . .	.033*	.008
	(.011)	. . .	. . .	. . .	(.013)	(.014)
Respect	. . .	.081**	. . .	. . .	.061**	.063**
	. . .	(.016)	. . .	. . .	(.020)	(.016)
Control	. . .	. . .	.015	. . .	.004	−.006
	. . .	. . .	(.027)	. . .	(.021)	(.018)
Obedience	. . .	. . .	. . .	−.054**	. . .	−.046**
	. . .	. . .	. . .	(.008)	. . .	(.009)
Constant	6.670**	2.353*	7.076**	10.134**	2.594	5.519**
	(.344)	(1.167)	(1.852)	(.361)	(1.607)	(1.421)
Adjusted R^2	.22	.25	.005	.35	.34	.54
Observations	64	64	63	64	63	63

Note. The dependent variable is average protection against risk of expropriation. SEs are in parentheses.
* Significant at the 5% level.
** Significant at the 1% level.

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