Does Property Rights Protection Affect Corporate Risk Management Strategy? Intra- and Cross-Country Evidence

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Abstract

Recent studies in the law and finance literature have shown that property rights protection is central to corporate financing and investment decisions and economic growth at large. We extend this literature by examining the effect of property rights security on corporate risk management decisions - an important element of a firm's business strategy. Using a unique dataset covering over 55,000 Chinese firms and employing both institution- and firm-level measures of property rights security, we find that secure property rights lead to higher corporate demand for property insurance, suggesting that property rights security is an important determinant of corporate risk management decisions. The effect of property rights protection on insurance consumption is also validated by a cross-country analysis that uses data from 93 countries over the period 1995-2008. Our study represents an initial attempt towards understanding the importance of property rights protection to corporate risk management decisions.

JEL classification: G32, G38, D23

Keywords: Property Rights Protection; Banking; Risk Management.

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1. Introduction

Property rights are a fundamental concept in the economics and finance literature. As Levine (p.61, 2005) points out, "the security of property rights . . . is not a natural occurrence; rather it is an outcome of policy choices and social institutions." Recent studies show that good legal environments that provide strong property rights protection and contract enforcement reduce cost of capital, enhance corporate governance, firm valuation, reinvestment rates, assets allocation, corporate innovation, firm growth and thereby economic growth (e.g., Acemoglu et al., 2001; Acemoglu and Johnson, 2005; Beck et al., 2003; Beck et al., 2005; Besley, 1995; Chen et al., 2009; Claessens and Laeven, 2005; Cull and Xu, 2005; Johnson et al., 2002; La Porta et al., 1998, 2002; Lin et al., 2010; Shleifer and Wolfenzon, 2002). Using a unique large corporate property insurance dataset covering more than 55,000 manufacturing firms in China and following the framework of Cull and Xu (2005) and Levine (2005), we add to this line of research by empirically testing the effect of property rights security on corporate risk management – an important element of a firm's overall business strategy (Guay and Kothari, 2003, p.423) but has been generally neglected so far in the law and finance literature. Bankruptcy is one of the major risks facing businesses and their investors and hence corporate risk management is of paramount importance in preventing financial distress and bankruptcy.

The study also adds to the existing literature of corporate risk management. The extant literature strives to explain why firms undertake risk management activities since risk management should be irrelevant in a classic Modigliani and Miller (M&M) world without market imperfections. In the real world with market imperfections, scholars have identified several important determinants of corporate risk management activities such as the expected cost of financial distress (e.g., Mayers and Smith, 1982; Smith and Stulz, 1985), tax incentives (e.g., Frestad, 2010; Mayers and Smith, 1982; Smith and Stulz, 1985), underinvestment and predation risk (e.g., Froot et al., 1993; Haushalter, 2000), and

managerial risk aversion (e.g. Smith and Stulz, 1985). Our study adds to this strand of literature by showing, for the first time, that property rights security is a new important determinant of corporate risk management decisions. By doing so, it also contributes to the broader corporate hedging and risk management literature, which examines the causes and consequences of various hedging mechanisms such as financial derivatives and corporate cash holdings (e.g., Fauver and Naranjo, 2010; Kuersten and Linde, 2011; Kusnadi and Wei, 2011).

Due to scarcity of data on corporate use of insurance, the corporate risk management literature normally takes the use of derivatives as a proxy for corporate hedging.[1] The existing corporate risk management literature assumes that firms use derivatives purely for hedging purposes (Guay and Kothari, 2003). However, managers may also engage in selective hedging or speculation with derivatives though this is rarely successful. Géczy et al. (2007) report that investors often are unable to discern the activities of frequent speculators based on corporate disclosures. Unlike derivatives, insurance cannot be used for speculation and therefore it provides a cleaner testing ground for the relation between property rights security and corporate risk management (Adams et al., 2008; Aunon-Nerin and Ehling, 2008). As pointed out by MacMinn and Garven (2000), insurance represents a simple and widely used corporate risk management tool and the corporate property-casualty insurance (P/C insurance) premiums typically exceed dividend payments by an order of 30-40%. In 2004, property-casualty insurance premiums amounted to US$1,395 billion globally. Indeed, Mayers and Smith (1982) and Smith (1986) conclude that insurance is an integral part of corporate financial policies. As such, evidence on the linkage between property rights security and corporate insurance is of significant managerial and policymaking implications.

[1] Corporate disclosure requirement has made derivative use data readily available in many countries, whereas there is no similar requirement concerning the purchase of insurance. While numerous studies have empirically examined the determinants of derivative use, investigations of corporate risk management via insurance purchases have been relatively sparse. Only several studies (e.g., Mayers and Smith, 1990; Hoyt and Khang, 2000; Zou and Adams, 2006; Regan and Hur, 2007; Aunon-Nerin and Ehling, 2008) have examined the determinants of corporate insurance. These studies typically use a sample of several hundred listed firms and invariably focus on firm characteristics in explaining the corporate purchase of insurance. None of them has focused on the importance of property rights security. In contrast, our study uses a sample of about 56,000 firms and examines the roles of both firm-specific characteristics and external institutional factors (e.g., property rights protection, legal and financing environment, economic development) in corporate insurance decisions.

There is a close theoretical linkage between corporate risk management via insurance purchases and property rights security. Corporate insurance is a contractual transfer of risks where the insurer agrees to reimburse the insured firm losses arising from specified accidental events (e.g., a fire). Property rights protection provides firms with the right to own assets, to benefit from the income generated from those assets, to dispose of the assets, and to seek compensation for any damages to such assets caused by third parties. The value of the insurance contract thus hinges on the degree of property rights protection afforded by legal rules and contract enforcement. Moreover, secure property rights lead to more corporate investments and thereby better growth opportunities (Besley, 1995; Cull and Xu, 2005) and this further provides a rationale for corporate risk management (e.g., via insurance) in order to mitigate the underinvestment problem (Froot et al., 1993). The important linkage between property rights security and insurance purchase, however, has rarely been tested, due to the paucity of corporate insurance data. Using a country-level dataset, Esho et al. (2004) is the only study that shows a positive relation between a country's protection of property rights and its aggregate property-casualty insurance consumption. Our study is the first to examine the relation between variations in property rights security and the purchase of insurance at the *firm-level*. This is important as Beck et al. (2006) argue that one needs to control for firm-specific characteristics to draw appropriate inferences about the relationship between institutions and firm behavior (e.g., risk management in our case).

China represents a unique environment within which to investigate the relation between property rights and corporate insurance because of the following salient features. First, property insurance is a common and major commercial risk management tool for companies in China because of the general lack of risk management expertise among Chinese firms and/or the relatively low safety standard.[2] By purchasing an insurance policy, the insured firm not only obtains loss coverage but also the insurer's services on loss prevention and control. According to Swiss Re (2004), property-casualty insurance premiums in China amounted to US$16.77 billion in 2004, with roughly 65% derived from corporate purchases.

[2] Property insurance covers accidental asset losses and is normally valid for one year and renewable upon mutual agreements between the insured and the insurer. The purchase of property insurance in China is voluntary (Zou and Adams, 2006).

Second, while extant risk management studies typically examine either corporate use of derivatives or insurance in managing risks, we recognize that firms may manage overall risks in a coordinated way with more than one commercial tool (e.g., both insurance and derivatives uses). Failure to take account of the interaction among different risk management tools may lead to a biased inference on the effect of using a particular tool (Allayannis and Weston, 2001). This possibility, however, is minimized in China because China does not have developed financial derivatives markets. Therefore, in this regard, China represents a cleaner setting for our investigation.

Third, more importantly, information on corporate purchase of property insurance is a standard expenditure item in the internal accounting books of China's manufacturing firms and was disclosed via the First Economic Census conducted in 2005. Such information is thus highly reliable and not subject to the biases associated with subjective survey data (Bertrand and Mullainathan, 2001). The unique Chinese insurance data thus provide a unique opportunity to explore the effects of property rights security on corporate risk management via insurance use. Fourth, China is a large and diverse country with substantial disparity in the levels of economic and institutional development (including contract enforcement, investor protection and the effectiveness and efficiency of the judicial system) across different regions. Our data show significant variations in the incidence and extent of corporate insurance among firms in different regions. In addition, Cull and Xu (2005) argue that one important aspect of property rights is corporate ownership. China is rich in various types of corporate ownership (e.g., state, private, and foreign ownership). In contrast to the radical corporate ownership privatization in Russia and Eastern Europe, China's reform of state-owned enterprises (SOEs) has been piecemeal and, as a result, the state still retains controlling interest in many firms, particularly in industries of strategic importance (e.g., resources) (Firth et al., 2011). Another element of the corporate reform in China is to allow and to encourage the development of private economy, particularly in industries subject to fierce market competition (Cull and Xu, 2005). These private firms are truly market-oriented entities responsible for their own performance and tend to be more efficient than SOEs. Allen et al. (2005) report that private firms in China now dominate SOEs both in terms of the

contribution to the national economy and growth rates. The rich variety of corporate ownership in China thus enables us to examine how state-owned and private firms that have different levels of property rights security are different in their risk management strategy.[3]

Finally, corporate risk management theories posit a close linkage between debt financing, investment and insurance (Campello et al., 2011). Insurance as a post-loss financing mechanism can help coordinate a firm's financing and investment decisions (Froot et al., 1993; Mayers and Smith, 1982, 1987). For example, the existence of an appropriate insurance program can provide cash flow hedging and help minimize the chance that investment in positive net-present-value (NPV) projects would have to be forgone or scaled down following a major accidental asset loss. Chinese firms (particularly unlisted firms) rely heavily on indirect debt financing (e.g., bank loans) as equity and bond issues are tightly regulated in China (Zou and Adams, 2008). While the state-dominated banking sector directs a disproportionate amount of bank loans to SOEs, Allen et al. (2005) find that bank loan also represents an important (and relatively low-cost) source of financing to private firms, particularly during the start-up period. They also report that the deals between banks and private firms are often of arm's length (e.g., in terms of collateral requirement). Zou and Adams (2008) report that (listed) firms often take out property insurance in order to secure bank loans and/or to lower the cost of borrowing in China. Therefore, debt financing and property insurance on collateral and other physical assets is likely to be a strategic issue in management decision-making for both SOEs and private firms in China.

Following the recent literature (e.g., Cull and Xu, 2005; Johnson et al., 2002; Levine, 2005) on the role of property rights security on corporate financial decisions, we measure property

[3] While prior studies (e.g., Zou and Adams, 2006) also examine corporate purchase of insurance in China, our study differs from theirs in three important ways. First, we focus on the effect of property rights security in our paper that is not examined in their study. Second, their study relies on a small data set hand collected from annual reports in which the disclosure of insurance information is voluntary. As a result, their study suffers from a sample selectivity bias. In contrast, our study leverages a much larger data set that is sourced from the mandatory regulatory filing to the State Statistical Bureau in which insurance spending is a must-to-disclose item. Their sample also only includes publicly listed companies (the majority of which are state-controlled and hence their samples lack variations in state ownership), whereas our sample comprises a good mix of private firms and (unlisted) state-owned firms. Third, about 85% of the sample firms in Zou and Adams (2008) carry property insurance, as opposed to about 40% in our sample. Therefore, our sample provides more variations in insurance and ownership and this enables us to have a more powerful and comprehensive test of the impacts of ownership – an important measure of property rights security – on corporate purchase of insurance.

rights security at both the institution- and firm-levels, and by different proxies. Levine (2005) summarizes the security of property rights into two important dimensions: 1) an active government that enforces property rights, facilitates private contracting, and applies laws and rules fairly to everyone; 2) a government that sufficiently constrains itself from expropriation. We measure the former dimension by a regional property rights protection index developed by the World Bank based on an economy-wide firm-level survey on investment climate and competitiveness in China (hereafter as the "World Bank Survey 2006").[4] This index measures the likelihood that the (local) legal system will uphold business contracts and property rights in business disputes in 2004, and is constructed separately for 120 major cities in China. Given the unbalanced economic developments across regions in China, this index exhibits significant variations across the cities in our sample.[5] In addition to contract enforcement and protection, Levine (2005) further posits that the operation and development of financial markets facilitates investor and creditor protection and therefore directly reflects the effectiveness of property rights protection. We thus adopt a 2003 NERI (National Economic Research Institute of China) provincial banking-sector marketization index (reported in Fan et al. (2006)) as another proxy.[6] Where the extent of marketization in the banking sector is high, property rights are more likely to be respected and safeguarded. Specifically, banks have more incentives to ask for collateral and property insurance to retain the value of collateral in granting loans.

We use a 2003 NERI provincial index on reducing non-tax levies and charges (Fan et al., 2006) as an *inverse* proxy for government expropriation risk in China. Non-tax levies and charges arbitrarily imposed by various government departments are common ways of government expropriation and/or rent-seeking by corrupt officials and can lower the security of property rights. In addition, we use the city-level index of bank lending corruption index

[4] The World Bank Survey was carried out in 2005 and measured the data for 2004. The survey results were published in2006.

[5] The property rights protection index and other survey indexes are associated with measurable outcomes in terms of efficiency of investment flows, firm growth, institutions, corruption, as shown in several recent studies (e.g., Acemoglu and Johnson, 2005; Beck et al., 2005; Cull and Xu, 2005; Djankov et al., 2003; Johnson et al. 2002).

[6] The National Economic Research Institute (affiliated with the China Reform Foundation) compiles the widely used marketization index for China's 31 provinces and regions every year since 2001 (Fan et al., 2006).

(from the World Bank Survey 2006) to measure the expropriation risk and rent seeking by corrupt bank officials. The index measures the level of expected informal payments firms have to pay in order to obtain bank loans in 2004. If corruption in the financing environment is pervasive, property rights and measures to safeguard property rights (e.g., insurance of collateral in bank loans) could be neglected in credit rationing and allocation. Therefore, corruption in lending can be viewed as an integral part of property rights measures, which has been shown to be of importance to external financing and firm growth (Beck et al., 2005; Demirguc-Kunt and Maksimovic, 1998).

Moreover, following Cull and Xu (2005) we measure the security of property rights at the firm level as different types of corporate ownership – state-owned vs. private firms. State ownership is particularly prevalent in China while private ownership is playing an increasingly important role in the national economy. State ownership is often associated with vaguely defined property rights, a greater chance of political intervention, and the pursuit of non-economic objectives at the expense of other shareholders and thus implies a low level of property rights security. We therefore hypothesize that SOEs that are associated with a lower level of property rights security have a lower demand for property insurance, other things being equal.

Our tests of the relation between property rights security and corporate purchase of property insurance suggest that: a) firms located in regions with a higher property rights protection index, a lower government expropriation risk, and/or a more market-oriented banking sector are more likely to insure their assets and purchase more insurance; b) a higher proportion of state (private) ownership tends to be associated with a lower (higher) incidence and extent of insurance use; and c) in areas with relatively poor property rights protection, corruption in bank lending seems to have a negative effect on corporate demand for insurance. Our tests also suggest that the strength of the property rights protection afforded by the local legal system seems to have a first-order effect on corporate demand for property insurance, while the effects of other institution- and firm-level property rights proxies are conditional on a region's overall protection of property rights. One may argue that in addition to the lower level of property rights security in SOEs, the potential access to state contingent financing by

SOEs may also lead to a lower demand for property insurance. However, when we repeat our analysis using only private firms that should not have access to state contingent financing and so presumably are a cleaner sample than SOEs, our results regarding institution-level property rights protection remain robust.

To generalize our findings and examine the issue in a broader context, we examine the property rights – insurance link in an international context using country-level data from 93 countries over the period 1995-2008. Our cross-country analysis using aggregate insurance spending suggests a strong and positive association between property rights protection and the purchase of P/C insurance. Overall, these findings are consistent with the notion that the degree of property rights security is an important factor that shapes risk management strategy.

The remainder of the paper is organized as follows. Section 2 discusses the linkage between property rights security and corporate risk management via insurance. Section 3 describes the research design. Section 4 discusses the results from the intra-country analysis. Section 5 provides a cross-country analysis of insurance purchase and property rights protection, and Section 6 concludes the paper.

2. Hypotheses Development: Property Rights Security and Corporate Insurance

This section discusses the linkages between property rights security and corporate purchase of insurance. Following the reasoning of Cull and Xu (2005) and Levine (2005), we focus on the effects of three aspects of property rights: the effectiveness of property rights protection system (including the ease and reliability of contract enforcement), expropriation risk, and corporate ownership (state vs. private).

Property Rights Protection and Demand for Property Insurance

A firm is always at risk of not getting the returns from its assets due to the actions by the government, its business clients, competitors and other related parties (Claessens and Laeven, 2003). Strong property rights protection and contract enforcement should boost corporate demand for insurance for three reasons. First, strong protection of property rights and enforcement of contracts by the legal system, on the one hand, creates incentives for firms to

acquire and insure their assets, because the property and the expected cash flows generated in using the property are protected (Hussels et al., 2005). On the other hand, the enforcement of property rights imposes more liabilities on firms and thereby motivates them to take out insurance as an ex-ante protection against ex-post liabilities.

Second, a strong system of property rights protection and contract enforcement means that creditors (e.g., insurance policyholders) are better protected in the event of a dispute over insurance settlement between the insurer and the policyholder and when the insurer is subject to liquidation, thereby leading to a higher demand for insurance (Skipper, 1998).[7] Indeed, Esho et al. (2004, p. 266) point out "since insurance involves the legal transfer of risk, the value of the contract is dependent upon legal rules and enforcement, the efficiency of conflict resolution through the judiciary, and the stability and integrity of the law-making process." They show a positive relation between the protection of property rights and P/C insurance consumption at the country-level using 44 countries for the period 1984-1998.

Third, property rights may affect corporate demand for insurance through the effect on firms' growth opportunities. Starting from Besley (1995), a growing body of the literature has shown that secure property rights provide more incentives of corporate investment and lead to improved growth opportunities. Cull and Xu (2005) and Johnson et al. (2002) report that in transition countries, weak property rights discourage corporate reinvestment of earnings even when bank loans are available. Using cross-country industry-wide data, Claessens and Laeven (2003) further demonstrate that in environments with weak property rights protection, firms are less likely to invest in intangible assets such as intellectual property, thereby dampening their long-term growth. The above reasoning suggests that secure property rights will lead to more growth opportunities. Firms with more growth opportunities tend to be more risky (Myers, 1984) and/or have more acute underinvestment problems than firms with fewer growth opportunities (Froot et al., 1993). Insurance not only reduces the risk of financial distress, but also lowers the incidence of cash flow shortfalls (following a major accidental loss) that could trigger a scale-down of attractive investment projects (Froot et al.,

[7] Given that insurers have a positive probability of insolvency, insurance liabilities can be viewed as analogous to risky corporate debt (see Cummins and Danzon, 1997).

1993).[8] Therefore, secure property rights may also lead to a higher corporate demand for insurance through the positive effect on firms' growth opportunities.

In addition, the operation of financial markets reflects the effectiveness of property rights and thereby affects private contracting. Where the degree of marketization of the banking sector is high, property rights are more likely to be respected and safeguarded. Specifically, in a more competitive and more market-oriented banking sector, banks have stronger incentives to allocate credits in an efficient and safe way. Banks are therefore more likely to request property insurance to retain the value of collateral in granting loans. Our first hypothesis is:

Hypothesis 1: Stronger property rights protection tends to boost corporate demand for insurance, other things being equal.

Expropriation Risk and Demand for Property Insurance

Government expropriation extracts benefits from owners of property rights and lowers the owners' expected payoffs from owning and using assets. As a result, government expropriation may impede normal business operations, hinder private contracting and the enforcement of existing contracts, add business uncertainties, and lower the property rights security of legitimate owners. In China, government expropriation can be in the form of various non-tax levies, charges and fines, which may be imposed arbitrarily by corrupt officials (e.g., from tax collection, business license, fire inspection, public utility service, food hygiene and environment departments). It is important to note that in China such levies and charges apply to firms of all kinds, regardless of ownership. Where the expropriation risk is high, business owners may be reluctant to make lumpy capital investments and to insure their assets.

In addition to government expropriation, expropriation risk might come from

[8] Mayers and Smith (1987) analyze a special type of underinvestment problem that may arise in highly levered firms following a major accidental loss because limited liability gives shareholders a "default put option" to walk away from a reinvestment project if they feel that the future cash flow benefits are more likely to accrue to debtholders rather than to themselves. The purchase of insurance coverage can also mitigate this sort of underinvestment incentive.

non-government parties (e.g., corrupt bank loan officials). In China, rent seeking in the banking sector may also decrease corporate demand for property insurance. As Beck et al. (2006) point out, corruption in bank lending directly affects firms' financial decisions and performance in developing countries like China where stock markets are not well developed and a major source of firm finance is bank loan. In economies (like China) where property rights protection and the legal system is generally weak, credit allocation might be shaped by corruption and political ties (Barth et al., 2009; Li et al., 2008, Xie and Lu, 2005).[9] Facing corrupt bank loan officers who are interested in rent seeking, property rights and mechanisms to safeguard property rights (e.g., the insurance of collateral) are likely to be bypassed. With bribery payment to loan officers or political tie to the government officials, loan applications may be approved even if the loan collateral is not backed by property insurance or without collateral (Li et al., 2008). Therefore, we expect a negative impact of expropriation and corruption on corporate insurance purchase. Our second hypothesis is:

Hypothesis 2: *Other things being equal, the more severe government expropriation is, the less the corporate demand for insurance would be*.

Corporate Ownership and Demand for Property Insurance

Cull and Xu (2005) argue that corporate ownership itself is a measure of the security of property rights, as it defines the owners of a firm and how their control and cash flow rights are safeguarded. Relative to private ownership which is in general clearly specified, state ownership tends to be ambiguously defined and is akin to public goods (Sun et al., 2002). As a result, though assets of SOEs belong to the whole group of people in theory, no particular individual has the residual claim rights and so the management and supervision of SOEs in practice have to be delegated to bureaucrats who do not necessarily have the incentives to maximize shareholders' wealth. This has two implications for corporate demand for insurance.

[9] According to a recent survey conducted by People's Bank of China (the central bank), 81.8% of the respondents think that corruption in bank lending is quite common in China (Xie and Lu, 2005).

First, since the identity of the owner is vague, the firm that manages the stated-owned assets may not have strong incentives to purchase insurance, simply because the property does not solely belong to the firm or anyone else who would otherwise require the purchase of insurance.

Second, in addition to the expropriation risk (e.g., the aforementioned various non-tax levies imposed by the government) that all firms face, SOEs often are directed to pursue political/social objectives (Chen et al., 2011; Firth et al., 2011). For example, the government may directly transfer resources among different SOEs for the purposes of cross-subsidizing certain SOEs that the government believes deserve help. Occasionally, the government may merge some SOEs with other SOEs through administrative commands. This represents an additional property rights risk and can lower SOE managers' incentives to purchase insurance for the assets in the firm.

On the other hand, we note that it might be possible for some SOEs that are large and important to obtain some funding help from the government should they suffer severe uninsured asset losses. This possibility also predicts that SOEs purchase less property insurance. However, we note that direct government financial assistance have been significantly reduced since the market-based reform (especially the reform in the banking sector in mid-1990s) (Zou and Adams, 2008, Firth et al., 2008). It is also difficult to disentangle the effects of weak property rights security and the possible alternative funding sources that are associated with state ownership. We therefore provide robustness checks in Section 4.4 to show that the effects of institution-level property rights protection on corporate demand for insurance hold if we limit our analyses to privately-controlled firms that are a cleaner sample than SOEs. We have the following third hypothesis:

Hypothesis 3: *Other things being equal, state ownership is likely to be associated with a lower demand for property insurance*.

3. Data and Variables

3.1. The Sample

The dataset used in this study is compiled from three sources: 1) the First Economic Census of Enterprises in China (2005); 2) the World Bank Survey on Governance and Investment Climate Indexes in 120 Cities in China (2006); 3) the NERI (National Economic Research Institute of China) Marketization Indexes. The First Economic Census of Enterprises in China was conducted in 2005 by the National Statistical Bureau, covering all enterprises in China. This comprehensive survey covered almost all the important aspects of a firm's operation during 2004, such as ownership structure, key financial statement variables, including R&D spending, advertising expenses, etc. More importantly, for the purpose of this study, the dataset reports firms' annual spending on property insurance that we use in constructing our dependent variable. Such information is rarely reported even for listed companies in their annual reports in other countries. Therefore, the dataset provides a unique opportunity to explore the effect of property rights security on corporate risk management via insurance purchase. In addition, the Census covers enterprises of all sizes and enterprises with various types of ownership structure (i.e., state, foreign and domestic private ownership). However, a limitation of the dataset is that it only contains one-year cross-sectional data.

We obtained from the Census database a subset of the manufacturing firms that have annual sales over RMB 5 million (approximately US$650,000) – an official size criterion to classify enterprises. We focus on relatively large companies as theory predicts that the insurance decisions of large companies cannot be satisfactorily explained by risk aversion alone (Mayers and Smith, 1982). The subset of the firms is drawn from 120 major cities (that are covered by the World Bank Survey on Governance and Investment Climate Indexes) in China using a stratified random sampling method. Specifically, staff at the State Statistical Bureau used a computer program and drew a random sample about 33 percent of all manufacturing firms with annual sales over RMB 5 million in each of the 120 cities. The actual number of firms entering our regression models is about 55,700 due to missing values on some variables and this sample size represents about 25 percent of the universe of manufacturing firms with annual sales over RMB 5 million in China in 2004. Tables 1 and 2 provide brief descriptions and summary statistics of the key variables.

Data on property rights protection and other institutional variables come from two

sources: a) the China City Investment and Governance Indexes compiled by the World Bank that measure the situation in 2004; and b) the marketization indexes for China's 31 provinces and autonomous regions that measure the situation in 2003 prepared by the National Economic Research Institute in China (see Fan et al., 2006). In other words, we use the contemporaneous values of city-level governance indexes and the one-period lag of province-level governance indexes.[10] The World Bank City Governance Indexes were composed based on a World Bank mega-scale enterprise survey on business environment, property rights protection and local government effectiveness in 120 cities in China in 2004. The City Governance Indexes contain various sub-indexes on property rights protection, environment protection, corruption in lending and investment attractiveness to foreign and private investors, etc. Other city-level information (e.g., GDP, population, and unemployment rate) are reported as well. Reports on the NERI marketization indexes for China's 31 provinces and autonomous regions have been published since 2001 and are widely used in evaluating institutional development and marketization across China. The index ranks each province and autonomous region based on an aggregate marketization index covering the relation between the government and market, the development of the private economic sector, the development of goods and factor markets, the development of market intermediaries and legal environment. Sub-indexes on each of the above aspects are also available. These indexes have been widely adopted in studies (e.g., Chen et al., 2011; Jian and Wong, 2010) on institutional development and corporate finance in China. The variable definition and summary statistics of the key variables are presented in Tables 1 & 2. The variables are discussed in detail in the following section.

[Tables 1 & 2 here]

3.2. Variables

3.2.1. Measuring the purchase of insurance

[10] Using the contemporaneous values of city-level property rights protection indexes is an unavoidable limitation of our study. However, these indexes that measure institutional developments are relatively stable in the short run, and as such, we believe using the contemporaneous values should not bias our results in a significantly way.

The corporate use of insurance is the dependent variable in our analysis. We use two insurance measures. The first is a dummy variable that equals 1 if the firm purchased insurance in 2004 (*Insurance Dummy*) and 0 otherwise. The second, widely used in the prior studies on corporate insurance, is a continuous measure of the extent of insurance use, which is defined as the ratio of total insurance spending scaled by the average book value of total assets during the year (*Insurance Intensity*).[11] Overall, about 44% of the firms reported insurance purchase during 2004 and this proportion is lower than the 85% reported in Zou and Adams (2006) that use a sample of publicly listed firms in China (Table 2). Such a difference suggests that insurance is more popular in listed firms than in unlisted firms, probably because the former firms are subject to closer external monitoring by regulators, investors and analysts. The mean insurance intensity ratio is about 0.25% and there are large variations in the insurance intensity evidenced by a standard deviation of 0.62%. However, one should not hasten to conclude that such level of insurance use is trivial given that the data presented here are based on insurance premiums rather than on coverage. We can divide the median insurance intensity ratio (0.27%) of the insured sample by 0.3% to gain a rough idea of the percentage of coverage relative to tangible assets and the proportion covered is about 90% of the average book value of tangible assets during the year in firms carrying insurance.[12] Therefore, it appears that our sample of firms purchased significant amounts of property insurance.

3.2.2. Measuring property rights protection and contract enforcement

We include two index variables to measure the degree of property rights protection and contract enforcement. The first index (*Property Rights Protection*) is a city level index that measures the likelihood that the legal system will uphold business contracts and property rights in business disputes in 2004. The index ranges from 0 to 1, with a high value indicating

[11] Other potential insurance measures such as insurance coverage cannot be used due to the unavailability of insurance coverage.

[12] Property insurance premiums rates vary according to the nature of the business. 0.3% is roughly the mean of the premiums rates charged by the Peoples' Insurance Company of China (PICC) (a major insurance provider in China) on an average industrial business basis.

better property rights protection and contract enforcement. A similar index was used by Cull and Xu (2005) in their study of the property rights security on firm reinvestment. The second index (*Banking Sector Marketization*) measures the relative ranking of the financial market development across provinces in 2003. Specifically, the index captures two aspects of the regional credit market: 1) the competitiveness of the banking sector based on the market structure; 2) the extent to which the banks employ economic criteria in the credit allocation process. The index is obtained from Fan et al. (2006). Higher values indicate a more market-oriented banking sector. As we discussed earlier, we expect a positive linkage between banking sector marketization and the corporate use of insurance.

3.2.3. Measuring expropriation risk

We use two expropriation risk proxies. The first one (*Reducing Non-tax Levies and Charges*) is a 2003 NERI index obtained from Fan et al. (2006) measuring the provincial business environment about the extent of reducing non-tax government levies and charges in 2003. Higher values indicate less non-tax government levies and charges to the firms. The second proxy (*Bank Corruption Index*) is a city-level index for 2004 defined as the ratio of (expected) informal payments made to bank loan officers scaled by the loan size. The index is obtained from the World Bank 2006 Survey and varies across the 120 cities with a range from 0 to 28%.

3.2.4. Measuring corporate ownership

We use two variables to measure the corporate ownership structure. The first is a dummy variable taking one for SOEs (including collectively-owned enterprises that are quasi-SOEs) (*State Dummy*).[13] The second ownership variable measures the proportion of state ownership in a firm's ownership structure (i.e., *Percent State Ownership*). As Table 2 shows, about 15% of sample firms are controlled by the state. These figures confirm the importance of private firms in the national economy in China. When the state dummy is used in analysis, the

[13] However, our results on state ownership are not sensitive if we categorize collectively-owned enterprises as private firms.

benchmark group comprises of private firms.

Table 2 Panel B presents the correlation coefficients between the five proxies of property rights security at the city level.[14] As expected, generally, there is a positive and statistically significant correlation between the first three property rights security proxies, and a negative correlation between the first three proxies and the last two (inverse) property rights security proxies. A reliability of the internal consistency among these five proxies generates a test scale of alpha value = 0.644, suggesting that these five proxes are reasonably consistent.

3.2.5. Firm-level control variables

In addition to the variables discussed above, we follow prior studies on corporate insurance (e.g., Hoyt and Khang, 2000; Mayers and Smith, 1982, 1990; Zou and Adams, 2006) and include in our regression models a host of firm characteristics that may affect the corporate purchase of insurance.

We first control for the effect of firm size (measured as the natural logarithm of book value of total assets) and asset tangibility (defined as the ratio of the book value of fixed assets and inventory to the book value of total assets) on corporate purchase of insurance. Prior studies generally find small firms, which have limited financial resources and/or lack risk management expertise, tend to buy relatively more insurance than large companies. Asset tangibility is included to control for the impacts of differences in asset structure, collateral and debt capacity on property insurance purchases, and we expect a positive relation between asset tangibility and the purchase of insurance.

As we discussed in Section 3, growth firms tend to have a higher demand for insurance in order to reduce firm risk and/or mitigate the underinvestment problem. We use the *R&D Intensity* (R&D spending/total assets) and *Advertising Effort* (advertising spending/total assets) as proxies of growth opportunities and expect that they exhibit a positive relation with corporate use of insurance.

Quick ratio, defined as (current assets – inventory)/current liabilities, is included to control

[14] We aggregate the state ownership to the city level by taking the average state ownership of all firms in that city.

for the effect of liquidity on the purchase of insurance. Financial constraints (denoted by a low quick ratio) may limit corporate risk management activities (Haushalter, 2000) or induce a firm to purchase property insurance (e.g., on collateral) in order to secure bank loan in China.

While market reforms have significantly weakened firms' affiliations with the government, some firms (particularly SOEs) may be able to obtain subsidies from the government in the form of tax rebates and/or direct fiscal assistance. We control for the potential effect of subsidies received on corporate purchase of insurance by including a fiscal subsidy to sales ratio (*Fiscal Subsidy Ratio*) in our analysis.

Tax position: Smith and Stulz (1985), among others, argue that risk management can help reduce the expected tax liability in firms with a convex tax schedule. Tax convexity may result from progressivity in statutory tax rates (e.g., in the U.S.) and the presence of tax preferential items (e.g., investment tax credits and operating losses) (e.g., see Mayers and Smith, 1982). China has a flat corporate income tax rate of 33% in our sample period, however, tax convexity may arise because the tax code only allows a maximum of five-year carry-forwards of operating losses and carry-backs of operating losses are not permitted. Additionally, the tax code allows tax exemptions or rebates to certain businesses (e.g., foreign-invested firms and government approved high-tech companies) (Zou and Adams, 2008). We therefore create a *Tax Credit Dummy* that equals one if the current effective tax rate (income tax/taxable income) is less than the standard rate of 33%, suggesting the existence of tax credit items. We expect a positive relation between *Tax Credit Dummy* and corporate insurance because insurance coverage can help reduce the chance of reporting a loss (following an accidental event) and thereby retain the value of tax credits.

We also control for the effect of firms' dependence on external debt financing (*Debt Dependence*). More debt-reliant firms are expected to have more incentives to purchase property insurance in order to lower expected costs of financial distress and secure bank loans (the major source of corporate financing in China). Following Grullon et al. (2006), we measure debt finance dependence as industry median leverage ratio, defined as the ratio of total debt to assets. Industry is classified by the two-digit industry code in China. Using

industry-wide leverage instead of firm-specific leverage is desirable is because similar firms tend to share commonalities in the factors that affect their capital structure and many firms tend to use industry average leverage ratio as a target debt ratio (see Bradley, Jarrell and Kim, 1984; Gilson, 1997; Grullon et al., 2006; Rajan and Zingales, 1998).[15] However, our results regarding property rights security are robust if we use firm-level leverage.

Industry effects: Adam et al. (2007) argue that firms in more competitive industries are more likely to hedge their risks than firms in other industries, because such firms may be more vulnerable to severe cash shortfalls following (accidental) loss events and face the risk of losing their key customers and suppliers. Therefore, the impact of product-market competition on corporate insurance purchase is an interesting question that, to our knowledge, has not been explicitly tested before. We measure industry competition as the natural log of the total number of firms nationwide with the same four-digit industry code. We also include the two-digit industry dummies in our regressions to control for the risk differences among industries.

Firm age (i.e., the number of years since establishment) is included as a further control for the effect of differences in growth opportunities and assets structure on insurance purchase (Bartram et al., 2006). For example, old firms may be more mature and may have more assets in place that are at risk than young firms. In addition, mature firms typically use more debt than young firms. Therefore, we expect old firms to use more property insurance than young firms, other things being equal. Finally, we control for whether a firm is a listed firm as listed firms are subject to more monitoring by regulators, investors and analysts and this higher visibility may affect a firm's risk management decisions.

3.2.6. Other control variables

To control for the potential effects of differences in economic development (and institutions) across regions on the corporate purchase of insurance, we include *GDP per capita* and *Unemployment Rate* in our models.

[15] In contrast, the current leverage ratio may merely represent a short-term swing from a firm's target debt ratio and such swing is to be rebalanced by management.

Insurance supply-side factors may affect corporate purchase of insurance. For example, one may argue that firms may buy more insurance if insurance price in the region is cheaper. This, however, is not a concern in China as the China Insurance Regulatory Commission (CIRC) tightly regulates property insurance pricing by setting the benchmark premium rates for the majority of corporate property insurance products and standardizes insurers' underwriting practices by issuing uniform guidelines on risk rating and applicable classified premium rates (e.g., based on the type of business to be covered) (Zou and Adams, 2006). The Insurance Law also forbids insurers to realize competitive advantages by giving their customers premium rebates. The three dominating insurance groups (i.e., PICC, China Pingan Insurance, China Pacific Insurance) also have their branches throughout the country. The products provided by each of them are largely homogenous across different parts of the countries. This feature of property insurance market in China makes it a cleaner research setting in which to test our hypotheses and we therefore believe corporate purchase of insurance is unlikely to be driven by regional differences in insurance prices or product availability. Furthermore, to the extent that insurance market development correlates with economic development, the inclusion of *GDP per Capita* as a control renders more control for the supply effects.

We checked the correlations between the measures of property rights and firm-characteristic variables and found all the correlation coefficients in the models employed are below 0.5. We also calculated the variance inflation factor of each independent variable and found no evidence of multicollinearity.

4. Empirical Results

4.1. The Probit model

We first employ a Probit model to test the effect of property rights security on firms' propensity to take out insurance. We then use a Tobit model to test the effect of property rights security on the financial extent of insurance use. As Zou and Adams (2006) point out, separate analysis of participation and volume decisions could yield interesting insights into

those factors that influence the ex ante and ex post managerial insurance decisions.[16] The probability (likelihood) function of purchasing insurance is expressed as follows:

Pr (*Insurance Dummy*=1) = *f* (*Property Rights Protection Index, Banking Sector Marketization, Reducing Non-tax Levies and Charges, Banking Corruption Index, State Ownership, Control Variables*) + ε (1)

Due to the non-linearity, the magnitude of coefficients in the Probit models cannot be directly read like those in the OLS regressions. We report marginal effects evaluated at the means of the independent variables from the regressions to facilitate the interpretation of results. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. We use heteroskedasticity robust standard errors clustered at the city level in computing t-values. Therefore, we explicitly allow for the cross-sectional correlation caused by city-specific factors (e.g., legal environment and area-specific catastrophe risk like flooding). The basic empirical results are presented in Table 3.

[Table 3 here]

As can be seen from Columns (1) & (2) of Table 3, both the *Property Rights Protection Index* and *Banking Sector Marketization* index are positively and significantly associated with the likelihood of corporate insurance purchase, which is consistent with our hypothesis that stronger property rights protection and better contract enforcement provide more incentives for firms to insure their assets. The (inverse) government expropriation risk proxy (*Reducing Non-tax Levies & Charges*) also, as expected, has a positive and significant coefficient, suggesting that firms from regions with lower government non-tax levies and charges are more likely to take out property insurance than other firms. Albeit with a negative sign, the coefficient of the *Bank Corruption Index* is not statistically significant.

The coefficients of the *State Dummy* and *Percent State Ownership* are negative and

[16] We also tried a Cragg's (1971) extension of the Tobit model that allows different parameter values for the insurance participation and volume decisions, but the second-stage volume decision failed to converge, suggesting that this model is not suitable for use on our dataset.

significant at the 1% level, suggesting that SOEs are less likely to purchase insurance than private firms. These results thus provide some support for our hypothesis about the effect of state ownership on corporate insurance purchase.

Among the control variables of corporate insurance purchase, the coefficients of *Firm Size* are positive and significant at the 1% across model specifications, suggesting that larger firms are more likely to insure their assets than small companies. This finding, albeit contrary to theory (Aunon-Nerin and Ehling, 2008), is consistent with the results reported in Zou and Adams (2006). An explanation is that the firms in our sample are relatively small. Indeed, the median natural log of book value of total assets (*Firm Size*) is 9.397 (which is about RMB 120.52 million in total assets) compared with the same figure 11.881 (about RMB 1.44 billion in total assets) in Zou and Adams (2008) that use a sample of listed firms in China. As expected, the coefficients of *Debt Finance Dependence* and *Tangibility* are positive and statistically significant, suggesting that firms from finance dependent industries and firms have relatively more tangible assets are more likely to take out property insurance.

Also, as expected, the two proxies for growth opportunities (*R&D Intensity* and *Advertising Efforts*) are found to have a positive and significant impact on a firm's propensity to purchase insurance. These results are consistent with the argument that firms facing more growth opportunities tend to be more risky and/or have higher agency costs of underinvestment problems than firms with fewer growth opportunities (Froot et al., 1993; Mayers and Smith, 1987).

Quick ratio is found to have a negative significant effect on the incidence of property insurance. This is plausible because liquid firms may have less need to use insurance as contingent financing, or alternatively, firms with a low liquidity purchase insurance to facilitate obtaining bank loans.

The other control variables also yield interesting results. Older companies are found to be more likely to purchase insurance probably because they have more insurable tangible assets in place than younger firms. With respect to the macro control variables, *Unemployment rate* is positively related to firms' likelihood of purchasing insurance perhaps because the asset loss risk in regions with a high unemployment rate is high. No other variables are found to

have material impacts on firms' propensity to purchase insurance.

4.2. The Tobit model

The above analyses focus on the impact of property rights security on the incidence of insurance. We now turn to the impact of property rights security on the financial extent of insurance purchase. Since the dependent variable is left censored at 0, Tobit model is employed in the analysis. The Tobit models are estimated using maximum likelihood estimation. The results are presented in Columns (3) & (4) of Table 3. Again, the coefficient estimates of the Tobit models are transformed to represent the marginal effects evaluated at the means of the independent variables from the regressions. The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable as the dummy variable changes from 0 to 1. We again use heteroskedasticity robust standard errors clustered at the city level in computing t-values to allow for the cross-sectional correlation.

As can be seen from Table 3 and consistent with the findings from the Probit analysis, the coefficients of *Property Rights Protection Index* and *Banking Sector Marketization* index are positive and significant at the 1% level in all model specifications, suggesting that stronger property rights protection, better contract enforcement and a more market-oriented banking sector lead to more corporate consumption of property insurance. Again, the coefficients of *Reducing Non-tax Levies & Charges* are positive and statistically significant, suggesting that firms from regions with less government expropriation tend to purchase more property insurance than do other firms.

The results on state ownership variables derived from the Tobit estimations are consistent with our findings from the Probit analysis. The coefficients of the *State Dummy* and *Percent State Ownership* are negative and statistically significant at the 1% level, suggesting that SOEs tend to purchase less insurance than private firms.

The two proxies for growth opportunities (*R&D Intensity* and *Advertising Efforts*) are, again, found to have a positive and significant influence on the extent of insurance purchased. The coefficient of *Tangibility* is negative and statistically significant, suggesting that firms do

not purchase insurance in amounts proportionate to asset tangibility though firms with higher asset tangibility intensity are more likely to purchase insurance in the first place. This could arise because property insurance is related to the replacement value of assets rather than the book value of assets. Alternatively, the marginal benefit of increasing property insurance may be declining once a certain level of coverage is obtained. These results on asset tangibility are consistent with the findings of Zou and Adams (2006) in their study of insurance purchases by a small sample of publicly listed Chinese firms.

Different from our expectation, the coefficients of *Firm Size* are positive and statistically significant, suggesting that large sample firms tend to buy more property insurance than small firms. As we pointed earlier, one reason may be that our sample firms are relatively small. The coefficient of *Debt Finance Dependence* is positive and statistically significant, suggesting that firms from finance dependent industries and/or those have a higher target debt ratio purchase more insurance than other firms. Older companies tend to purchase more insurance than younger firms. Firms from more economically developed areas (proxyed by a high GDP per capita) tend to purchase less insurance on a relative basis. Perhaps firms from more economically developed areas are more capable of self insuring some asset-loss risks. Moreover, listed firms are found to have a higher insurance intensity than unlisted firms, other things being equal, possibly reflecting the effects of more monitoring in these firms and their more visibility on risk management decisions. No other variables are found to have significant impacts on the extent of corporate insurance.

4.3. Further Results from the Split-Sample Analysis

Our previous results show that property rights protection is associated with a higher corporate demand for insurance. We suspect that among our three measures of property rights security, the regional property protection index may have a first-order effect. To study whether the effect of corporate ownership and government expropriation on corporate purchase of insurance is conditional on the overall environment of property rights protection, we split the sample into cities with good property rights protection and contract enforcement (the cities with *Property Rights Protection Index* above the sample median) and poor property

rights protection and contract enforcement (the cities with *Property Rights Protection Index* below the sample median) and repeat the regression analysis in each sub-sample. The empirical results are presented in Table 4.

[Table 4 here]

There are three interesting findings. First, reducing government expropriation only significantly increases corporate demand for insurance when regional protection of property rights is strong. Second, in regions with weak property rights protection, the effect of bank lending corruption on corporate purchase of property insurance is negative (with the coefficient being significant in the Probit model). Therefore, corruption in bank lending seems to reduce firms' likelihood of insurance purchase when local protection of property rights is poor. Third, the negative effect of state ownership on corporate purchase of insurance is attenuated by the strong property right protection. Indeed, according to Wald tests, the difference in the coefficient of *Percent State Ownership* between the group with strong property right protection and the group with weak property rights protection in the Probit model is 0.030 with a *p*-value of 0.058 (two-tailed). The difference in the coefficient of *Percent State Ownership* between the group with strong property right protection and the group with weak property rights protection in the Tobit model is 0.045, with a *p*-value of 0.001 (two-tailed). In other words, in areas where property rights protection is weak, SOEs tend to buy less property insurance, other things being equal. These findings suggest that a region's overall protection of property rights seems to have a first-order effect on corporate demand for property insurance, while the effects of other institution- and firm-level property rights proxies are conditional on a region's overall protection of property rights.

In addition, firms from economically more developed areas have a lower demand for property insurance only when the region's property rights protection is weak, further highlighting the importance of property rights protection. The other variables have similar impacts on corporate purchase of insurance in both samples.

4.4. Results from using only privately-controlled firms

As noted earlier, a finding of a negative effect of state ownership on the purchase of property insurance is not only consistent with the argument that SOEs have a weak property rights security, but also in line with the possible alternative funding sources available to SOEs. In this section, we focus on privately-controlled firms and test the robustness of our findings on hypotheses 1 & 2. Analysis based on privately-controlled firms provides a sharper and cleaner test of how institution-level property rights protection shapes corporate property insurance decisions. Below we repeat our analyses in Tables 3 and 4 using firms that have private ownership over 50% and the results are reported in Tables 5 and 6. It is clear that our major results from using only private firms confirm our previous main finding – i.e., weak property rights protection discourages firms from engage in risk management activities via insurance.

[Table 5 and 6 here]

4.5. Results from split-sample analysis by listing status

Listed firms may face more stringent regulations and are subject to more monitoring by investors and analysts than unlisted firms. As a result, city-level property right protection may not have as large an impact on listed firms as on unlisted firms. To investigate this possibility, we repeat the regression analysis regarding the effects of property rights security on corporate purchase of property insurance separately for listed firms and unlisted firms.[17] We focus on privately controlled firms (i.e., non-SOEs) since they are cleaner setting in which to test the effects of property rights protection on insurance purchases. The results are reported in Table 7.

The results show while *Reducing Non-tax Levies & Charges* still exerts a positive and significant effect on the incidence and extent of property insurance purchase, the positive effect of *Property Rights Protection Index* and *Banking Sector Marketization* on insurance

[17] We thank an anonymous reviewer for suggesting this.

purchases is only present in unlisted firms. On the other hand, the coefficient of *Bank Corruption Index* is negative and marginally significant at the 10% level in the Probit model for listed firms, but insignificant in models for unlisted firms. Therefore, there is some evidence that city-level property right protection affects the insurance decisions of listed companies to a less extent compared with their unlisted counterparts.

[Table 7 here]

5. Evidence from a Cross-Country Analysis

Thus far, we have provided evidence on the effects of regional property rights protection on the corporate purchase of P/C insurance using detailed firm-level insurance data from China. One may wonder how generalizable the result is. In this section, we attempt to provide additional evidence of property rights protection on the purchase of P/C insurance within an international context. Two caveats are in order. First, it is not possible to obtain firm-level insurance data within an international context because firm-level insurance spending is only uniquely available from China (see footnote 1 for details). As a result, the analysis must be carried out at the country level. Second, we are unable to separate from the aggregate insurance data the portion of corporate purchase of insurance. These two caveats mean that the cross-country analysis presented in this section should not be construed as a simple extension of our intra-country analysis that is much more detailed. Nevertheless, we believe the cross-country validation adds additional rigor to our single-country analysis and sheds further insights into the importance of property rights protection to the purchase of P/C insurance. Our analysis based on a more complete and more recent dataset (93 countries over 1995-2008), and therefore our study also extends the prior research by Esho et al. (2004).

5.1. Data and Variables

We purchased P/C insurance data from Swiss Re, a leading reinsurance company in the world and famous for its authoritative insurance statistics and research for 93 countries for the period 1995-2008. As Esho et al. (2004), we measure consumption of P/C insurance as

Insurance Premium per Capita (measured in US dollars) in corresponding years.

In line with our analysis of China, we measure property rights protection with three categories of indexes measuring (a) the rule of law and contract enforcement; (b) banking sector development and marketization;[18] and (c) corruption and expropriation risk that is an inverse proxy for the cleanliness of the government. We conducted a comprehensive study and obtained several indexes from various authoritative sources.

For (a), we have two indexes – i.e., the rule-of-law index compiled by the International Country Risk Guide (ICRG), (hereafter as *ROL of ICRG*) and the index on legal structure and security of property rights compiled by the Economic Freedom Network (hereafter as *LSSPR of EFN*). Please see Table 1 for details of variable definition and data source.

For (b), we have two measures. The first is *Bank Credit/GDP*, measuring the importance of bank-intermediated finance to the national economy[19]. If banks typically require a borrowing company to take out property insurance, this ratio should have a positive effect on P/C insurance consumption. The second is a proxy for the competitiveness of banking business (*Bank Concentration*), which is defined as the proportion of assets owned by the three largest banks as a share of assets of all commercial banks in a country. Higher concentration generally means a lower level of competition within the banking industry (Barth et al., 2009). Banks in such countries may have fewer incentives to request collateral and insurance coverage of collateral in lending. Alternatively, corruption in lending may substitute for the insurance requirement. We therefore expect *Bank Concentration* to have a negative effect on P/C insurance consumption. These two measures are extracted from the World Bank website.

For (c), we have the index on control of corruption prepared by the World Bank (hereafter as *COC of WB*), freedom from corruption prepared by the Heritage Foundation (hereafter as *FFC of HF*).

In addition to the above variables, we also include the *GDP per Capita* (measured in

[18] We focus on private debt because a collateral requirement and associated insurance is less common in public debt (e.g., bond).

[19] This ratio has been widely used as a measure for financial development (e.g., Beck et al. 2000, Beck and Levine, 2002).

thousand US dollars) to control for the effect of income and economic development on the purchase of P/C insurance and expect it to have a positive effect. We then match these variables with the insurance data. To facilitate the interpretation of the results, we lag all explanatory variables by one period. Occasionally, an explanatory variable may have a gap in data availability, and in such a case, we use the variable's value that is immediately available before year t to match with the insurance variable in year t. For instance, ROL of ICRG and COC of WB only have values for 1996, 1998, 2000, 2002, and each year from 2002 onwards. For the insurance variable in year 1998, we use the value of ROL and COC in 1996 in modeling.[20] The actual number of observations and countries entering the regression varies according to which variables are used. These different numbers of observations in different model specifications provide a good opportunity to examine the robustness of our results.

Table 8 Panel A provides summary statistics of the variables used in the cross-country analysis. It is apparent that *Insurance Premium per capita* is highly skewed and we therefore use the natural log of the variable in our regression analysis. Panel B presents the correlation coefficients between the dependent variable and the various proxies for property rights protection. As predicted, there is a positive and statistically significant correlation between *Insurance Premium per capita* and proxies for property rights protection. It is also evident that the various indexes for property rights protection that are obtained from different sources are highly correlated. A reliability test of the internal consistency of these four measures produces a test scale for the alpha value = 0.961. This lends credence to these indexes as reasonable proxies for a country's protection of property rights. However, because of the high correlation coefficients between these proxies for property rights protection, we only include one proxy at a time to avoid multicollinearity.

[Table 8 here]

Our data set is a panel. We can, in theory, run a Hausman specification test to ascertain whether fixed or random-effects models are econometrically more appropriate. There is,

[20] The ISSPR of EFN does not have values between 1996 and 1999.

however, an additional factor relating to the nature of our data to consider. These country-level indexes may reflect institutional features that are slowly evolving and indeed some proxies are not compiled each year. This poses an identification issue to the fixed-effects estimation due to the correlation between country fixed-effects and property protection indexes that may have limited time-series variations (Zhou, 2001). We therefore report in Table 8 the results from both a fixed-effects and random-effects estimation.[21] We report heteroskedasticity-robust standard errors clustered at the country level in computing t-values to allow for the within-country but between-year correlation.

As Table 9 shows, all the four proxies for property rights protection have a positive regression coefficient and the coefficient is statistically significant except for ln(FFC of HF) in the fixed-effects model. Because of the potential low power of a fixed effects estimation when a test variable has limited time-series variations, we place more reliance on the random-effects estimation.[22]

As for the control variables, consistent with our expectation, the coefficient of *Bank Concentration* is negative and statistically significant in all the estimations. Therefore, in countries that lack market competition in the banking sector, banks tend to have fewer incentives to request collateral and associated insurance in lending. Alternatively, corruption in lending may circumvent the insurance requirement. The coefficient of *Bank Credit/GDP* is insignificant in all the models, which suggests that insurance purchase is not a direct derivative of using bank credit. Moreover, the level of economic development, in general, has a positive effect on the consumption of insurance, though its significance varies between a fixed- and random-effects model. Overall, the results from the cross-country analysis validates our key finding from the single-country analysis that strong property rights protection leads to more use of property insurance as a risk management mechanism.

[Table 9 here]

[21] Unreported pooled OLS models using clustered standard errors at the country level suggest all the property rights indexes have a positive and statistically significant regression coefficient in the insurance model.

[22] For example, a random check of the FFC of HF suggests that ALBANIA scored 10 between 1995 and 2000.

6. Conclusion

Taking advantage of a large and unique firm-level dataset on corporate insurance that is recently available from China's first economic census, this study empirically tests the effects of property rights security on the corporate risk management via insurance use. Following the recent literature (e.g., Cull and Xu, 2005; Levine, 2005), we measure property rights security at both the institution- and firm-level. We obtain the following results. First, firms located in regions with better property rights protection, lower government expropriation risk, and/or a more market-oriented banking sector, have more incentives to insure their assets. Second, relative to private ownership, state ownership tends to be associated with a lower incidence and extent of insurance use. Third, in areas with a lower-than-sample-median index of property rights protection, corruption in bank lending seems to have a negative effect on corporate demand for insurance, and reducing non-tax levies & charges does not increase corporate demand for insurance. Our tests also suggest that the strength of the property rights protection afforded by the local legal system has a first-order effect on corporate demand for property insurance, while the effects of other institution- and firm-level property rights proxies are conditional on a region's overall protection of property rights. Our results regarding institution-level property rights protection are robust to limiting the analysis to privately controlled firms that are a cleaner sample for testing the effects of property rights protection on corporate purchase of property insurance. The importance of property rights protection is further underpinned by our cross-country results from using 93 countries for the period 1995-2008. Overall, these findings are consistent with the notion that the degree of property rights security is an important determinant of corporate insurance decisions.

Our study represents the first study focusing on the important relation between property rights security and corporate risk management. The documented evidence adds to the expanding body of research on the importance of property rights and investor protection to corporate financial decisions. Prior studies (Allayannis and Weston, 2001; Mayers and Smith, 1982; Smith and Stulz, 1985; Zou, 2010; Zou and Adams, 2008) have shown both theoretically and empirically that corporate risk management can be value increasing in the

presence of market imperfections, for example, via coordinating a firm's financing and investment decisions. An important policy implication of our results is that weak property rights protection also hurts firms (the basic economic units) and their investors by inhibiting their use of corporate risk management in coordinating firms' financing and investment decisions. This should ultimately compromise a country's economic growth. Future study should benefit from examining the effect of property rights security and corporate derivative hedging when reliable derivatives data are available.

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Table 1
Variable definitions

Variable	Definition
Dependent variables	
Insurance Dummy	1 = a firm bought property insurance in 2004
Insurance Intensity (%)	Annual spending on property insurance/the average assets value in 2004 ×100%, winsorized at the 1% at both tails.
Test variables	
Property Rights Protection Index	The city-level index measures the likelihood that a firm's contractual and property rights are protected in business disputes in 2004. (Obtained from the World Bank Survey 2006)
Banking Sector Marketization	The index measures the relative ranking of financial market development across provinces based on the proportion of deposits attracted by non-state-owned banks and the proportion of bank loans provided to non-state-owned firms in 2003. (Obtained from Fan et al. (2006))
Reducing Non-tax Levies & Charges (an inverse proxy for expropriation risk)	The province-level index measures the relative ranking of government imposed non-tax levies & charges on local firms in 2003. (Obtained from Fan et al. (2006))
Bank Corruption Index (expropriation proxy)	The city-level index measures the expected informal payments to bank officials as a percentage of bank loan obtained in 2004. (Obtained from the World Bank Survey 2006)
State Dummy	1 = a firm is majority State-owned or collectively-owned (with ownership more than 50%) and 0 for otherwise
Percent State Ownership	Capital contributed by the state and collective / total registered capital
Control variables	
Firm Size	Defined as the natural log of book value of total assets
R&D Intensity	R&D spending/total assets, winsorized at the 1% at both tails.
Advertising Effort	Advertising expense/total assets, winsorized at the 1% at both tails.
Tangibility	(inventory + net book value of fixed assets)/total assets, winsorized at the 1% at both tails.
Fiscal Subsidy Ratio	Total subsidies received from local government/sales, winsorized at the 1% at both tails.
Quick Ratio	Ratio of liquid assets to current liabilities (not including inventory), winsorized at the 1% at both tails.
Tax Credit Dummy	Equals 1 if current tax rate (income tax/taxable income)<33%, suggesting the existence of preferential tax credit items or tax shields.
Utilities Firm Dummy	Regulated (utilities) firm dummy, 1 = if the firm is an utilities firm.
Dept Finance Dependence	Proxied by industry median leverage ratio (determined by two-digit industry code)
Industry Competition	Natural log of the number of firms having the same 4-digit industry code nationally (obtained from *China's Market Statistical Yearbook* 2005)
Firm Age	The natural log of number of years since business commencement

Unemployment Rate	Unemployment rate of a city
GDP per Capita	Natural log of Real GDP per capita (RMB)
Explanatory variables for cross-country analysis	
ROL of ICRG	Rule-of-law index compiled by the International Country Risk Guide (ICRG), capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. A high value means better property rights protection. Lagged value used. Source: http://info.worldbank.org/governance/wgi/index.asp
ISSPR of EFN	Index on legal structure and security of property rights compiled by the Economic Freedom Network (see Gwartney et al., 2009). A high value means better property rights protection. Lagged value used. Source: http://www.freetheworld.com/datasets_efw.html
COC of WB	Index on control of corruption compiled by the World Bank (with a high value for low corruption). Lagged value used. Source: http://info.worldbank.org/governance/wgi/index.asp
FFC of HF	Index on freedom from corruption compiled by the Heritage Foundation. A high value means low corruption. Lagged value used. Source: http://www.heritage.org/Index/Download.aspx
Bank Concentration	The proportion of total assets owned by the three largest banks to the total assets of commercial banks in a country. Lagged value used. Source: http://econ.worldbank.org/wbsite/external/extdec/extresearch
Bank Credit/GDP	Lagged value used. Source: http://econ.worldbank.org/wbsite/external/extdec/extresearch
GDP per Capita	GDP/population, GDP is measured in thousand US dollars. Lagged value u sed. Source: http://www.imf.org/external/ns/cs.aspx?id=28

Table 2
Summary statistics of main variables

Panel A

Variables	Mean	Median	SD	Min	Max	N
Insurance Dummy	0.438	0.000	0.496	0.000	1.000	55702
Insurance Intensity (%)	0.246	0.000	0.617	0.000	4.297	55702
Insurance Intensity (%) (insured sample)	0.562	0.267	0.831	0.000	4.297	24402
Property Rights Protection Index	0.679	0.702	0.172	0.269	0.982	55702
Banking Sector Marketization	8.040	8.520	1.777	2.670	10.170	55702
Reducing Non-tax Levies & Charges	10.049	9.960	0.765	5.440	12.000	55702
Bank Corruption Index	0.056	0.046	0.036	0.000	0.280	55702
State Dummy	0.145	0.000	0.352	0.000	1.000	55702
Percent State Ownership	0.135	0.000	0.325	0.000	1.000	55607
Firm Size	9.606	9.397	1.423	3.555	18.469	55702
R&D Intensity	0.002	0.000	0.009	0.000	0.070	55702
Advertising Effort	0.001	0.000	0.004	0.000	0.030	55702
Tangibility	0.471	0.465	0.215	0.049	0.943	55702
Fiscal Subsidy Ratio	0.003	0.000	0.011	0.000	0.075	55702
Quick Ratio	1.302	0.791	2.111	0.046	16.333	55702
Tax Credit Dummy	0.815	1.000	0.388	0.000	1.000	55702
Debt Finance Dependence	0.592	0.596	0.042	0.428	0.661	55702
Industrial Competition	6.634	6.663	1.169	0.693	9.097	55702
Firm Age	1.667	1.609	0.951	0.000	6.001	55702
Unemployment Rate	3.175	3.500	1.160	0.500	8.500	55702
GDP per Capita	9.490	9.572	0.619	7.517	10.511	55702
Listing dummy	0.024	0.000	0.152	0.000	1.000	55702

Panel B: correlation between proxies for property rights security at the city level

		(a)	(b)	(c)	(d)	(e)
Property Rights Protection Index	(a)	1.000				
Banking Sector Marketization	(b)	0.268	1.000			
		(0.003)				
Reducing Non-tax Levies & Charges	(c)	0.103	0.272	1.000		
		(0.251)	(0.002)			
Bank Corruption Index	(d)	-0.288	-0.187	-0.321	1.000	
		(0.001)	(0.037)	(0.000)		
Percent State Ownership	(e)	-0.398	-0.646	-0.030	0.143	1.000
		(0.000)	(0.000)	(0.743)	(0.112)	

Note: reported in parentheses are p-values (two-tailed). A reliability test of the internal consistency among these proxies produces a test scale for alpha value =0.644. Percent state ownership is the mean of state ownership of each city.

Table 3

Property rights security and the incidence & extent of insurance purchases

Dependent variable	Insurance dummy		Insurance intensity (%)	
	Probit	Probit	Tobit	Tobit
	(1)	(2)	(3)	(4)
Property Rights Protection Index	0.121***	0.121***	0.096***	0.096***
	[2.743]	[2.739]	[3.470]	[3.425]
Banking Sector Marketization	0.024***	0.024***	0.016***	0.016***
	[4.181]	[4.195]	[4.365]	[4.407]
Reducing Non-tax Levies & Charges	0.031***	0.031***	0.022***	0.022***
	[2.973]	[3.008]	[3.127]	[3.079]
Bank Corruption Index	-0.195	-0.192	0.024	0.023
	[-0.664]	[-0.654]	[0.128]	[0.125]
State Dummy	-0.050***		-0.041***	
	[-5.610]		[-5.560]	
Percent State Ownership		-0.066***		-0.051***
		[-7.453]		[-6.327]
Firm Size	0.093***	0.092***	0.024***	0.023***
	[31.137]	[31.229]	[8.350]	[8.311]
R&D Intensity	1.261***	1.238***	0.612**	0.589**
	[3.899]	[3.763]	[2.475]	[2.336]
Advertising Effort	7.124***	7.081***	7.404***	7.389***
	[8.593]	[8.520]	[8.520]	[8.417]
Tangibility	0.101***	0.101***	-0.140***	-0.139***
	[7.089]	[7.093]	[-11.149]	[-11.091]
Fiscal Subsidy Ratio	0.360	0.379	-0.040	-0.028
	[1.422]	[1.488]	[-0.221]	[-0.160]
Quick Ratio	-0.005***	-0.005***	-0.001	-0.001
	[-4.238]	[-4.309]	[-0.797]	[-0.867]
Tax Credit Dummy	-0.008	-0.008	-0.006	-0.006
	[-1.006]	[-1.057]	[-0.743]	[-0.794]
Debt Finance Dependence	1.296***	1.274***	0.722***	0.709***
	[10.535]	[10.250]	[6.576]	[6.396]
Industrial Competition	0.001	0.001	0.001	0.001
	[0.236]	[0.315]	[0.203]	[0.311]
Firm Age	0.051***	0.052***	0.036***	0.037***
	[15.172]	[15.470]	[12.933]	[13.562]
Unemployment Rate	0.016**	0.016**	0.005	0.006
	[2.239]	[2.313]	[1.207]	[1.242]
GDP per Capita	-0.017	-0.017	-0.020*	-0.020*
	[-1.015]	[-1.009]	[-1.776]	[-1.757]
Listing dummy	0.008	0.006	0.019*	0.017
	[0.639]	[0.430]	[1.755]	[1.517]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.155	0.156	0.017	0.017
N	55,702	55,607	55,702	55,607

Marginal effects are reported. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the city level to allow for cross-sectional correlation. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity.

Table 4

Sub-group analysis by property rights protection

	Probit (strong rights)	Tobit (strong rights)	Probit (weak rights)	Tobit (weak rights)
	(1)	(2)	(3)	(4)
Banking Sector Marketization	0.032***	0.018***	0.018***	0.015***
	[3.680]	[3.623]	[3.495]	[3.658]
Reducing Non-tax Levies & Charges	0.049***	0.043***	0.015	0.005
	[2.885]	[3.702]	[1.490]	[0.741]
Bank Corruption Index	0.106	0.199	-0.719**	-0.331
	[0.241]	[0.724]	[-2.098]	[-1.403]
Percent State Ownership	-0.045***	-0.023**	-0.075***	-0.068***
	[-3.342]	[-1.988]	[-7.579]	[-7.431]
Firm Size	0.088***	0.017***	0.095***	0.029***
	[23.867]	[4.211]	[19.927]	[8.877]
R&D Intensity	1.814***	0.953***	0.718*	0.267
	[3.876]	[2.909]	[1.698]	[0.795]
Advertising Effort	6.415***	8.753***	7.795***	6.442***
	[4.582]	[5.389]	[8.175]	[7.047]
Tangibility	0.103***	-0.152***	0.103***	-0.127***
	[4.892]	[-9.179]	[5.480]	[-7.482]
Fiscal Subsidy Ratio	0.721	0.224	0.140	-0.156
	[1.558]	[0.669]	[0.512]	[-0.827]
Quick Ratio	-0.005***	-0.001	-0.005***	-0.001
	[-2.821]	[-0.506]	[-2.907]	[-0.445]
Tax Credit Dummy	-0.022**	-0.016*	0.007	0.006
	[-2.369]	[-1.900]	[0.723]	[0.522]
Debt Finance Dependence	1.214***	0.596***	1.289***	0.864***
	[7.769]	[4.714]	[5.873]	[5.076]
Industrial Competition	0.001	0.003	-0.001	-0.002
	[0.296]	[0.593]	[-0.462]	[-0.880]
Firm Age	0.059***	0.041***	0.046***	0.033***
	[12.192]	[11.099]	[11.688]	[8.658]
Unemployment Rate	0.022**	0.004	0.006	0.006
	[2.437]	[0.624]	[0.665]	[0.885]
GDP per Capita	0.023	0.004	-0.068***	-0.049***
	[0.906]	[0.236]	[-3.509]	[-3.770]
Listing dummy	-0.017	0.008	0.021	0.021
	[-0.950]	[0.490]	[1.087]	[1.401]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.158	0.018	0.162	0.018
N	27,861	27,861	27,746	27,746

This table presents probit and tobit regression results based on two sub-groups determined by property rights protection. The "strong rights" group comprises observations if the local property rights protection index is higher than the sample median and the "weak rights" group includes observations if the local property rights protection index is lower than the sample median. Marginal effects are reported. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the city level to allow for cross-sectional correlation. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity. A Wald test of the difference in the coefficient of *Percent State Ownership* between groups (1) and (3) generates a Chi-square of 3.60 (*p*-value=0.058, d.f.=1, two-tailed). The difference in the coefficient of *Percent State Ownership* between groups (2) and (4) generates a Chi-square of 11.66 (*p*-value=0.001, d.f.=1, two-tailed). Therefore, the negative effect of state ownership on corporate purchase of insurance is attenuated by the strong property right protection

Table 5

Property rights security and the incidence & extent of insurance purchases (private firms)

	Probit	Tobit
	(1)	(2)
Property Rights Protection Index	0.151***	0.124***
	[2.736]	[2.850]
Banking Sector Marketization	0.029***	0.018***
	[4.378]	[3.751]
Reducing Non-tax Levies & Charges	0.031***	0.026***
	[2.610]	[2.869]
Bank Corruption Index	0.018	0.198
	[0.058]	[0.901]
Firm Size	0.094***	0.024***
	[20.267]	[6.018]
R&D Intensity	1.227***	0.751***
	[2.988]	[2.597]
Advertising Effort	7.123***	8.317***
	[6.133]	[6.785]
Tangibility	0.105***	-0.147***
	[5.131]	[-7.890]
Fiscal Subsidy Ratio	0.290	-0.165
	[0.762]	[-0.540]
Quick Ratio	-0.009***	-0.003
	[-4.490]	[-1.320]
Tax Credit Dummy	-0.009	0.002
	[-0.921]	[0.185]
Debt Finance Dependence	1.399***	0.867***
	[7.389]	[4.657]
Industrial Competition	-0.006	-0.005
	[-1.536]	[-1.363]
Firm Age	0.057***	0.047***
	[12.389]	[11.098]
Unemployment Rate	0.015**	0.009
	[2.100]	[1.631]
GDP per Capita	-0.009	-0.016
	[-0.457]	[-1.062]
Listing dummy	0.010	0.014
	[0.377]	[0.651]
Two-digit industry dummies	yes	yes
Pseudo-R^2	0.152	0.018
N	26,097	26,097

Marginal effects are reported. Only privately-controlled firms (in which private ownership>50%) enter the regression. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the city level to allow for cross-sectional correlation. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity.

Table 6

Sub-group analysis by property rights protection (private firms)

	Probit (strong rights)	Tobit (strong rights)	Probit (weak rights)	Tobit (weak rights)
	(1)	(2)	(3)	(4)
Banking Sector Marketization	0.041***	0.023***	0.020***	0.015***
	[4.188]	[3.299]	[3.273]	[2.700]
Reducing Non-tax Levies & Charges	0.054***	0.054***	0.003	0
	[2.834]	[4.068]	[0.298]	[0.040]
Bank Corruption Index	0.449	0.427	-0.721**	-0.292
	[0.993]	[1.514]	[-2.134]	[-0.986]
Firm Size	0.091***	0.016***	0.097***	0.032***
	[12.471]	[2.888]	[16.432]	[6.478]
R&D Intensity	1.533**	0.733*	0.948**	0.732**
	[2.215]	[1.666]	[2.500]	[2.319]
Advertising Effort	6.279***	10.028***	8.360***	7.545***
	[3.178]	[4.395]	[6.323]	[6.336]
Tangibility	0.101***	-0.161***	0.106***	-0.135***
	[3.229]	[-6.340]	[4.118]	[-5.389]
Fiscal Subsidy Ratio	0.395	0.019	0.299	-0.159
	[0.584]	[0.038]	[0.654]	[-0.383]
Quick Ratio	-0.008***	-0.001	-0.009***	-0.003
	[-2.599]	[-0.518]	[-3.098]	[-1.011]
Tax Credit Dummy	-0.020	-0.005	0.004	0.011
	[-1.523]	[-0.458]	[0.273]	[0.749]
Debt Finance Dependence	1.429***	0.809***	1.351***	1.032***
	[6.229]	[3.816]	[4.528]	[3.747]
Industrial Competition	-0.004	-0.002	-0.007*	-0.007*
	[-0.702]	[-0.371]	[-1.707]	[-1.702]
Firm Age	0.066***	0.054***	0.050***	0.041***
	[10.375]	[10.130]	[9.004]	[6.434]
Unemployment Rate	0.019**	0.005	-0.001	0.002
	[2.137]	[0.638]	[-0.139]	[0.244]
GDP per Capita	0.010	-0.013	-0.053***	-0.036**
	[0.377]	[-0.637]	[-2.756]	[-2.129]
Listing dummy	-0.006	0.016	0.029	0.014
	[-0.169]	[0.487]	[0.743]	[0.452]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.168	0.022	0.148	0.018
N	13,233	13,233	12,864	12,864

This table presents probit and tobit regression results based on two sub-groups determined by property rights protection. Only privately-controlled firms (in which private ownership>50%) enter the regression. The "strong rights" group comprises observations if the local property rights protection index is higher than the sample median and the "weak rights" group includes observations if the local property rights protection index is lower than the sample median. Marginal effects are reported. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the city level to allow for cross-sectional correlation. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity.

Table 7

Sub-group analysis by listing status of private firms

	Listed firms		Unlisted firms	
	Probit	Tobit	Probit	Tobit
	(1)	(2)	(3)	(4)
Property Rights Protection Index	-0.073	0.055	0.154***	0.127***
	[-0.454]	[0.585]	[2.784]	[2.849]
Banking Sector Marketization	-0.010	-0.016	0.030***	0.018***
	[-0.496]	[-1.371]	[4.448]	[3.815]
Reducing Non-tax Levies & Charges	0.081**	0.055***	0.030**	0.025***
	[2.081]	[2.612]	[2.496]	[2.664]
Bank Corruption Index	-1.286*	-0.379	0.048	0.220
	[-1.677]	[-0.930]	[0.153]	[0.979]
Firm Size	0.096***	-0.015	0.094***	0.025***
	[6.053]	[-0.943]	[19.469]	[5.978]
R&D Intensity	2.053	1.614	1.232***	0.746**
	[0.928]	[1.574]	[2.975]	[2.486]
Advertising Effort	15.404	11.832**	7.035***	8.258***
	[1.563]	[2.306]	[6.005]	[6.723]
Tangibility	0.086	-0.205*	0.105***	-0.146***
	[0.612]	[-1.883]	[5.188]	[-7.886]
Fiscal Subsidy Ratio	-4.032**	-2.502*	0.490	-0.042
	[-2.177]	[-1.919]	[1.269]	[-0.135]
Quick Ratio	0.009	0.004	-0.010***	-0.003
	[0.587]	[0.345]	[-4.653]	[-1.410]
Tax Credit Dummy	0.001	-0.009	-0.010	0.002
	[0.014]	[-0.216]	[-0.938]	[0.165]
Debt Finance Dependence	0.488	1.659**	1.406***	0.855***
	[0.236]	[2.009]	[7.314]	[4.622]
Industrial Competition	0.012	0.008	-0.006	-0.005
	[0.434]	[0.448]	[-1.558]	[-1.389]
Firm Age	0.083**	0.072***	0.057***	0.047***
	[3.039]	[4.158]	[12.124]	[10.782]
Unemployment Rate	0.005	0.005	0.016**	0.009
	[0.261]	[0.455]	[2.132]	[1.633]
GDP per Capita	-0.018	0.033	-0.009	-0.016
	[-0.346]	[0.994]	[-0.450]	[-1.095]
Two-digit industry dummies	yes			yes
Pseudo-R^2	0.357	0.097	0.150	0.018
N	476	476	25,621	25,621

Marginal effects are reported. Only privately-controlled firms (in which private ownership>50%) enter the regression. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the city level to allow for cross-sectional correlation. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity.

Table 8

Panel A: Summary statistics of main variables used in cross-country analysis

Variables	Mean	Median	Std.Dev.	Min	Max	N
Insurance Premium per Capita (unlogged)	336.061	93.600	491.686	0.600	4483.500	336.061
Insurance Premium per Capita	4.588	4.539	1.838	-0.511	8.408	4.588
ROL of WB	0.418	0.460	0.953	-1.719	2.014	0.418
ISSPR of EFN	6.283	6.400	1.747	1.400	9.600	6.283
COC of WB	0.452	0.321	1.056	-1.521	2.591	0.452
FFC of HF	51.844	50.000	23.955	4.000	100.000	51.844
Bank Credit/GDP	0.572	0.465	0.456	0.072	3.896	0.572
Bank Concentration	0.640	0.633	0.199	0.148	1.000	0.640
GDP per Capita	12.854	5.851	14.322	0.179	107.098	12.854

Panel B: Correlations among insurance and proxies for property rights protection

		(1)	(2)	(3)	(4)	(5)
Insurance Premium per Capita	(1)	1.000				
ROL of ICRG	(2)	0.810	1.000			
ISSPR of EFN	(3)	0.772	0.902	1.000		
COC of WB	(4)	0.823	0.950	0.895	1.000	
FFC of HF	(5)	0.768	0.863	0.840	0.888	1.000

Note: a reliability test of the internal consistency produces a test scale for alpha value is 0.961

Panel C: 93 Countries included in the analysis (1995-2008)

Algeria	El Salvador	Luxembourg	Slovakia
Angola	Estonia	Malaysia	Slovenia
Argentina	Finland	Malta	South Africa
Australia	France	Mauritius	South Korea
Austria	Germany	Mexico	Spain
Bahamas	Greece	Morocco	Sri Lanka
Bangladesh	Guatemala	Namibia	Sweden
Barbados	Hong Kong	Netherlands	Switzerland
Belgium	Hungary	New Zealand	Taiwan
Botswana	Iceland	Nigeria	Thailand
Brazil	India	Norway	Trinidad And Tobago
Bulgaria	Indonesia	Oman	Tunisia
Canada	Iran	Pakistan	Turkey
Chile	Ireland	Panama	Ukraine
China	Israel	Peru	United Arab Emirates
Colombia	Italy	Philippines	United Kingdom
Costa Rica	Jamaica	Poland	United States
Croatia	Japan	Portugal	Uruguay
Cyprus	Jordan	Qatar	Venezuela
Czech Rep.	Kenya	Romania	Vietnam
Denmark	Kuwait	Russia	Zimbabwe
Dominican Republic	Latvia	Saudi Arabia	
Ecuador	Lebanon	Serbia & Montenegro	
Egypt	Lithuania	Singapore	

Table 9: Property rights security and the extent of insurance purchases (cross-country analysis)
(Dependent variable = ln(P/C Insurance Premium per Capita))

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE	RE	FE	RE	FE	RE	FE	RE
ROL of the ICRG	0.309**	0.560***						
	[2.620]	[5.337]						
ISSPR of EFN			0.087**	0.159***				
			[2.486]	[4.917]				
COC of WB					0.253***	0.441***		
					[3.026]	[5.981]		
Ln(FFC of HF)							0.061	0.136***
							[1.274]	[2.798]
Bank Concentration	-0.651***	-0.639***	-0.440**	-0.402*	-0.623***	-0.588***	-0.663***	-0.609***
	[-2.922]	[-2.875]	[-2.100]	[-1.935]	[-2.915]	[-2.835]	[-2.959]	[-2.709]
Bank Credit/GDP	-0.026	0.027	-0.017	0.133	0.070	0.186	-0.007	0.149
	[-0.162]	[0.167]	[-0.126]	[1.031]	[0.422]	[1.066]	[-0.053]	[1.097]
GDP per capita	0.003	0.007*	0.005	0.013***	0.005	0.010**	0.005	0.012**
	[0.829]	[1.706]	[1.568]	[3.085]	[1.257]	[2.327]	[1.322]	[2.480]
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Overall adjusted-R^2	0.458	0.661	0.319	0.603	0.501	0.682	0.118	0.364
N	933	933	683	683	933	933	980	980

This table presents results from regressing P/C insurance consumption on property rights protection proxies. Reported in parentheses are t-values computed using heteroskedasticity robust standard errors clustered at the country level to allow for cross-sectional correlation. "FE" means estimation from models with country fixed effects, "RE" means estimation from models with country random effects. ***, **, * denotes significance at the 1, 5, and 10 percent level, respectively (two-tailed). The intercept is included in all models but its coefficient is unreported for brevity. Ln(*FFC of HF*) is the natural log of *FFC of HF*.