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 56,000 Chinese manufacturing 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., Besley, 1995; Acemoglu, Johnson and Robinson, 2001; Johnson, McMillan and Woodruff, 2002; La Porta, Lopez-de-Silanes, Shileifer and Vishny, 1998, 2002; Shleifer and Wolfenzon, 2002; Beck, Demirguc-Kunt and Levine, 2003; Acemoglu and Johnson, 2005; Beck, Demirguc-Kunt and Maskimovic, 2005; Claessens and Laeven, 2005; Cull and Xu, 2005; Lin, Lin and Song, 2010). Using a unique large corporate property insurance dataset covering more than 56,000 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 managers undertake risk management activities since risk management should be irrelevant in a classic Modigliani and Miller (M&M) world without market imperfection. 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. Mayers and Smith, 1982; Smith and Stulz, 1985), underinvestment and predation risk

(e.g. Froot, Scharfstein, and Stein, 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 another important determinant of *corporate* risk management decisions.

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, Minton, and Schrand (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 clean testing ground for the relation between property rights security and corporate risk management (Adams, Hardwick and Zou, 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 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.

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

[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.

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 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, Kirievsky, Ward and Zurbruegg (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, Demirguc-Kunt and Levine (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 accounting books of China's manufacturing firms. Such information is thus highly reliable and not subject to the biases associated with subjective survey data (Bertrand and Mullainathan, 2001). Chinese 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 (Cull and Xu, 2005). Our data show significant variations in the incidence and extent of corporate insurance among firms in different regions (see Section 3.2.1 and Table 3 for details). 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, collective, 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). 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, Qian and Qian (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, Lin, Ma and Zou, 2011). Insurance as a post-loss financing mechanism can help coordinate a firm's financing and investment decisions (Mayers and Smith, 1982, 1987; Froot et al., 1993). 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.

[3] While Zou and Adams (2006; 2008) also examine the 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 studies. Second, their studies rely on datasets hand collected from annual reports in which the disclosure of insurance information is voluntary. As a result, their studies suffer from a sample selectivity bias. In contrast, our study uses a dataset that is sourced from the mandatory regulatory filing to the State Statistical Bureau in which insurance spending is a must-to-disclose item. Second, their samples are small and only include 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 their sample firms 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.

Following the recent literature (e.g., Johnson et al., 2002; Cull and Xu, 2005; Levine, 2005) on the role of property rights security on corporate financial decisions, we measure property 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"). This index measures the likelihood that the (local) legal system will uphold business contracts and property rights in business disputes, 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.[4] In addition to contract enforcement and protection, Levine (2005) further posits that the operation and development of financial markets facilitates the investor and creditor protection and therefore directly reflects the effectiveness of property rights protection. We thus adopt a NERI (National Economic Research Institute of China) provincial banking-sector marketization index compiled by Fan et al. (2006) as another proxy.[5] 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 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

[4] 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., Johnson et al. 2002; Djankov, La Porta, Lopez-De-Silanes and Shleifer, 2003; Beck, Demirguc-Kunt and Maskimovic, 2005; Acemoglu and Johnson, 2005; Cull and Xu, 2005).

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

rights. In addition, we use the city-level index of bank lending corruption index (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. 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 (Demirguc-Kunt and Maksimovic, 1998; Beck, Demirguc-Kunt and Maskimovic, 2005).

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.[6] 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. In our analysis, private enterprises are treated as the (omitted) benchmark group.

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 and collective (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

[6] For convenience of discussion, we broadly term non-state-owned and non-collectively-owned firms as private firms hereafter.

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 remain robust irrespective of whether we include SOEs in the analysis or not.

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, Ward and Zurbruegg, 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 property-casualty 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. Johnson et al. (2002) and Cull and Xu (2005) 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 thereby affecting 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, Lin, Lin and Song, 2009; Li, Meng, Wang Zhou, 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, Tong and Tong, 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 three implications for corporate

[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).

demand for insurance.

First, since the identity of the owner is vague, the firm that utilizes 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. 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.

Third, the government may offer a helping hand in case that a SOE suffers severe uninsured asset losses. Indeed, until recently, SOEs in China are rarely liquidated due to the government's concern over social stability. Such a helping hand may take the form of pressuring state-owned banks to provide loan support (known as SOEs' "soft budget constraint" problem) or a direct fiscal bailout in the extreme, though both forms of assistance have been significantly reduced since the market-based reform (especially the reform in the banking sector in mid-1990s). These potential funding sources represent an alternative loss coverage mechanism for SOEs and hence further decrease managerial incentives to insure asset-loss risks (i.e., the so-called "charity hazard" of state ownership, see Browne and Hoyt (2000)).[10]

In sum, we argue that state ownership tends to be associated with a lower level of property rights security and additional mechanisms of loss coverage. Both tend to decrease firms' demand for insurance. We provide two tests in Section 4.4 in attempt to disentangle the two effects and find that insecure property rights associated with state ownership seems to be

[10] There is a counter argument. Zou and Adams (2008) contend that in state-owned listed companies, politically-connected managers could be motivated to insure firm assets because an uninsured major loss may be counted as functional incompetence and/or dereliction of duty and thereby adversely affects their future political career prospects. As our sample firms are mainly unlisted firms that are subject to less government monitoring compared with listed firms, we think that this argument should be less relevant to our sample.

the primary driver of the negative effect of state ownership on insurance demand. We also provide robustness checks in Section 4.5 to show that the effects of institution-level property rights protection on corporate demand of insurance hold if we limit our analyses to privately-controlled firms. 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. 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, one 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 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 56,000 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 (measured in 2004) come from two sources: a) the China City Investment and Governance Indexes compiled by the World Bank in 2006; and b) the marketization indexes for China's 31 provinces and autonomous regions prepared by the National Economic Research Institute in China (see Fan et al., 2006). 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 the period 2004-2005. 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 the most authoritative evaluation of 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., 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

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*).[11] Overall, more than 43% 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. As Table 3 shows, corporate use of insurance varies across cities. The mean proportion of firms purchasing insurance ranges from less than 20% (e.g., 19.9% in *Datong*) to above 60% (e.g., 65.4% in *Guiyang*). The mean insurance/tangible assets ratio also varies across cities, ranging from 0.1% to 1.0% with a sample average about 0.27%, and it is close to the mean level of insurance purchased by a sample of Chinese listed firms reported in Zou and Adams (2006). 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 to tangible assets ratio (0.27%) 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

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

carrying insurance.[12] Therefore, it appears that our sample of firms purchased significant amounts of property insurance.

[Table 3 here]

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. The index ranges from 0 to 1, with a high value indicating 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. 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 the NERI indexes compiled by 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 NERI index obtained from Fan et al. (2006) measuring the provincial business environment about the extent of reducing non-tax government levies and charges. Higher values indicate less non-tax government levies and charges to the firms. The second proxy (*Bank Corruption Index*) is a city-level index defined as the ratio of (expected) informal

[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.

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*). 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. The benchmark group comprises of private firms.

3.2.5. Firm-level control variables

In addition to the variables discussed above, we follow prior studies on corporate insurance (e.g., Mayers and Smith, 1982, 1990; Hoyt and Khang, 2000; 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 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, Kanatas and Kumar (2006), we measure debt finance dependence as industry median leverage ratio, defined as

the ratio of total debt to assets. Industry is classified by 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; Rajan and Zingales, 1998; Gilson, 1997; Grullon et al., 2006).[13] However, our results regarding property rights security are robust if we use firm-level leverage.

Industry effects: Adam, Dasgupta and Titman (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 differences in loss risk among different industries.

Finally, 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, Brown and Fehle, 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.

3.2.6. Other institutional control variables

In addition to firm-level control variables, we also include a bunch of institutional variables in our model to minimize the chance of the bias caused by omitted variables. Below provides a brief discussion.

Unemployment Rate: Firms located in a city with a higher crime rate are likely to have a

[13] 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.

higher exposure to asset losses (e.g., due to theft, arson or sabotage) and such firms are expected to have a higher demand for property insurance. Given the positive relation between unemployment rate and property crime rate (e.g., see Raphael and Winter-Ebmer, 2001), we use city-level unemployment rate as a proxy for crime rate.

GDP per Capita: Finally, we include GDP per capita to control for the potential effects of differences in economic development and institutions across regions on the corporate purchase of insurance. In economically developed areas, firms may have more financial resources and higher insurance awareness than firms located in undeveloped areas. We therefore expect *GDP per Capita* to be positively related to the use of property insurance.

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.[14] 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 4.

[Table 4 here]

As can be seen from Columns (1) & (2) of Table 4, 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

[14] 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.

that stronger property rights protection and better contract enforcement provide more incentives for firms to insure their assets. The 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 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). One 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 9.372 (which is about RMB 117.55 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 (Mayers and Smith, 1987; Froot et al., 1993).

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. *Industry Competition* is found to increase firms' likelihood of purchasing insurance, suggesting that firms operating in industries with fierce market competition have added incentives to insure their assets in order to remain competitive and/or keep overall business risks under control. To our knowledge, this is the first evidence concerning the direct impact of product-market competition on corporate insurance purchase in the literature.

Finally, 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,* the proxy variable of crime rate, is as expected positively related to firms' likelihood of purchasing insurance. 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 4. 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. We winsorize *Insurance Intensity* at the 99% percentile to eliminate extreme values.

As can be seen from Table 4 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 unexpectedly 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 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. Product market competition is found to have a positive impact on the extent of corporate insurance. 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. Finally, 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 have a lower insurance intensity

than other firms. Perhaps firms from more economically developed areas are more capable of self insuring some asset-loss risks. 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 5.

[Table 5 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 0.025 with a *p*-value of 0.118 (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 0.043, 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.Disentangle the effect of insecure property rights and access to alternative finance on insurance use in SOEs

The aforementioned tests reveal a negative relation between the incidence and extent of corporate purchase of property insurance and state ownership. We believe that this relation is primarily driven by the ambiguity and unsecure property rights in SOEs (we call this the property rights story). As discussed in Section 2, one, however, may argue that the negative relation may be driven by SOEs' soft-budget constraints and/or potential funding help offered by the government (i.e., the charity hazard) (we broadly call them the "soft-budget constraint story"). That is, the potential bailout by the government will decrease SOEs' demand for property insurance. We provide two tests in this section in attempt to disentangle the property rights story and the soft-budget constraint story of state ownership.

Our first test is to interact the *State Dummy* with *Fiscal Subsidy Ratio*. If the soft-budget constraint story is at work, we expect that SOEs receiving more fiscal subsidies from the government may have few incentives to use property insurance. SOEs that are currently receiving more fiscal subsidies also may expect to receive government help in case of a major uninsured accidental loss (e.g., caused by a fire or a natural disaster). Therefore, a negative and statistically significant coefficient of the interaction term would provide some support for the soft-budget constraint story. The results from the Probit and Tobit models are reported in

Table 6. The coefficient of *Fiscal Subsidy Ratio* is found to be positive and significant in the Probit models, suggesting that in private firms the existence of fiscal subsidies seems to complement the use of commercial property insurance. In SOEs, the aggregate effect of *Fiscal Subsidy Ratio* is negative, but the negative coefficient of the interaction term *State Dummy* × *Fiscal Subsidy Ratio* is not statistically significant. Therefore, we find no significant support for the soft-budget constraint story.

[Table 6 here]

Fan et al. (2006) compiled an index on the relation between the government and market for each province. The index measures the proportion of resources distributed by the market (defined as 1-governement fiscal expenditure/GDP). In a similar vein, we calculate a city-level index on market allocation of resources for the year 2004. In regions where resources are predominantly allocated by the market (e.g., the coastal East area), the soft-budget constraint problem with SOEs should be less severe and so the effect of state ownership on insurance purchases is more likely to be driven by the low level of property rights security associated with SOEs. Therefore, we expect to find that the market allocation index attenuates the negative relation between state ownership and corporate demand of insurance if the relation is driven by the soft budget constraints. Table 7 presents the Probit and Tobit regression results based on two sub-groups determined by whether the market-resource-allocation index is above or below sample median. Strikingly, the coefficients of state ownership are always negatively significant at the 0.01 level. We carried out a Wald test of the difference in the coefficients of state ownership between the two sub-groups in the Probit and Tobit models, respectively. Neither Chi-square statistic is statistically significant (with a *p*-value of 0.799 and 0.686 respectively, d.f.=1). Therefore, we find no evidence supporting that the negative effect of state ownership on corporate demand for insurance is mainly due to the soft-budget constraints of SOEs. Instead, the property rights story of state ownership seems to be at work.

[Table 7 here]

4.5. Results from using only privately-controlled firms

Unlike SOEs, privately-controlled firms do not face soft-budget constraints and the charity hazard that may lower insurance demand. Analysis based on privately-controlled firms therefore might provide a sharper and cleaner test of how institution-level property rights protection shapes corporate property insurance decisions. Below we repeat our analyses in Tables 4 and 5 using only privately-controlled firms (with private ownership over 50%). The results are reported in Tables 8 and 9. 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 8 and 9 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 of 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 aggregation level instead of firm 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) also extends 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.[15]

In line with our analysis of China, we measure property rights protection with three categories of indexes measuring (a) the rule of law, contract enforcement; (b) banking sector development and marketization;[16] and (c) the cleanliness of government is an inverse proxy for corruption and expropriation risk. 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 World Bank (hereafter as *ROL of WB*) 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[17]. This ratio should have a positive effect on P/C insurance consumption if property rights protection and contract enforcement is strong. 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 is generally linked to 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

[15] In unreported results, we also measure P/C insurance consumption as Insurance Premium/GDP, and find similar results.

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

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

(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 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. 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 10 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 take natural log and use it in our regression analysis. Panel B presents the correlation coefficients of the various proxies for property rights protection, corruption, and credit market development. It is also evident that indexes for property rights protection and (anti-) corruption measures are highly correlated. In addition, the property rights protection (or anti-corruption) measures obtained from different sources are also highly correlated, which lends more credence to these indexes as reasonable proxies for a country's protection of property rights. Because of the high correlation coefficients between property rights protection and anti-corruption measures, we do not include them simultaneously in the model to avoid multicollinearity.

[Table 10 here]

Panel A of Table 11 reports the regression results from using the rule-of-law index compiled by the World Bank as the proxy for property rights protection. 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. We enter independent variables stepwise to show the robustness of our results and for each model specification we report the results from the ordinary least square (OLS) estimation and the country fixed-effects panel models. We performed a Hausman specification test, which is based on the differences

between the coefficients estimated from fixed or random-effects models, to determine which kind of panel model – fixed-effects or random-effects – should be used in this study. The unreported test rejected the null hypothesis of zero correlation between the unobservable country-specific effects and the explanatory variables in the model. In this case, the fixed-effects model can derive consistent estimates but the random-effects model cannot; therefore, we report the results from fixed-effects estimations.[18]

In Columns (1) and (2), the coefficient of the rule-of-law index is positive and statistically significant at the 0.01 level, supporting our hypothesis that stronger property rights protection leads to more purchase of P/C insurance. In fact, the rule-of-law index alone (and year dummies) helps explain over 60% of the variations in insurance consumption, suggesting that potential importance of property rights protection. We then add in the model proxies for banking sector development and marketization. Consistent with our expectation, the coefficient of *Bank Concentration* is negative and statistically significant in the fixed-effects 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. However, the coefficient of *Bank Credit/GDP* is insignificant, which suggests that insurance purchase is not a direct derivative of using bank credit. In Columns (5) and (6), we further control for the level of economic development and find the effect of property rights protection on P/C insurance consumption is still positive and significant.

[Table 11 here]

In Panel B, we measure property rights protection with the index on legal structure and security of property rights compiled by the World Economic Forum. Note that using this measure results in a loss of about 500 observations, however, this reduced size of sample serves a robustness check of our results. Our results are qualitatively similar. In Panel C and D, we use two measures of government cleanliness, respectively, and we find the tenor of our main results is unaffected.

[18] Nevertheless, random-effects estimations produce similar (and actually stronger) results.

6. Conclusion

Taking advantage of a large and unique firm-level dataset on corporate insurance recently available from China, 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 and collective 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 remain robust irrespective of whether we include SOEs in the analysis or not. 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. It also contributes to the limited corporate insurance literature by including employment, product-market competition and some institutional variables as potential determinants of corporate purchase of insurance. 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 99th percentile to eliminate extreme values
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. (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. (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. (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. (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
Advertising Effort	Advertising expense/total assets
Tangibility	(inventory + net book value of fixed assets)/total assets, winsorized at 1st percentile to eliminate extreme values
Fiscal Subsidy Ratio	Total subsidies received from local government/sales
Quick Ratio	Ratio of liquid assets to current liabilities (not including inventory), winsorized at the 99th percentile to eliminate extreme values
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 WB	Rule-of-law index compiled by World Bank, 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. 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. 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). 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. 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 Source: http://econ.worldbank.org/wbsite/external/extdec/extresearch
Bank Credit/GDP	Source: http://econ.worldbank.org/wbsite/external/extdec/extresearch
GDP per Capita	GDP/population, GDP is measured in thousand US dollars Source: http://www.imf.org/external/ns/cs.aspx?id=28

Table 2
Summary statistics of main variables

Variables	Mean	Median	Std.Dev.	Min	Max	N
Insurance Dummy	0.434	0.000	0.496	0.000	1.000	56723
Insurance Intensity (%)	0.245	0.000	0.619	0.000	4.297	56723
Insurance Intensity (%) (insured sample)	0.565	0.267	0.837	0.000	4.297	24631
Property Rights Protection Index	0.679	0.702	0.172	0.269	0.982	56723
Banking Sector Marketization	8.027	8.520	1.782	2.670	10.170	56723
Reducing Non-tax Levies & Charges	10.046	9.960	0.766	5.440	12.000	56723
Bank Corruption Index	0.056	0.046	0.036	0.000	0.280	56723
State Dummy	0.146	0.000	0.353	0.000	1.000	56723
Percent State Ownership	0.146	0.000	0.325	0.000	1.000	56617
Firm Size	9.596	9.389	1.423	3.555	18.469	56723
R&D Intensity	0.003	0.000	0.020	0.000	0.905	56723
Advertising Effort	0.002	0.000	0.012	0.000	0.796	56723
Tangibility	0.472	0.466	0.216	0.049	0.999	56723
Fiscal Subsidy Ratio	0.003	0.000	0.020	0.000	0.797	56723
Quick Ratio	1.522	0.801	2.767	0.000	16.333	56723
Tax Credit Dummy	0.816	1.000	0.388	0.000	1.000	56723
Utilities Firm Dummy	0.022	0.000	0.147	0.000	1.000	56723
Debt Finance Dependence	0.592	0.596	0.042	0.434	0.659	56723
Industrial Competition	6.622	6.663	1.190	0.693	9.097	56723
Firm Age	1.667	1.609	0.951	0.000	6.001	56723
Unemployment Rate	3.175	3.500	1.159	0.500	8.500	56723
GDP per Capita	9.487	9.552	0.620	7.517	10.511	56723

Table 3
Corporate insurance purchase across 120 cities

City	Mean proportion of firms buying insurance (%)	Mean insurance spending to tangible assets ratio (%)	City	Mean proportion of firms buying insurance (%)	Mean insurance spending to tangible assets ratio (%)
East			*Central*		
Anshan	37.8	0.3	Anqing	50.4	0.3
Baoding	36.8	0.3	Changde	35.9	0.2
Beijing	38.4	0.1	Changchun	38.6	0.3
Benxi	34.1	0.1	Changsha	44.3	0.5
Cangzhou	34.8	0.1	Chenzhou	33.3	0.9
Changzhou	47.5	0.4	Chuzhou	42.4	0.3
Dalian	46.9	0.2	Daqing	37.9	0.2
Dongguan	33.6	0.2	Datong	19.9	0.1
Foshan	39.3	0.4	Ganzhou	41.2	0.4
Fuzhou	38.7	0.2	Haerbin	32.0	0.1
Fushun	43.9	0.3	Hefei	47.9	0.2
Guangzhou	36.8	0.2	Hengyang	41.4	0.3
Haikou	50.8	0.2	Huanggang	37.9	0.3
Handan	34.0	0.2	Jilin	42.4	0.5
Hangzhou	52.9	0.3	Jingmen	35.2	0.3
Huzhou	59.1	0.4	Jingzhou	42.9	0.2
Huizhou	40.4	0.4	Jiujiang	32.6	0.2
Jinan	28.4	0.5	Luoyang	27.7	0.2
Jining	46.9	0.5	Nanchang	36.3	0.2
Jiaxing	64.0	0.3	Nanyang	36.2	0.5
Jiangmen	38.8	0.3	Qiqihaer	38.6	0.2
Jinhua	49.4	0.4	Shangqiu	29.5	0.1
Jinzhou	28.3	0.2	Shangrao	31.1	0.2
Langfang	34.1	0.2	Taiyuan	22.7	0.2
Lianyungang	40.0	0.2	Wuhu	42.5	0.2
Linyi	34.4	0.2	Wuhan	42.0	0.4
Maoming	23.9	0.2	Xiangfan	31.5	0.3
Nanjing	37.2	0.2	Xiaogan	46.4	0.2
Nantong	45.8	0.4	Xinxiang	35.2	0.2
Ningbo	59.0	0.3	Xuchang	37.4	0.6
Qinhuangdao	43.5	0.2	Yichang	46.6	0.3
Qingdao	47.1	0.3	Yichun	35.0	0.3
Quanzhou	41.4	0.4	Yueyang	28.9	0.3
Sanming	41.7	0.3	Yuncheng	39.6	0.1
Shantou	31.0	0.2	Zhengzhou	31.2	0.3
Shanghai	46.7	0.4	Zhoukou	27.7	0.3
Shaoxing	61.8	0.4	Zhuzhou	34.9	0.3
Shenzhen	37.8	0.2	*West*		

City	Mean proportion of firms buying insurance (%)	Mean insurance spending to tangible assets ratio (%)	City	Mean proportion of firms buying insurance (%)	Mean insurance spending to tangible assets ratio (%)
Shenyang	32.0	0.2	Baotou	40.2	0.2
Shijiazhuang	34.6	0.4	Baoji	51.9	0.1
Suzhou	44.2	0.2	Chengdu	39.0	0.3
Taizhou	41.2	0.3	Deyang	47.2	0.2
Taian	39.2	0.3	Guilin	38.8	0.2
Tangshan	36.6	0.3	Guiyang	65.4	0.2
Tianjin	33.1	0.2	Huhehaote	39.4	0.2
Weihai	46.2	0.5	Kunming	41.2	0.2
Weifang	36.4	0.3	Lanzhou	42.9	0.2
Wenzhou	40.9	0.3	Leshan	45.2	0.2
Wuxi	40.3	0.3	Liuzhou	43.2	0.2
Xiamen	46.1	0.2	Mianyang	45.7	0.5
Xuzhou	32.3	0.3	Nanning	45.8	0.3
Yantai	36.2	0.3	Qujing	55.9	0.2
Yancheng	40.2	0.3	Tianshui	36.0	0.1
Yangzhou	42.7	0.4	Wulumuqi	58.3	0.1
Zhangzhou	37.6	0.2	Wuzhong	65.7	0.4
Zhangjiakou	34.2	0.1	Xian	43.4	0.5
Zhuhai	33.8	0.1	Xining	40.4	0.1
Zibo	39.3	1.0	Xianyang	55.1	0.2
			Yibin	60.0	0.4
			Yinchuan	50.7	0.1
			Yuxi	62.7	0.2
			Chongqing	44.3	0.3
			Zunyi	39.4	0.2

Table 4: Property rights security and the incidence & extent of insurance purchases

Dependent variable	Insurance dummy		Insurance to tangible assets ratio (%)	
	Probit	Probit	Tobit	Tobit
	(1)	(2)	(3)	(4)
Property Rights Protection Index	0.124***	0.124***	0.100***	0.099***
	[2.814]	[2.816]	[3.514]	[3.481]
Banking Sector Marketization	0.025***	0.025***	0.016***	0.016***
	[4.279]	[4.291]	[4.533]	[4.586]
Reducing Non-tax Levies & Charges	0.030***	0.030***	0.022***	0.022***
	[2.835]	[2.871]	[3.056]	[3.012]
Bank Corruption Index	-0.196	-0.194	0.02	0.02
	[-0.665]	[-0.657]	[0.109]	[0.108]
State Dummy	-0.052***		-0.043***	
	[-5.740]		[-5.719]	
Percent State Ownership		-0.068***		-0.055***
		[-7.693]		[-6.640]
Firm Size	0.092***	0.092***	0.025***	0.024***
	[31.545]	[31.702]	[9.120]	[9.102]
R&D Intensity	0.438***	0.433***	0.287***	0.281***
	[4.056]	[3.943]	[3.308]	[3.185]
Advertising Effort	1.184***	1.180***	1.371***	1.370***
	[3.580]	[3.570]	[3.748]	[3.730]
Tangibility	0.096***	0.096***	-0.139***	-0.139***
	[6.925]	[6.894]	[-11.733]	[-11.635]
Fiscal Subsidy Ratio	0.127	0.129	-0.027	-0.026
	[1.100]	[1.106]	[-0.396]	[-0.379]
Quick Ratio	-0.009***	-0.009***	-0.004***	-0.004***
	[-8.279]	[-8.303]	[-4.035]	[-4.048]
Tax Credit Dummy	-0.008	-0.009	-0.007	-0.008
	[-1.104]	[-1.178]	[-0.981]	[-1.051]
Debt Finance Dependence	0.905***	0.891***	0.486***	0.476***
	[8.366]	[8.253]	[5.095]	[5.021]
Industrial Competition	0.006**	0.006**	0.005**	0.005**
	[2.300]	[2.364]	[2.096]	[2.172]
Firm Age	0.051***	0.052***	0.037***	0.037***
	[14.504]	[14.964]	[12.519]	[13.202]
Unemployment Rate	0.015**	0.015**	0.005	0.005
	[2.107]	[2.186]	[0.989]	[1.038]
GDP per Capita	-0.018	-0.018	-0.022**	-0.021*
	[-1.100]	[-1.090]	[-1.972]	[-1.950]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.153	0.153	0.016	0.015
N	56,723	56,617	56,723	56,617

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 5 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***	0.017***	0.019***	0.015***
	[3.639]	[3.550]	[3.556]	[3.726]
Reducing Non-tax Levies & Charges	0.047***	0.043***	0.014	0.005
	[2.718]	[3.519]	[1.390]	[0.723]
Bank Corruption Index	0.088	0.181	-0.694**	-0.314
	[0.195]	[0.630]	[-2.035]	[-1.354]
Percent State Ownership	-0.051***	-0.027**	-0.076***	-0.070***
	[-3.635]	[-2.201]	[-7.429]	[-7.649]
Firm Size	0.087***	0.017***	0.096***	0.030***
	[23.200]	[4.714]	[20.903]	[9.817]
R&D Intensity	0.673***	0.421***	0.299***	0.202*
	[3.699]	[2.677]	[2.652]	[1.933]
Advertising Effort	1.007**	1.887***	1.369***	1.019***
	[2.108]	[2.743]	[3.051]	[2.927]
Tangibility	0.095***	-0.155***	0.101***	-0.124***
	[4.508]	[-10.129]	[5.380]	[-7.534]
Fiscal Subsidy Ratio	0.329	0.163	0.017	-0.104
	[1.473]	[1.103]	[0.126]	[-1.320]
Quick Ratio	-0.009***	-0.004***	-0.007***	-0.004**
	[-6.057]	[-2.924]	[-5.538]	[-2.426]
Tax Credit Dummy	-0.023***	-0.018**	0.006	0.004
	[-2.576]	[-2.221]	[0.624]	[0.363]
Debt Finance Dependence	0.916***	0.439***	0.833***	0.559***
	[7.319]	[4.519]	[4.103]	[3.316]
Industrial Competition	0.006	0.005	0.005	0.004
	[1.385]	[1.269]	[1.583]	[1.562]
Firm Age	0.059***	0.043***	0.045***	0.032***
	[11.777]	[10.624]	[11.126]	[8.276]
Unemployment Rate	0.022**	0.004	0.004	0.004
	[2.383]	[0.632]	[0.495]	[0.670]
GDP per Capita	0.022	0.003	-0.068***	-0.050***
	[0.863]	[0.196]	[-3.481]	[-3.809]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.155	0.016	0.159	0.017
N	28,362	28,362	28,255	28,255

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 2.47 (*p*-value=0.118, d.f.=1, two-tailed). The difference in the coefficient of *Percent State Ownership* between groups (2) and (4) generates a Chi-square of 10.75 (*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 6 Disentangling the effects of property rights and the charity hazard in SOEs: Interacting State Dummy with Fiscal Subsidy Ratio

	Probit (1)	Probit (2)	Tobit (3)	Tobit (4)
Property Rights Protection Index	0.124***	0.124***	0.100***	0.099***
	[2.819]	[2.820]	[3.515]	[3.483]
Banking Sector Marketization	0.025***	0.025***	0.016***	0.016***
	[4.284]	[4.295]	[4.534]	[4.586]
Reducing Non-tax Levies & Charges	0.030***	0.030***	0.022***	0.022***
	[2.832]	[2.869]	[3.054]	[3.010]
Bank Corruption Index	-0.195	-0.193	0.02	0.021
	[-0.662]	[-0.654]	[0.109]	[0.109]
State Dummy	-0.050***		-0.043***	
	[-5.510]		[-5.559]	
Percent State Ownership		-0.067***		-0.054***
		[-7.614]		[-6.603]
Firm Size	0.092***	0.092***	0.025***	0.024***
	[31.481]	[31.668]	[9.115]	[9.093]
R&D Intensity	0.435***	0.429***	0.286***	0.280***
	[4.028]	[3.917]	[3.301]	[3.174]
Advertising Effort	1.184***	1.180***	1.371***	1.370***
	[3.580]	[3.569]	[3.748]	[3.729]
Tangibility	0.097***	0.097***	-0.139***	-0.139***
	[6.979]	[6.948]	[-11.731]	[-11.629]
Fiscal Subsidy Ratio	0.327*	0.356*	0.007	0.041
	[1.661]	[1.801]	[0.051]	[0.324]
State Dummy ×	-0.341	-0.383	-0.058	-0.115
Fiscal Subsidy Ratio	[-1.360]	[-1.547]	[-0.345]	[-0.706]
Quick Ratio	-0.009***	-0.009***	-0.004***	-0.004***
	[-8.267]	[-8.292]	[-4.033]	[-4.049]
Tax Credit Dummy	-0.008	-0.009	-0.007	-0.008
	[-1.095]	[-1.168]	[-0.979]	[-1.047]
Debt Finance Dependence	0.910***	0.896***	0.486***	0.478***
	[8.451]	[8.333]	[5.111]	[5.040]
Industrial Competition	0.006**	0.006**	0.005**	0.005**
	[2.285]	[2.343]	[2.098]	[2.169]
Firm Age	0.051***	0.052***	0.037***	0.037***
	[14.492]	[15.016]	[12.510]	[13.228]
Unemployment Rate	0.015**	0.015**	0.005	0.005
	[2.105]	[2.185]	[0.988]	[1.036]
GDP per Capita	-0.018	-0.018	-0.022**	-0.021*
	[-1.093]	[-1.082]	[-1.971]	[-1.947]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.153	0.153	0.016	0.017
N	56,723	56,617	56,723	56,617

This table presents the results from the probit and tobit regressions by adding the interaction term between State Dummy and Fiscal Subsidy Ratio. 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). A negative and statistically significant coefficient of the interaction term State Dummy × Fiscal Subsidy Ratio would provide some support for the soft-budget constraint story, however, there is no such evidence found.

Table 7 Disentangling the effects of property rights and soft-budget constraints in SOEs: Sub-group analysis by the proportion of resources allocated by the market

	Probit (high market allocation)	Probit (low market allocation)	Tobit (high market allocation)	Tobit (low market allocation)
	(1)	(2)	(3)	(4)
Property Rights Protection Index	0.106	0.122	0.048	0.121***
	[1.555]	[1.634]	[1.064]	[2.804]
Banking Sector Marketization	0.025**	0.025***	0.009	0.018***
	[2.411]	[2.804]	[1.368]	[4.088]
Reducing Non-tax Levies & Charges	0.033	0.031**	0.045***	0.018**
	[1.437]	[2.531]	[2.788]	[2.546]
Bank Corruption Index	-0.199	-0.208	-0.286	0.048
	[-0.277]	[-0.693]	[-0.752]	[0.227]
Percent State Ownership	-0.071***	-0.067***	-0.054***	-0.056***
	[-5.595]	[-5.357]	[-4.253]	[-5.255]
Firm Size	0.090***	0.094***	0.021***	0.026***
	[17.023]	[31.712]	[4.504]	[9.095]
R&D Intensity	0.483***	0.410***	0.309***	0.292***
	[3.472]	[2.962]	[2.715]	[2.671]
Advertising Effort	1.209**	1.191***	1.735***	1.085***
	[2.241]	[2.948]	[2.778]	[3.041]
Tangibility	0.103***	0.093***	-0.155***	-0.123***
	[4.849]	[5.012]	[-9.616]	[-7.242]
Fiscal Subsidy Ratio	0.15	0.098	-0.086	0.02
	[1.047]	[0.553]	[-0.939]	[0.196]
Quick Ratio	-0.007***	-0.009***	-0.004***	-0.004***
	[-4.856]	[-6.163]	[-2.817]	[-2.804]
Tax Credit Dummy	-0.009	-0.004	-0.012	0.002
	[-1.016]	[-0.255]	[-1.330]	[0.146]
Debt Finance Dependence	0.980***	0.798***	0.484***	0.495***
	[6.011]	[5.232]	[3.181]	[4.482]
Industrial Competition	0.006	0.006*	0.003	0.006**
	[1.446]	[1.795]	[0.923]	[2.330]
Firm Age	0.059***	0.047***	0.042***	0.034***
	[11.909]	[11.321]	[9.752]	[10.579]
Unemployment Rate	0.016	0.017**	-0.003	0.010**
	[1.104]	[1.981]	[-0.353]	[1.988]
GDP per Capita	-0.017	-0.027	-0.022	-0.031***
	[-0.375]	[-1.596]	[-0.838]	[-2.861]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.151	0.158	0.017	0.016
N	28,110	28,507	28,110	28,507

This table presents the results from the probit and tobit regressions based on two sub-groups determined by whether a city-level index on the proportion of resources distributed by market (defined as 1-governement fiscal expenditure/GDP) is above or below the sample median. In regions where the market dominates resources allocation, the soft-budget constraint problem with SOEs should be less severe and so the effect of state ownership on insurance purchases is more likely to be driven by the low level of property rights security associated with SOEs. 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). We carried out a Wald test of the difference in the coefficients of state ownership between the two sub-groups in the Probit and Tobit models, respectively. Neither Chi-square statistic is statistically significant (with a *p*-value of 0.799 and 0.686 respectively, d.f.=1, two-tailed).

Table 8: Property rights security and the incidence & extent of insurance purchases (private firms)

	Probit	Tobit
	(1)	(2)
Property Rights Protection Index	0.154***	0.128***
	[2.843]	[2.928]
Banking Sector Marketization	0.030***	0.018***
	[4.555]	[4.030]
Reducing Non-tax Levies & Charges	0.031***	0.026***
	[2.607]	[2.891]
Bank Corruption Index	0.017	0.201
	[0.052]	[0.894]
Firm Size	0.094***	0.025***
	[20.581]	[6.247]
R&D Intensity	0.406***	0.307***
	[2.660]	[2.933]
Advertising Effort	1.463***	2.126***
	[2.913]	[3.238]
Tangibility	0.107***	-0.143***
	[5.558]	[-8.236]
Fiscal Subsidy Ratio	0.115	-0.133
	[0.441]	[-0.687]
Quick Ratio	-0.012***	-0.006***
	[-7.235]	[-3.482]
Tax Credit Dummy	-0.011	0
	[-1.047]	[-0.019]
Debt Finance Dependence	1.160***	0.733***
	[6.419]	[4.076]
Industrial Competition	0.002	0
	[0.476]	[0.134]
Firm Age	0.058***	0.048***
	[12.889]	[11.492]
Unemployment Rate	0.014*	0.007
	[1.918]	[1.228]
GDP per Capita	-0.01	-0.018
	[-0.534]	[-1.217]
Two-digit industry dummies	yes	yes
Pseudo-R^2	0.147	0.016
N	26,565	26,565

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 9 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	0.039***	0.021***	0.021***	0.016***
	[3.872]	[3.060]	[3.425]	[2.855]
Reducing Non-tax Levies & Charges	0.057***	0.058***	0.002	0.001
	[3.072]	[4.167]	[0.214]	[0.017]
Bank Corruption Index	0.265	0.281	-0.624*	-0.221
	[0.554]	[0.908]	[-1.836]	[-0.736]
Firm Size	0.090***	0.018***	0.097***	0.032***
	[12.816]	[3.186]	[16.976]	[6.967]
R&D Intensity	0.585**	0.298	0.312**	0.317***
	[2.195]	[1.572]	[2.228]	[2.863]
Advertising Effort	1.366*	2.908**	1.674**	1.453**
	[1.842]	[2.459]	[2.313]	[2.399]
Tangibility	0.100***	-0.156***	0.114***	-0.131***
	[3.326]	[-6.557]	[4.527]	[-5.420]
Fiscal Subsidy Ratio	0.305	0.070	0.023	-0.22
	[0.694]	[0.249]	[0.069]	[-0.829]
Quick Ratio	-0.010***	-0.003	-0.013***	-0.008***
	[-4.084]	[-1.276]	[-6.013]	[-3.561]
Tax Credit Dummy	-0.023*	-0.009	0.004	0.011
	[-1.830]	[-0.811]	[0.305]	[0.715]
Debt Finance Dependence	1.171***	0.677***	1.167***	0.896***
	[5.282]	[3.589]	[4.200]	[3.157]
Industrial Competition	0.003	0.003	-0.001	-0.002
	[0.647]	[0.496]	[-0.172]	[-0.484]
Firm Age	0.066***	0.055***	0.050***	0.041***
	[10.974]	[10.504]	[8.902]	[6.366]
Unemployment Rate	0.017*	0.003	-0.002	0.001
	[1.905]	[0.313]	[-0.246]	[0.078]
GDP per Capita	0.013	-0.009	-0.055***	-0.040**
	[0.511]	[-0.441]	[-2.857]	[-2.366]
Two-digit industry dummies	yes	yes	yes	yes
Pseudo-R^2	0.161	0.019	0.143	0.015
N	13,615	13,615	12,950	12,950

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 10

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)	336.06	93.60	491.69	0.60	4483.50	1275
Insurance Premium per Capita	4.588	4.539	1.838	-0.511	8.408	1275
ROL of WB	0.441	0.474	0.948	-1.717	2.116	1249
ISSPR of EFN	6.282	6.400	1.782	1.400	9.600	761
COC of WB	0.476	0.365	1.030	-1.546	2.625	1248
FFC of HF	51.934	50.000	23.994	4.000	100.000	1201
Bank Credit/GDP	0.582	0.465	0.463	0.072	3.896	1026
Bank Concentration	0.639	0.630	0.199	0.148	1.000	1096
GDP per Capita	13.469	5.915	15.663	0.288	118.04	1249

Panel B: Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Insurance Premium per Capita	(1)	1.000						
ROL of WB	(2)	0.820	1.000					
ISSPR of EFN	(3)	0.779	0.914	1.000				
COC of WB	(4)	0.838	0.965	0.906	1.000			
FFC of HF	(5)	0.750	0.809	0.797	0.827	1.000		
Bank Credit/GDP	(6)	0.072	0.179	0.269	0.223	0.179	1.000	
Bank Concentration	(7)	0.495	0.529	0.495	0.499	0.458	-0.073	1.000
GDP per Capita	(8)	0.777	0.741	0.720	0.753	0.631	0.078	0.590

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 11: 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)
ROL of WB	1.605***	0.373***	1.635***	0.418***	1.140***	0.403***
	[15.531]	[3.248]	[13.183]	[3.161]	[6.194]	[3.166]
Bank Concentration			-0.573	-0.568**	-0.428	-0.566**
			[-0.981]	[-2.584]	[-0.851]	[-2.590]
Bank Credit/GDP			0.118	0.025	-0.206	-0.049
			[0.721]	[0.176]	[-1.009]	[-0.356]
GDP per Capita					0.048***	0.009**
					[4.177]	[2.296]
Year dummies	yes	yes	yes	yes	yes	yes
Country fixed-effects	no	yes	no	yes	no	yes
Adjusted-R^2	0.71	0.632	0.715	0.617	0.758	0.624
N	1249	1249	985	985	985	985

Panel B	(1)	(2)	(3)	(4)	(5)	(6)
ISSPR of EFN	0.813***	0.070**	0.783***	0.079**	0.464***	0.098***
	[11.959]	[2.113]	[9.807]	[2.273]	[4.309]	[2.844]
Bank Concentration			-0.429	-0.519**	-0.153	-0.515**
			[-0.664]	[-2.351]	[-0.303]	[-2.405]
Bank Credit/GDP			0.337**	0.152	-0.233	-0.009
			[2.000]	[0.973]	[-1.005]	[-0.057]
GDP per Capita					0.062***	0.012***
					[5.121]	[2.787]
Year dummies	yes	yes	yes	yes	yes	yes
Country fixed-effects	no	yes	no	yes	no	yes
Adjusted-R^2	0.626	0.576	0.641	0.618	0.734	0.630
N	761	761	676	676	676	676

Panel C	(1)	(2)	(3)	(4)	(5)	(6)
COC of WB	1.507***	0.300***	1.543***	0.315***	1.175***	0.319***
	[15.770]	[3.495]	[14.228]	[2.892]	[7.256]	[3.012]
Bank Concentration			-0.937*	-0.569***	-0.744*	-0.566***
			[-1.900]	[-2.719]	[-1.694]	[-2.732]
Bank Credit/GDP			0.163	0.118	-0.108	0.031
			[0.938]	[0.753]	[-0.540]	[0.212]
GDP per Capita					0.038***	0.010**
					[3.673]	[2.394]
Year dummies	yes	yes	yes	yes	yes	yes
Country fixed-effects	no	yes	no	yes	no	yes
Adjusted-R^2	0.737	0.632	0.757	0.615	0.782	0.623
N	1248	1248	984	984	984	984

Panel D:

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(FFC of HF)	2.545***	0.105*	2.429***	0.111**	1.517***	0.108**
	[10.348]	[1.830]	[9.331]	[2.060]	[5.545]	[2.045]
Bank Concentration			-0.043	-0.609***	-0.159	-0.603***
			[-0.072]	[-2.880]	[-0.360]	[-2.853]
Bank Credit/GDP			0.637***	0.13	-0.112	0.046
			[2.897]	[0.900]	[-0.475]	[0.339]
GDP per Capita					0.068***	0.009**
					[7.010]	[2.307]
Year dummies	yes	yes	yes	yes	yes	yes
Country fixed-effects	no	yes	no	yes	no	yes
Adjusted-R^2	0.591	0.623	0.627	0.619	0.742	0.627
N	1201	1201	962	962	962	962

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. ***, **, * 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*.