Does ERM Improve Firm Value? Evidence from Listed Chinese Nonfinancial SOEs

Jing Ai
Department of Financial Economics and Institutions
Shidler College of Business
University of Hawaii at Manoa
2404 Maile Way E602a
Honolulu, HI 96822
Phone: (808) 956-9519
Fax: (808) 956-9887
Email: jing.ai@hawaii.edu

Hua Chen
Department of Risk, Insurance and Healthcare Management
Fox School of Business
Temple University
1801 Liacouras Walk, 625 Alter Hall
Philadelphia, PA 19122
Phone: (215) 204-5905
Fax: (215) 204-4712
Email: hchen@temple.edu

Yang Zhao
Business School
University of International Business and Economics
No.10 Huixin Dongjie, Chaoyang District
Beijing, China 100029
Phone: (86)1052893585
Fax: (86)1052893585
Email: lucaszhao@126.com

Electronic copy available at: http://ssrn.com/abstract=2538915

Does ERM Improve Firm Value? Evidence from Listed Chinese Nonfinancial SOEs

Abstract

Enterprise risk management (ERM) has gradually become a celebrated risk management practice by corporations in the U.S. and worldwide. However, evidence on the value of ERM was mostly from U.S. insurers and other financial institutions. We provide some of the first evidence for the value of ERM for nonfinancial firms and in the international markets, in the meanwhile arguably mitigating a number of sample-related biases commonly seen in this type of studies. Using a unique sample of listed Chinese nonfinancial State Owned Enterprises (SOEs) that were stipulated to implement ERM by a set of regulatory guidelines in 2006, we show that ERM significantly increases firm value. This result is robust after accounting for China's unique institutional background and differences in firm characteristics between the ERM and the non-ERM firms. Our analysis using a sample of all listed Chinese nonfinancial firms provides similar results albeit slightly weaker effects.

Key Words: enterprise risk management (ERM), firm value, nonfinancial firms, state owned enterprises, propensity score matching

Electronic copy available at: http://ssrn.com/abstract=2538915

1. Introduction

Enterprise risk management (ERM) has gradually become a celebrated risk management practice by corporations in the U.S. and worldwide (Beasley et al. 2012). The recognition is further elevated in the wake of the recent financial crisis (Deloitte 2012). Unlike traditional risk management, ERM proposes an overarching approach to risk management in an organization, where a variety of risk exposures are managed in a portfolio manner. A properly designed ERM framework will allow an organization to identify different sources of risks across the entire organization that might positively or negatively impact firm value, and manage them holistically to optimize its objectives (COSO 2004; S&P 2013). While a well-implemented ERM program can improve the effectiveness of risk management in the organization and protect firm value, its implementation often involves a complex and lengthy process and is associated with substantial costs. Therefore, whether ERM can increase firm value is largely an empirical question.

Earlier studies examine the characteristics of firms that have adopted an ERM program and find that larger and highly leveraged firms, firms that are more heavily regulated or have a higher level of institutional ownership are more likely to adopt ERM (e.g., Kleffner et al. 2003; Liebenberg and Hoyt 2003; Beasley et al. 2005; Pagach and Warr 2011; Altuntas et al. 2011). More recent ERM studies tend to focus on examining the value of ERM programs. While Hoyt and Liebenberg (2011) and McShane et al. (2011) find that ERM seems to increase the total value of the firm, some other studies aim at investigating the channels through which value is generated. For example, Grace et al. (2014) find that ERM improves firms' operational

efficiencies. Eckles et al. (2012) and Pooser and McCullough (2012) find that ERM can reduce incidences of external shocks to the firm, hence increasing firm value. Baxter et al. (2013) find that ERM creates value for banks and insurance companies by increasing the quality of internal control measures. A few other studies fail to find supporting evidence. For instance, Gates et al. (2009) find that while ERM might lead to better decision-making for firms, its effect on firms' profitability is not clear. For a detailed summary of these studies and an analysis of their heterogeneous assumptions and findings, see a recent survey by Gatzert and Martin (2013).

Although there is a growing body of literature investigating the determinants and the value of ERM adoption, the focus of the attention has been on the financial industries, particularly the insurance industry. Little research has been done with respect to ERM's effect on nonfinancial firms. To our best knowledge, Pagach and Warr (2011) examining the determinants of ERM implementation is the only empirical study that uses a mixed sample of financial and nonfinancial public firms. They, however, did not elaborate on the differences between these two groups nor did they conduct separate analyses for nonfinancial firms. As we will discuss in the next section, risk management activities and their effects can indeed differ greatly between financial and nonfinancial firms (Bodnar et al. 2011). Therefore, the goal of this paper is to investigate the value of ERM for nonfinancial firms.

In addition, previous studies in this area have been criticized for various sample-related issues due to data limitations. One issue is the identification of ERM implementation based on the popular choice of keyword search in self-reported announcements (e.g., Liebenberg and Hoyt

2003; Beasley et al. 2008; Pagach and Warr 2011). The proper choice of a search string thus becomes critical to the analysis.[1] Another issue is the potential endogeneity in ERM adoption and nonrandomness in sample selection. In this paper, we take advantage of a unique sample of listed Chinese nonfinancial State Owned Enterprises (SOEs) that were under significant external regulatory pressure to implement ERM starting in year 2006. We use this sample to mitigate these sample-related problems and provide evidence in support of the value-adding effects of ERM for these firms.

Lastly, risk management standards and practices can vary across different markets because of institutional differences. Therefore, the results in the current literature focusing on U.S. firms do not directly extend to international markets where more ERM practice is seen nowadays.[2] It will be interesting to see if ERM is a valuable corporate strategy in a non-U.S. environment. In our analysis, we take into account the institutional background of an emerging market like China and specifically control for unique characteristics such as the state ownership of our sample firms and the imbalanced regional economic development in China. We find robust evidence for significant and positive effects of ERM on firm value.

[1] A few other studies make use of survey based samples but these either provide limited information or have been exclusively focused on the insurance industry (e.g., Kleffner et al. 2003, Beasley et al. 2005, Altuntas et al. 2011 and Grace et al. 2014).

[2] There is some initial evidence on the adoption and value of ERM using data from the international markets. For example, Kleffner et al. (2003) study the effect of corporate governance on ERM adoption by Canadian companies. Altuntas et al. (2011) use a survey of 95 German property-liability insurers to investigate the adoption and the design of ERM programs. A recent working paper by Bertinetti et al. (2013) finds a significantly positive effect of ERM on firm value using a sample of large European firms on the STOXX® Europe Large 200 Index. A working paper by Waweru and Kisaka (2011) finds similar results using a small sample of 22 companies on the Nairobi Stock Exchange in East Africa.

The rest of the paper is organized as follows. Section 2 elaborates on the differences of risk management objectives and practices between financial and nonfinancial firms. Section 3 describes our samples and explains why our sample can mitigate problems pertaining to ERM identification and endogeneity. Section 4 discusses our empirical models and describes the dependent and independent variables used in our analysis. Section 5 presents the empirical results. Section 6 concludes.

2. Risk Management for Financial and Non-financial Firms

Nonfinancial firms are well worth a careful examination as they increasingly practice sophisticated risk management. The value of specific risk management activities have been investigated for nonfinancial firms in the recent finance literature (e.g., Jin and Jorion 2006; Pérez-González and Yun 2013; Cornaggia 2013). The rating agency Standard & Poor's has been a major advocate for ERM by rating companies' ERM practices and they have been providing these ratings for nonfinancial firms since 2008. The insights from the previous studies do not extend directly to nonfinancial firms because financial and nonfinancial firms differ greatly in many aspects of risk management activities. In a recent global survey of more than 1100 large companies, Bodnar et al. (2011) find extensive evidence supporting disparities in risk management between financial and nonfinancial firms, ranging from risk sources, to risk management objectives, to risk management methods, and how the managers perceive the value of risk management.

The survey finds that for financial firms credit risks and interest rate risks seem to be the most important risk exposures, whereas for nonfinancial firms foreign exchange rate risks, commodity risks and interest rate risks are the most significant. When managing risks, although in general operational risk management methods are used more often than financial risk management methods in almost all areas of risks, nonfinancial firms are more likely to use the former and financial firms use the latter much more often. Financial and nonfinancial firms also differ in their risk management goals. Through risk management, financial firms often want to "avoid large losses from unexpected price movements" and would like to have "the ability to pursue investments in difficult times" while nonfinancial firms desire to "increase expected cash flows" and "reduce operating cash flow volatilities." (Bodnar et al. 2011)

These significant differences warrant a new study looking into whether the increasingly popular practice of ERM enhances the value of nonfinancial firms. Using a sample of listed Chinese nonfinancial firms, our paper is among the first to find evidence that ERM programs significantly increase the value (measured by Tobin's Q) of nonfinancial companies after controlling for firm characteristics and institutional factors. We are also able to leverage a clear definition of ERM in our data and reduce data-induced sample limitations in previous ERM studies, which will be discussed in detail subsequently.

3. Sample-Related Issues and Our Samples

State-owned enterprises in China have undergone many waves of painful reforms in the past two decades and have made significant progress along the way. The ultimate goal of the

reforms is to allow the SOEs to break free of excessive government support and intervention, become a self-sustained legal entity and compete efficiently in a market economy. Towards these goals, the Chinese government has established a state-level regulatory agency, the State-owned Assets Management and Supervision Commission (SASAC), to improve the corporate governance structure and stimulate more competitions in industries that have been traditionally dominated by the SOEs. The SASAC oversees a large set of nonfinancial SOEs owned by the central government (SOECGs).[3]

In June 2006, a set of ERM adoption guidelines (henceforth "the guideline") was issued by the SASAC. The guideline stipulates that starting from the year 2006 all SOECGs administered by SASAC should start developing an ERM program. To facilitate ERM implementation, SASAC organized four experience sharing meetings (in 2007, 2008, 2010, and 2011, respectively) and requested SOECGs to file progress reports on a voluntary basis since 2008.

Our sample drawn from these SASAC-administered SOECGs (the SOECG sample hereafter) provides us with a few unique advantages over those used in the existing literature. First, one issue in the previous ERM studies is the identification of ERM implementation based on keyword search. The proper choice of search string thus becomes critical to the analysis.

[3] Chinese SOEs include central government-owned SOEs (SOECGs) and local government-owned SOEs (SOELGs). SOECGs can be further divided into those administered by the SASAC and those administered by other central government agencies (such as the Ministry of Finance, the Ministry of Education, etc.). The majority of the nonfinancial SOECGs are administered by SASAC and thus governed by the guideline. Only these SASAC-administered SOECGs are included in our sample.

Extant literature often uses a comprehensive set of possible keywords, with "enterprise risk management," "chief risk officer (CRO)," "holistic risk management," and "risk management committee" being most popular examples (e.g., Hoyt and Liebenberg 2011; Pagach and Warr 2011). This approach is subject to two notable drawbacks. First, some of the keywords, albeit closely related to firms' risk management activities, do not necessarily indicate any actual ERM practice. For example, as Grace et al. (2014) have pointed out, at times a firm may appoint a CRO and yet is not using ERM. Second, even if an announcing firm is indeed practicing ERM, the specific ERM program and the quality of implementation can vary greatly, even for firms within the same industry. Therefore, inferences may be drawn from a sample largely heterogeneous in their actual ERM practices.

This ambiguity is much reduced in our sample because the guideline contains standard languages that these SASAC-administered SOECGs follow closely in their own announcements, leading to the use of *one* clear keyword in the keyword search. Specifically, we perform a detailed search in the companies' annual reports, their websites and other media sources, using the keyword "holistic risk management" as our search string.[4] Our manual examination confirms this search string appears in virtually every ERM announcement in the SOECG sample. Moreover, the guideline provides rather granular instructions for ERM implementation, so the

[4] As the announcements are in Chinese, we actually use the search string "全面风险管理," or "holistic risk management" in Chinese. We also use other keywords in our search to avoid missing sample firms. While the search string "holistic risk management" has appeared in every ERM announcement by our sample firms, only 8 SOECGs have also established a risk management committee and none of them have appointed a CRO.

sample firms are likely to establish ERM programs that exhibit similar important characteristics, which makes comparisons meaningful among these firms.

Another issue in similar ERM studies is the endogeneity problem. Risk management is one of the most difficult firm strategies to observe and a firm's choice of adopting ERM practices can be driven by many value-related considerations. Econometric techniques such as the treatment effect model are a popular resolution but the choice of identification variables often presents a challenge. Because of the unusually high external pressure of regulatory compliance, ERM implementations in the SOECG sample are largely driven by the guideline, providing a (quasi) natural experiment to study the value-adding effect of ERM. Natural experiments are advocated for examining the value of specific risk management activities in the recent financial literature. For example, Pérez-González and Yun (2013) use the introduction of weather derivatives in 1997 to study the effects of weather hedging whereas Cornaggia (2013) takes advantages of the introduction of various types of crop insurance products as the experiment. We posit that firms in our SOECG sample chose to implement ERM to satisfy the exogenous regulatory requirement, rather than being motivated by other value-related endogenous considerations. In fact, before the guideline was issued in 2006, only 5 SASAC-administered SOECGs have implemented ERM. By 2011, 64 percent (163 out of 254) of SASAC-administered SOECGs have adopted ERM, which is over three times of the ERM adoption rate in the overall sample of listed firms. Therefore, our SOECG sample allows us to examine the value of ERM subject to less endogeneity bias.

Our sample period is from 2006 to 2011. We focus on publicly traded companies to obtain financial data and a market-based measure of value. We exclude from the sample the firms that are on the watch list for delisting from the exchanges in any given year and firms whose primary business segment is in finance.[5,6] We also exclude firm-year observations that have missing values in any of the variables we use. Our final SOECG sample is composed of 254 nonfinancial listed firms (or 1,317 firm-year observations), among which 163 firms (507 firm-year observations) have adopted ERM. This is a much larger sample than most of current ERM studies.

For comparison, we also extend our SOECG sample to a more comprehensive sample including all listed nonfinancial firms in the Shanghai and Shenzhen Stock Exchanges for the same sample period (ALL LISTED sample hereafter). Again, we exclude firms that are on the watch list for delisting and whose primary business is in finance. We also exclude firm-year observations that have missing values in any of the variables we use. The final sample is composed of 1,506 firms, or 6,782 firm-year observations.

[5] If a listed firm in the Shanghai or Shenzhen Stock Exchange had two consecutive annual losses (or whose book value is negative), the firm will be designated as "specially treated" with the symbol "ST" before its ticker. ST stocks are ''on probation'' for the risk of delisting and operate under various trading and financial restrictions. For example, the price fluctuations of a "ST" firm in a single trading day is restricted to [-5%, 5%], compared with [-10%, 10%] for other listed firms. If they report one more annual loss, trading will be suspended; a fourth loss will result in delisting. ST status can be served as a comparable measure of financial distress and a warning to investors for delisting risk.

[6] The main business segment of SOECGs administered by SASAC is not in the financial industry. However, a subsidiary may focus on finance. One example is the China Merchants Group. As a SASAC-administered SOECG, its main business is shipping, but China Merchants Bank, a subsidiary of the China Merchants Group, is a commercial bank. China Merchants Bank is then excluded from our sample.

Since listed firms other than the SASAC-administered SOECGs are not subject to any regulatory guidelines, we follow the literature (e.g., Hoyt and Liebenberg, 2011) to use a search string that includes "enterprise risk management," "holistic risk management," "integrated risk management," "CRO," and "risk management committee" for the ALL LISTED sample. We examine each of the hits manually to verify that an ERM program is actually adopted, including looking for mentioning of "the guideline" for SOECGs not administered by SASAC and "COSO's ERM framework (COSO 2004)" for other listed firms.[7] The ALL LISTED sample contains 299 ERM firms (805 firm-year observations) and 1,207 non-ERM firms (5,977 firm-year observations). This sample of nonfinancial firms is subject to identification and endogeneity problems similar to most of the current ERM studies. We compare these results with those from our SOECG sample and from the existing ERM literature.

4. Empirical Models

4.1. Empirical Methodologies

Our primary objective is to examine the relationship between ERM adoption and firm value. A natural way is to use an OLS regression with Tobin' Q as the dependent variable and ERM as our variable of interest while controlling for other variables, i.e.,

$$Q_{it} = X_{it}\beta + \alpha ERM_{it} + \varepsilon_{it}, \quad (1)$$

[7] Although there is not a particular set of guidelines for other listed firms, COSO's ERM Framework is especially popular because most of the risk management standards set by various Chinese regulatory agencies (e.g., China Securities Regulatory Commission and the Ministry of Finance) are based on the COSO ERM Framework.

where ERM_{it} indicates whether ERM treatment is assigned to the *i*-th firm in year *t* and X_{it} is a vector of control variables that may contribute to the firm value variation.

ERM adoption may be possibly due to self-selection, which can result in potential bias of the estimated coefficients. Heckman-type treatment effect models are usually used to correct for the selection bias (Hoyt and Liebenberg 2011). Treatment effect models, however, have their own caveats. First, they rely on a specific functional form to provide an indirect estimate of treatment effects. Second, when the underlying function form is nonlinear, the nonlinearity could have a potential impact on estimating the treatment effect. Third, they could generate biased results when the exclusion restriction, i.e., variables that influence ERM adoption but not firm value, is not met. Hence we use an alternative approach, propensity score matching, in this paper.

The propensity score is the conditional probability of receiving the treatment (in our case, ERM adoption), given observed baseline covariates *Z* (Rosenbaum and Rubin, 1983). Therefore, the propensity score, $e(Z)$, is defined as $e(Z) = \Pr(ERM = 1 | Z)$. It is a balancing score: conditional on the propensity score, the distribution of measured baseline covariates is similar between the treated (*ERM*=1) and the untreated (*ERM*=0) subjects. The propensity score is estimated using a probit regression model, i.e.,[8]

$$\begin{aligned} ERM^* &= Z'\alpha + u_i \\ ERM &= 1 \quad \text{if } ERM^* > 0, \\ ERM &= 0 \quad \text{if } ERM^* \le 0 \end{aligned} \tag{2}$$

[8] Propensity scores can be estimated from binomial regression models including logistic or probit models or statistical learning algorithms, for example, classification trees or ensemble methods like boosting, bagging or random forests (Hastie et al. 2001).

where Z is a vector of firm characteristics that can affect the firm's decision of ERM adoption. The estimated propensity score is the predicted probability of treatment derived from the fitted regression model, i.e.,

$$e(Z) = \Pr(ERM = 1 | Z) = \Phi(Z'\alpha). \quad (3)$$

After the propensity scores are derived, samples are selected from the common support area of propensity scores between the groups under comparison.[9] We use the caliper matching method (caliper = 0.005) without replacement. Specifically, both treated and control subjects are randomly sorted and then the first treated unit is selected to find its closest control unit by the propensity score. In addition, we require that the absolute difference in the propensity scores of matched subjects must be below some pre-specified caliper distance in order to avoid bad matches. If no control subjects had propensity scores that lie within the caliper distance to that of the treated subject, the treated subject would not be matched with any control subject and would then be excluded from the matched sample. Matching without replacement requires a given control subject to be included in at most one matched set.

In effect, this procedure creates a pseudo "random" sample in which any resulting differences in firm value between the two groups should reflect the effect of ERM adoption and not pre-existing client characteristics (Heckman et al. 1997, 1998; Dehejia and Wahba 1999, 2002). Hence, differences in means between these two groups should be sufficient to estimate the

[9] The common support region excludes treated units whose propensity scores are higher than the highest propensity score of the control units and control units whose propensity scores are lower than the lowest propensity score of the treated united.

treatment effect. Nonetheless, we also run OLS analysis in equation (1) to further control for any remaining characteristic imbalances between the two groups as well as general cross-sectional characteristic variations.

In spite of the strengths, matching models have drawbacks too. First, matching models rely on the assumption that the selection of treatment can all be explained by observable factors. Second, the estimated treatment effect using matching can only be generalized to common support, which is the portion of the population that can meaningfully decide whether to participate or not. Hence we have to balance between identifying the treatment effect and generalizing the results to the population. Third, matching results in a different composition of ERM adoption in the matched samples compared to that in the population. These features of matching models could bias our findings due to the reduced power of the tests or due to systematic differences in the subsamples from the population. To check the robustness of our results, we perform additional analysis in Section 5.4 and our results are robust.

4.2. Data and Variables

All of our financial data is from the China Stock Market and Accounting Research (CSMAR) database. CSMAR is an on-line database independently developed by Shenzhen GTA Information Technology Co., Ltd. (henceforth "GTA").[10] The CSMAR database is widely used

[10] GTA is a leading global provider of China financial market data, China industries and economic data to international financial and academic institutions. GTA's financial market data feeds and delivery platforms offer access to China's largest collection of historical data up to date, including intraday and closing exchange prices (e.g., data of all companies listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 1990 to present), fundamentals including company financial statements, corporate decisions, ownership, etc.

in the recent finance literature studying the Chinese markets (e.g., Chen, et al. 2009; Calomiris, et al. 2010; Gul et al. 2010; Peng, et al. 2011).

Dependent Variable: Tobin's Q

We use Tobin's Q as a measure of firm value instead of using an accounting based performance measure (such as ROA) because Tobin's Q does not require risk adjustment or normalization (Lang and Stulz 1994), is subject to less managerial manipulation (Lindenberg and Ross 1981), and most importantly, reflects the forward looking perspectives of investors. Consistent with Hoyt and Liebenberg (2011), we define Tobin's Q as the market value of equity plus the book value of liability divided by the book value of asset.[11]

Independent Variable: ERM

We use a dummy variable, ERM, to indicate whether a firm is engaged in ERM in a given year. ERM equals 1 in the year when a firm first announces ERM adoption, and remains 1 in the subsequent years. ERM equals 0 for the years prior to the first observed ERM usage by a firm and for firms that never adopted ERM in the sample period.

Control Variables

SIZE: Following Hoyt and Liebenberg (2011), we use the logarithm of the book value of assets as a proxy for firm size. The literature suggests that larger firms are more likely to engage in ERM (see, e.g., Liebenberg and Hoyt 2003; Beasley et al. 2005). The theoretical relationship

[11] Due to institutional reasons, some shares of listed companies in China were non-tradable historically. These non-tradable shares thus do not have a "market value" *per se*. Following the previous literature (e.g., Bailey et al. 2011), we calculate the market value of equity as the sum of the market value of the standard (tradable) shares and the book value of the non-tradable shares.

between size and firm value is mixed. Large firms may benefit from economies of scale but size can also exacerbate agency problems and reduce the efficiency of decision-making. The latest empirical evidence consistently finds a negative relationship between size and firm value (Lang and Stulz 1994; Allayannis and Weston 2001; Hoyt and Liebenberg 2011).

GROWTH: Myers (1977) and Smith and Watts (1992) have argued that firm value depends on future investment opportunities. Allayannis and Weston (2001) and Mackay and Moeller (2007) use the ratio of R&D expenditures to assets as a proxy for investment opportunities when they examine the relationship between risk management activities and firm value. Unfortunately, this data is not subject to mandatory reporting and is missing for most sample firms. Following Hoyt and Liebenberg (2011), we use historical (1 year) sales growth in our model to control for growth related variation in Tobin's Q. Because growth firms have more investment opportunities and hence face higher cash flow uncertainties, they are more likely to adoption an ERM program (Liebenberg and Hoyt 2003; Pagach and Warr 2011).

LEV: Highly leveraged firms are more inclined to adopt ERM to manage increased risks (Liebenberg and Hoyt 2003). However, firms adopting ERM programs may have lower financial leverage if they have decided to reduce their probability of financial distress. So the effect of leverage on ERM adoption is unclear. Capital structure may also affect firm value. Jensen (1986) argues that debt financing can serve as a governance mechanism, reducing agency costs by cutting free cash flows that self-interested managers can easily manipulate and thus increasing firm value. Excessive leverage, however, increases the probability of financial distress and

bankruptcy especially in adverse financial environments. Most of the recent literature studying Chinese listed companies finds a significant negative relationship between leverage and firm value (Chen, et al. 2009; Jiang, et al. 2010).

DIVID: There are two competing hypotheses on the relationship between dividend and firm value. Based on information asymmetry, Miller and Rock (1985) propose the cash flow signaling hypothesis, i.e., dividends can signal the firm's future prospects to investors. Jensen (1986) proposes the free cash flow hypothesis, i.e., dividends can reduce agency costs in the same vein as debt can. If either of the above holds true, dividends should have a positive effect on firm value. Dividend payments, however, can also exhaust growth opportunities and damage firm value. We include a dummy variable, *DIVID*, to control for the relationship between dividends and firm value. *DIVID* is set to 1 for the years when dividends are paid and 0 otherwise. Profitable firms (who can pay dividends) may or may not be more inclined to adopt ERM practices so our hypothesis on the effect of dividends on ERM adoption is inconclusive.

NERI: One of the major institutional factors in China is the imbalance of regional socioeconomic status. Fan et al. (2001) create and provide periodic updates of a widely cited index, i.e., the NERI index, to measure the different stages of the economic and financial market development across the provinces of China.[12] Existing studies find that firms located in more developed provinces benefit from less government intervention, easier access to financial

[12] The NERI index, published by National Economic Research Institute, has five components: (1) the relationship between market and government; (2) the development of non-state-owned economy; (3) the development of the product market; (4) the development of the factor market; and (5) the development of market intermediaries and the legal environment.

intermediaries, better intellectual property protection, etc. (Chen, et al. 2006; Chen, et al.,2009). We thus expect a positive relationship between *NERI* and firm value. Meanwhile, we also expect a positive relationship between *NERI* and ERM adoption: firms in the more developed regions have better access to modern technologies and management techniques, so they are more likely to follow best practice standards such as ERM.

CR: Shleifer and Vishny (1986) argue that large shareholders can serve as an internal governance mechanism to reduce agency costs and improve firm value. Nevertheless, subsequent studies (see, e.g., Bae, et al. 2002; Cheung et al. 2006; Berry-Stölzle et al. 2011) find that the controlling shareholder may exploit small shareholders through related-party transactions, earnings management, market manipulation and excessive diversification when the investor protection mechanism is imperfect. Specifically, evidence from China (a typical emerging market with poor investor protection) often suggests a negative relationship between controlling shareholders and firm performance (Jiang, et al. 2010; Peng, et al. 2011). To control for this effect, we include a dummy variable, *CR*, which is set to 1 if the shares held by the largest shareholder is more than a certain threshold and 0 otherwise.[13] We expect a negative relationship between *CR* and firm value in our analysis. We also anticipate that having a controlling shareholder can help firms reduce agency costs and thus make an easier decision on ERM adoption.

[13] The threshold for identifying the controlling shareholder in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. This number is stable over sample years, ranging from 36.06% to 36.91%.

MARKETINDEX: To control for market-wide dynamics, we include the "CNI A-Share Index" provided by the Shenzhen Security Information Co., Ltd. (SSI). "CNI A-Share Index" is a widely used stock market index in China, covering all firms listed in the Shenzhen and Shanghai Stock Exchanges (except for those on the watch list for delisting risks).[14] We expect that the overall stock market performance is positively related to firm value. We also hypothesize that when economy is strong, firms are more likely to adopt ERM because they can more easily afford the cost of ERM implementation.

NATURE/SOECG and SOELG: We create two sets of variables to control for the effects of ownership in the ALL LISTED sample. Historically, Chinese SOEs suffered from unclear property rights that increase agency costs and dampen firm performance. The above defects, however, can be offset by monopoly rights to some extent. With the continuous reforms of SOEs in the recent years, especially for the listed ones, both the agency costs and the monopoly rights have been reduced, but the overall effect of ownership on firm value is still mixed. We use a dummy variable, *NATURE*, to control for the ownership of the firm. *NATURE* equals to one if the firm is a SOE, and zero otherwise. In addition, Chen et al. (2009) find that ownership by different levels of government also affects the performance of SOEs. In our robustness check, we further divide SOEs into SOECGs (SOEs owned by the central government) and SOELGs (SOEs owned by local governments). Non-SOEs are the omitted category in this case. Because of the

[14] A-shares are issued by Chinese companies incorporated on the mainland and traded in the Shanghai and Shenzhen Stock Exchanges, quoted in RMB. A-shares are generally only available for purchase by mainland China investors; foreign investment is only allowed through a highly-regulated structure known as the Qualified Foreign Institutional Investor (QFII) system.

regulatory guidelines, we expect that the SOEs, especially SOECGs, are more likely to adopt ERM than the other firms.

*FOCUS: D*iversification comes with both benefits and costs. Benefits of diversification include economies of scope, larger internal capital markets, and risk reduction (Lewellen 1971; Teece, 1980). At the same time, diversification may increase agency costs and cause inefficient cross-subsidization of poorly performing businesses (Easterbrook 1984; Berger and Ofek 1995). Although a large body of finance and insurance literature has found a "discount" to the value of diversified firms (e.g., Lang and Stulz 1994; Berger and Ofek 1995; Liebenberg and Sommer 2008; Elango et al. 2008), a few recent studies have challenged this finding by citing potential problems in their model specifications (e.g., Villalonga 2004; Santalo and Becerra 2008). We, therefore, do not have a prediction for the sign of diversification or business focus on firm value. According to Standard & Poor's (2013), more complex firms are more likely to benefit from implementing ERM. We thus hypothesize that stronger business focus will lead to a reduced likelihood of ERM adoption. We construct a Herfindahl index of revenues from different business sectors as our measure of business focus.

We also follow the current literature to identify an additional set of variables that affect the ERM adoption decision and yet are not likely to impact firm value (hence are excluded from the Tobin's Q regression).[15] These variables include *OPACITY* of the firm, defined as the ratio

[15] In the treatment effect model, one usually needs to identify some variables (i.e., identification variables) that affect the choice of selection but not the outcome variable. The propensity score matching analysis does not have this requirement. To compare the PSM results with those from the treatment effect model in our robustness analysis, we include these identification variables in the first stage of PSM (i.e., the probit model to estimate the likelihood of

of intangible assets to total assets (Liebenberg and Hoyt 2003; Pagach and Warr 2011), where more opaque firms are more likely to adopt ERM to better manage risks; *AUDITRISK*, a dummy variable that equals 1 if the firm switched the auditor or if the audit opinion is modified in the current year, and 0 otherwise (Baxter et al. 2013; Wang et al. 2008), indicating that firms with higher audit risks are less likely to have adopted an ERM practice; and *BIG15*, a dummy variable that equals 1 if the company uses a big 15 auditor for the current year and 0 otherwise (Baxter et al. 2013; Chen et al. 2011), where firms using a big name auditor is more likely to follow best practice standards and thus implement ERM.[16]

Table 1 presents all variable definitions. Summary statistics are reported in Table 2. Compared with all listed samples, we can see that on average those SASAC-administered SOECGs are larger, have higher growth opportunities, more leveraged, more likely to have a controlling shareholder, located in less developed regions, have a stronger business focus, and tend to hire major auditors. Most variables have much greater variations in the ALL LISTED sample than in the SOECG sample, indicating the SOECG sample are less heterogeneous. To avoid the influence of extreme values, we winsorize Tobin's Q at the 5% and 95% levels for the

ERM adoption). We also conduct robustness tests by dropping these variables in our PSM analysis. Results are largely the same.

[16] Baxter et al. (2013) and Chen et al. (2011) use a dummy variable, Big 4, which is equal to 1 if the firm uses a big 4 auditor (Deloitte, PwC, Ernst & Young, and KPMG) and 0 otherwise. We find that the use of big 4 auditors in China is very limited in our sample period. Only 14% (7%) of firm-year observations in our SOECG (ALL LISTED) sample use big 4 auditors. We, therefore, use Big 15 in the Chinese market to define auditor types. About 72% (49%) of firm-year observations in the SOECG (ALL LISTED) sample use big 15 auditors. These numbers are comparable to the use of big 4 auditors in the U.S data sets.

SOECG sample and then do the same for Tobin's Q, *GROWTH*, and *LEV* for the ALL LISTED sample.[17]

[Insert Table 1 and Table 2 Here]

5. Main Results

5.1. OLS and PSM Results for the SOECG Sample

Since the SASAC-administered SOECGs adopt ERM primarily to comply with regulatory requirements, thus mitigating the sample selection issue, we run the OLS regression for this sample first to investigate the effect of ERM adoption on firm value, while controlling for other firm characteristics. The first column in Table 5 presents the OLS regression results. The coefficient of ERM is significant and positive at the 5% level. The value enhancing effect of ERM is also economically significant. Using the mean value of Tobin's Q for our sample, we find that ERM adoption can increase firm value by 6%. We also find that firm size, leverage and existence of a controlling shareholder are negatively associated with firm value, and the stage of economic and financial market development, i.e., the NERI index, is positively related to firm value. Moreover, firm value is also positively related to the overall performance of the stock market. These results are consistent with our expectations and previous literature.

A question that often comes up in this type of observational studies is whether our results are driven by the systematic differences between the two groups of firms under comparison or by the treatment effect of ERM adoption. This may be a more serious concern for the sample of all

[17] Based on the distribution of Tobin's Q presented in Table 2, we also delete the top 1% extreme values for the ALL LISTED sample before winsorization. This results in a reduction of 77 firm-year observations.

listed firms where ERM adoption can be a self-selected firm strategy. To address this question, we adopt the propensity score matching approach for the ALL LISTED sample to reduce the potential confounding effects in later analysis. We also apply this to the SOECG sample for consistency and robustness.

[Insert Table 3, Table 4 and Table 5 Here]

Panel A in Table 3 reports for the SOECG sample the T-test results for the differences in variable means between firm-years with an identified ERM program (*ERM* = 1) and those without an ERM program (*ERM* = 0). Surprisingly, Tobin's Q of ERM firms is on average lower than that of non-ERM firms although the difference is not statistically significant. This suggests that these two types of firms are comparable in overall performance on a univariate basis. For all covariates but *GROWTH*, differences in means between these two groups are significant at the 10% level or above. The average ERM firm tends to be bigger, more leveraged, more likely to have a controlling shareholder, paying dividends more often, located in a province with greater economic and financial market development, and more diversified in their business income. ERM firms also tend to be slightly more opaque, use large auditors more often, and have less audit related risk.

We employ a Probit model to estimate the likelihood (propensity score) of ERM adoption based on firm characteristics, the result of which is shown in Column 2 in Table 5. We can see that firms that are larger in size, located in more advanced provinces, more diversified and use big auditors are more likely to adopt ERM programs. We then implement propensity score

matching as described in Section 4.1. Our original SOECG sample has 507 observations of ERM firms and 810 observations of non-ERM firms. Matching reduces the sample to 391 ERM firm-year observations and 391 non-ERM firm-year observations. Panel A of Table 4 reports the means test results for key variables after matching. Average Tobin's Q for ERM firms becomes higher than that for non-ERM firms, albeit still not statistically significant. The means of all the other covariates, however, are no longer significantly different, suggesting that the matched sample is well balanced between the two groups of firms. We then use the matched SOECG sample to run the OLS regression. We obtain largely the same results as before (see Column 3 in Table 5). Our key variable of interest, ERM, has a significant and positive coefficient at the 5 percent level with a similar magnitude. The effects of firm size, leverage, the NERI index and stock market index remain unchanged.

5.2. PSM Results for the ALL LISTED Sample

As ERM adoption has permeated corporate practices worldwide, many firms may have chosen to adopt an ERM strategy in managing their risks. In this subsection, we proceed to investigate the value-enhancing effect of ERM for all nonfinancial listed companies in China.

Because the firms in the ALL LISTED sample are not subject to the same regulatory requirements and thus are adopting ERM as a value maximizing strategy, we only present results using the propensity score matching method. Panel B of Table 3 compares the means of key variables between ERM firms and non-ERM firms for the ALL LISTED sample. We observe a pattern similar to that of the SOECG sample. Tobin's Q of ERM firms is on average significantly

lower than that of non-ERM firms, which is again contrary to our expectation. We find significant differences in means for all firm characteristics between these two groups. We also note that SOEs are more likely to implement ERM, due to strong incentives by the regulatory requirements. After matching, all covariates are balanced in means, as in Panel B of Table 4.

We run the OLS regression on the matched sample and report the result in Column 5 of Table 5. We again find a significant value-adding effect of ERM, although the magnitude of the effect (4%) seems to be lower than that for the SOECG sample. Results for the other control variables are similar to the SOECG sample with the exception of the NERI index, which is no longer significant for the ALL LISTED sample.

When we further classify SOEs to SOECGs and SOELGs, we can see that centrally owned state enterprises (SOECGs) are more likely to adopt ERM (again, owing to the "guidelines") and perform marginally better than the other firm types. This is consistent with previous studies (e.g., Chen et al. 2009).

5.3. Sample Partition based on Regional Economic Development

As China goes through continuous economic and financial market reforms, one of the most important institutional factors is the imbalance of economic development among different geographic regions. The difference is most pronounced between the EAST region, commonly associated with better-developed economic and financial markets, and the NONEAST region.[18]

[18] Following Fan et al. (2011) and Yang and Sun (2008), the EAST region includes eleven provinces, municipalities, or autonomous regions (i.e., Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong, Shandong and Hainan), and the NONEAST region includes twenty provinces, municipalities, or autonomous

For example, in 2013 the eleven provinces, municipalities, or autonomous regions in the EAST region (out of thirty-one provinces, municipalities or autonomous regions in China) produced a total GDP of RMB 34.93 trillion, 55.45% of the total GDP in China. The GDP per capita was RMB 62,000 in the EAST region, compared to RMB 35,000 in the NONEAST region. More firms were based in the EAST region than the NONEAST region (64% vs. 36%), providing more employment in the EAST region (52.49% vs. 47.51%)[19]. Previous research has found that these differences may impact greatly firms' strategic plans and corporate performance (Chen et al. 2006; Chen et al. 2009). Therefore, we further examine if this factor influences the strategic decision of ERM adoption and the subsequent value of ERM.

[Insert Table 6 here]

Table 6 verifies that the EAST region is indeed much more advanced with respect to the stages of economic and financial market development (measured by the higher NERI index). The difference is economically and statistically significant and is found for both the SOECG and ALL LISTED sample.

[Insert Table 7 here]

Table 7 suggests that there are more ERM activities in the EAST than in the NONEAST region. For both the SOECG sample and ALL LISTED sample, there are at least 50% more firms located in the EAST region. The SOECG firms have a much higher ERM adoption rate in

---

regions (i.e., Anhui, Gansu, Guangxi, Guizhou, Henan, Heilongjiang, Hubei, Hunan, Jilin, Jiangxi, Neimenggu, Ningxia, Qinghai, Shanxi, Sichuan, Xizang, Xinjiang, Shanxi, Yunnan and Chongqing).

[19] Data is available from the National Bureau of Statistics of People's Republic of China at http://www.stats.gov.cn/, last accessed on December 8, 2014

general (64% of firms over the sample period) than ALL LISTED firms (20% of firms over the sample period). Interestingly, SOECG firms located in the EAST region have a higher ERM adoption rate (69% of firms over the sample period) than those located in the NONEAST region (57% of firms over the sample period), probably because the firms in the EAST region have easier access to the state-of-the-art management technology and corporate strategies, and thus are more inclined to follow best practices such as ERM. Due to the low overall adoption rate, the difference in ERM adoption rate is not significant between the two regions in the ALL LISTED sample (19% v.s. 21%). These results are consistent with our hypothesis on how more advanced socioeconomic development in the EAST region motivates ERM adoption, leading us to further examine the value of ERM for the two regions.

[Insert Table 8 and Table 9 here]

We re-estimate the value of ERM for the EAST and NONEAST sub-samples using the PSM model and present the results in Tables 8 and 9. We find a robust and significant positive impact of ERM on firm value in each region, except for the EAST region in the SOECG sample where the ERM effect is positive but insignificant. This result suggests that despite current lower recognition in the NONEAST region, ERM seems to be a value adding strategy for firms in both regions.[20] Moreover, the ERM effect is larger for the firms in the NONEAST regions than those in the EAST regions (3.25% v.s. 7.84% for the SOECG sample and 4.21% v.s. 8.60% for the

[20]In untabulated analysis, we also add an interaction term between ERM adoption and the NERI index in the Tobin's Q regression. We find that both ERM and the NERI Index are positive and significant while the interaction term is not. This also suggests that for firms in both the EAST and the NONEAST regions, ERM is a value maximizing strategy.

ALL LISTED sample). This is an interesting result suggesting that firms in the less developed NONEAST region that have historically had more difficulty in obtaining cutting-edge management concepts and technologies can benefit greatly from the introduction of these new corporate strategies. Through this, they may be able to significantly enhance performance and better compete in the national and/or international marketplace, and eventually promote faster development of the region and gradually close the gap. The effects of other control variables are largely the same as previously discussed.

5.4. Other Robustness Tests

We have run a set of additional analysis (untabulated) to further test the robustness of our results. These analyses include using different econometric models, such as OLS models for the ALL LISTED sample and models with firm and year fixed effects, treatment effect models with the same set of identification variables in the ERM regression, two-stage least square (2SLS) models with instrument variables for ERM adoption, survival analysis based on sample construction where firm-year observations are deleted after the first observation of ERM adoption for a firm, and partitioning our sample to account for potential differences before and after the financial crisis. The results are qualitatively the same as those presented in this paper and they are available upon request from the authors.

6. Conclusion

This paper examines the effect of ERM implementation on firm value. Using a unique sample of listed Chinese nonfinancial State Owned Enterprises, we find that ERM has a

significant and positive effect on firm value. Our paper is among the first to provide evidence for the value of ERM for nonfinancial firms and in the international markets. Our choice of sample also allows us to mitigate the sample identification bias and the sample selection bias commonly seen in similar studies. Our results are robust after controlling for relevant firm characteristics using the propensity score matching method, after accounting for unique characteristics associated with China's institutional background. Our analysis using all listed Chinese nonfinancial firms, after controlling for possible endogeneity bias, provides similar results that ERM contributes positively to firm value. Future research is needed to explore if similar results hold true for nonfinancial firms in the U.S. and if our results extend to the Chinese financial institutions.

References:

[1] Allayannis, G., and J. Weston, 2001, The Use of Foreign Currency Derivatives and Firm Market Value, *Review of Financial Studies*, 14: 243-276.

[2] Altuntas M., T. R. Berry-Stölzle, and R. E Hoyt, 2011, Dynamic Determinants of Enterprise Risk Management Adoption in the Property-liability Insurance Industry: Evidence from Germany, Working Paper, University of Georgia.

[3] Bae, K. H., J. K. Kang, and J. M. Kim, 2002, Tunneling or Value Added? Evidence from Mergers by Korean Business Groups, *Journal of Finance*, 57: 2695-2740.

[4] Bailey, W , Huang, V., and Yang, Z., 2011, Bank Loans with Chinese Characteristics: Some Evidence on Inside Debt in a State Controlled Banking System, *Journal of Financial and Quantitative Analysis 46*, 1795 – 1830.

[5] Baxter, R., Bedard, J. C., Hoitash, R., and Yezegel, A., 2013, Enterprise Risk Management Program Quality: Determinants, Value Relevance, and the Financial Crisis, *Contemporary Accounting Research*, *30*(4): 1264-1295.

[6] Beasley, M. S., B. Branson and B. Hancock, 2012, Current State of Enterprise Risk Management: Progress is Occurring but Opportunities for Improvement Remain, www.erm.ncsu.edu.

[7] Beasley, M. S., R. Clune, and D. R. Hermanson, 2005, Enterprise Risk Management: An Empirical Analysis of Factors Associated with the Extent of Implementation, *Journal of Accounting and Public Policy*, 24: 521-531.

[8] Beasley, M. S., D. Pagach, and R. Warr, 2008, The Information Conveyed in Hiring Announcements of Senior Executives Overseeing Enterprise-Wide Risk Management Processes, *Journal of Accounting, Auditing, and Finance*, 23: 311-332.

[9] Berger, P., E. Ofek, 1995, Diversification's Effect on Frm Value, *Journal of Financial Economics*, 37: 39–66.

[10] Berry-Stölzle, B. R., R. E. Hoyt, and S. Wende, 2011, Capital Market Development, Competition, Property Rights, and the Value of Insurer Product-Line Diversification: A Cross Country Analysis, working paper, University of Georgia.

[11] Bertinetti G. S., E. Cavezzali, and G. Gardenal, 2013, The Effect of the Enterprise Risk Management Implementation on the Firm Value of European Companies, working paper, Ca' Foscari University of Venice.

[12] Bodnar, G., J. Graham, C. R. Harvey, and R.C. Marston, Managing Risk Management, AFA in *2012 Chicago*，working paper.

[13] Calomiris, C. W., R. Fisman, Y. X. Wang, 2010, Profiting from Government Stakes in a Command Economy: Evidence from Chinese Asset Sales, *Journal of Financial Economics*, 96:399-412.

[14] Chen, G., M. Firth, D.N. Gao, O. Rui, 2006, Ownership Structure, Corporate Governance, and Fraud: Evidence from China, *Journal of Corporate Finance*, 12:424–448.

[15] Chen G. M., M. Firth, and L. P. Xu, 2009, Does the Type of Ownership Control Matter? Evidence from China's Listed Companies, *Journal of Banking and Finance*, 33: 171-181.

[16] Chen, H., Chen, J. Z., Lobo, G. J., Wang, Y., 2011, Effects of audit quality on earnings management and cost of equity capital: evidence from China. *Contemporary Accounting Research*, 28(3): 892-925.

[17] Cheung Y. L., P.R. Rau, and A. Stouraitis, 2006, Tunneling, Propping and Expropriation, Evidence from Connected Party Transactions in Hong Kong, *Journal of Financial Economics*, 82: 343-386.

[18] Cornaggia, J. 2013. Does risk management matter? Evidence from the U.S. agricultural industry, *Journal of Financial Economics*, 109 (2),419–440.

[19] COSO, 2004, Enterprise risk management-integrated framework, Committee of Sponsoring Organizations of the Treadway Commission.

[20] Dehejia, R., 2005, Practical Propensity Score Matching: A Reply to Smith and Todd, *Journal of Econometrics*, 125: 355–364.

[21] Dehejia, R., and S. Wahba, 1999, Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs, *Journal of the American Statistical Association*, 94: 1053–1062.

[22] Dehejia, R., and S. Wahba, 2002, Propensity Score Matching Methods for Nonexperimental

Causal Studies, *Review of Economics and Statistics*, 84(1): 151-161.
[23] Deloitte, 2012, Aftershock: Adjusting to the New World of Risk Management.
[24] Easterbrook, F., 1984, Two Agency Cost Explanations of Dividends, *American Economic Review*, 74: 650-659.
[25] Eckles, D., R. Hoyt, and S. M. Miller, 2012, The Impact of Enterprise Risk Management on the Marginal Cost of Reducing Risk: Evidence from the Insurance Industry, Working Paper, University of Georgia.
[26] Elango B., Y. Ma, and N. Pope, 2008, An Investigation Into The Diversification-Performance Relationship In The U.S. Property-Liability Insurance Industry, *Journal of Risk and Insurance*, 75 (3): 567-591.
[27] Fan G, X. L. Wang and L. W. Zhang, 2001, NERI INDEX of Marketization of China's Provinces 2001 Report, *Journal of National School of Administration*, 3:17-27.
[28] Fan G., X. L. Wang, and H. P. Zhu, 2011, NERI INDEX of Marketization of China's Provinces 2011 Report, Beijing, Economic Science Press.
[29] Freedman, D., and R. A. Berk, 2008, Weighting Regressions by Propensity Scores, *Evaluation Review*, 32:392-409.
[30] Gates, S., J. L. Nicolas, and P. L. Walker, 2009, Perceived Value of Enterprise Risk Management, working paper, University of Virginia.
[31] Gatzer, N., and M. Martin, 2013, Determinants and Value of Enterprise Risk Management: Empirical Evidence from the Literature, Working Paper, Friedrich-Alexander-University.
[32] Grace M. F., J. T. Leverty, R. D. Phillips, P. Shinmpi, 2014, The Value of Investing in Enterprise Risk Management, *Journal of Risk and Insurance*, forthcoming.
[33] Gul, F. A., J. B. Kim, A. A. Qiu, 2010, Ownership Concentration, Foreign Shareholding, Audit Quality, and Stock Price Synchronicity: Evidence from China, *Journal of Financial Economics*, 95:425-442.
[34] Hastie, T., R. Tibshirani, and J. Friedman, 2001, The Elements of Statistical Learning: Data Mining, Inference and Prediction, Springer, New York.
[35] Heckman, J., and S. Navarro-Lozano, 2004, Using Matching, Instrumental Variables, and Control Functions to Estimate Economic Choice Models, *Review of Economics and Statistics*, 86(1):30-57.
[36] Heckman, J., H. Ichimura, and P. E. Todd, 1997, Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program, *Review of Economic Studies*, 64: 605–654.
[37] Heckman, J., H. Ichimura, J. Smith, and P. E. Todd, 1998, Characterizing Selection Bias using Experimental Data, *Econometrica*, 66: 1017–1098.
[38] Hoyt R., and A. P. Liebenberg, 2011, The Value of Enterprise Risk Management, *Journal of Risk and Insurance*, 78:795-822.
[39] Jensen, M. C., 1986, Agency Costs of Free Cash Flow, Corporate Finance and Takeover, *American Economic Review*, 76: 323-329.

[40] Jiang G. H., C. Lee, and H. Yue, 2010, Tunneling through Intercorporate Loans: the China Experience, *Journal of Financial Economics*, 98: 1-20.
[41] Jin, Y. B., and P. Jorion, 2006, Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers, *Journal of Finance*, 61: 893-919.
[42] Kleffner, A. E., R. B. Lee, and B. McGannon, 2003, The Effect of Corporate Governance on the Use of Enterprise Risk Management: Evidence from Canada, *Risk Management and Insurance Review*, 6(1):53-73.
[43] Lang, L. and R. Stulz, 1994, Tobin's Q, Diversification, and Firm Performance, *Journal of Political Economy*, 102: 1248-1280.
[44] Lewellen, W., 1971, A Pure Financial Rationale for the Conglomerate Merger, *Journal of Finance*, 26:521-537.
[45] Liebenberg, A. P., and R. E. Hoyt, 2003, Determinants of Enterprise Risk Management: Evidence From the Appointment of Chief Risk Officers, *Risk Management and Insurance Review*, 6: 37-52.
[46] Liebenberg A. P., and D. W. Sommer, 2008, Effects of Corporate Diversification: Evidence from the Property-Liability Insurance Industry, *Journal of Risk and Insurance*, 75 (4): 893–919.
[47] Lindenberg, E. and S. Ross, 1981, Tobin's Q Ratio and Industrial Organization, *Journal of Business*, 54: 1-32.
[48] Mackay, K., and S. Moeller, 2007, The Value of Corporate Risk Management. *Journal of Finance*, 62(3): 1379-1419.
[49] McShane M. K., N. Nair, E. Rustambekov, 2011, Does Enterprise Risk Management Increase Firm Value? *Journal of Accounting, Auditing & Finance*, 26: 641-658.
[50] Miller M. H. and K. Rock, 1985, Dividend Policy under Asymmetric Information, *Journal of Finance*, 40: 1031-1051.
[51] Myers, S. C., 1977, The Determinants of Corporate Borrowing, *Journal of Financial Economics*, 4: 147-175.
[52] Rosenbaum P R, and D. B. Rubin, 1983. The Central Role of the Propensity Score in Observational Studies for Causal Effects, *Biometrika*, 70(1): 41-55.
[53] Pagach D., and R. Warr, 2011, The Characteristics of Firms That Hire Chief Risk Officer, *Journal of Risk and Insurance*, 78: 185-211.
[54] Peng Q., K. C. Wei, and Z.S. Yang, 2011, Tunneling or Propping: Evidence from Connected Transactions in China, *Journal of Corporate Finance*, 17: 306-325.
[55] Pérez-González, F., and H Yun, 2013, Risk Management and Firm Value: Evidence from Weather Derivatives, *Journal of Finance*, 68(5):2143-2176.
[56] Pooser D. M., and K. A. McCullough, 2012, ERM Determinants, Use, and Effects on the Firm. Working Paper, St. John's University.
[57] Santalo, J. and M. Becerra, 2008, Competition from Specialized Firms and the Diversification-Performance Linkage, *Journal of Finance*, 63: 851-883.

[58] Shleifer A., and R. W. Vishny, 1986, Large Shareholders and Corporate Control, *Journal of Political Economy*, 94: 481-488.

[59] Smith, C. W., and R. L. Watts, 1992, The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies, *Journal of Financial Economics*, 32: 263-292.

[60] Standard & Poor's, 2013, Enterprise Risk Management, May 7, 2013, available at www.standardandpoors.com/ratingsdirect

[61] Teece, D.J., 1980, Economics of Scope and the Scope of the Enterprise, *Journal of Economic Behavior and Organization*, l(3):223-247.

[62] Villalonga, B., 2004, Does Diversification Cause the Diversification Discount? *Financial Management*, 33(2):5-27.

[63] Wang Q, Wong T J, Xia L., 2008, State Ownership, the Institutional Environment, and Auditor Choice: Evidence from China. *Journal of Accounting and Economics*, 46(1): 112-134.

[64] Waweru N., and E. S. Kisaka, 2011, The Effect of Enterprise Risk Management Implementation on the Value of Companies Listed in the Nairobi Stock Exchange, Working Paper, York University.

[65] Yang C M, and Q L Sun, 2008, The Effects of External Risk on Local Government Size of China: Theory and Evidence, *Economic Research Journal*, 9: 115- 122.

Table 1：Variable Definitions and Data Sources

Variable	Definition	Source
Q	(market value of equity + book value of liability)/(book value of total asset – intangible asset)	CSMAR
ERM	Dummy, ERM= 1 for firm-years starting from the first observed ERM adoption; 0 otherwise.	Financial reports, company website, other media sources
SIZE	Ln (book value of total asset)	CSMAR
GROWTH	$(Sales_t - Sales_{t-1}) / Sales_{t-1}$	CSMAR
LEV	Book value of liability ／ market value of equity	CSMAR
ROA	Net income/ book value of asset	CSMAR
DIVID	Dummy, DIVID=1 if a dividend is paid; and 0 otherwise	CSMAR
NERI	A measure of the stage of economic and financial market development in different provinces of China	Fan et al. (2011)
NATURE	Dummy, NATURE=1 if the ultimate owner is the government, 0 otherwise	CSMAR
SOECG	Dummy, SOECG=1 if the ultimate owner is the central government, 0 otherwise	CSMAR
SOELG	Dummy, SOELG=1 if the ultimate owner is a local government, 0 otherwise	CSMAR
CR	Dummy, CR=1 if the shares held by the largest shareholder> threshold *; 0 otherwise.	CSMAR
MARKETINDEX	Ln (CNI A-share index)	CSMAR
FOCUS	A measure based on the Herfindahl index of income from different business segments	CSMAR
OPACITY	Intangible assets/Total assets	CSMAR
AUDITRISK	Dummy, equals 1 if the firm switched auditor, or the audit opinion is modified; 0 otherwise. Following Wang et al. (2008), we classify unqualified opinions with an explanatory paragraph, qualified opinions, disclaimers, and adverse opinions as “modified opinions.’’	CSMAR
BIG15	Dummy, equals 1 if the company uses a big 15 auditor; 0 otherwise	CSMAR

*: The threshold for identifying the controlling shareholder in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. This number is stable over our sample years, ranging from 36.06% to 36.91%.

Table 2: Summary Statistics

	MIN	P1	P5	P50	P95	P99	MAX	MEAN	SD	N
Panel A: Summary Statistics for the SOECG Sample										
Q	0.9366	0.9366	0.9366	1.5010	4.1467	4.1467	4.1467	1.7957	0.8632	1317
SIZE	18.5160	19.7817	20.2124	21.9470	25.5108	26.7635	28.2729	22.255	1.5691	1317
GROWTH	-0.8752	-0.4655	-0.2263	0.1895	0.8396	2.2624	8.7890	0.2641	0.5864	1317
LEV	0.0106	0.0245	0.0600	0.5044	2.8193	5.6358	7.6448	0.8662	1.0786	1317
MARKETINDEX	7.3693	7.3693	7.3693	8.0756	8.3591	8.3591	8.3591	7.8508	0.3724	1317
NERI	4.5800	4.8200	5.5600	8.5400	10.9600	11.8000	11.8000	8.4871	1.8036	1317
FOCUS	0.2136	0.2667	0.3535	0.8552	1.0000	1.0000	1.0000	0.7640	0.2383	1317
OPACITY	0.0000	0.0000	0.0001	0.0218	0.1005	0.2019	0.5323	0.0338	0.0423	1317
CR	0						1	0.6173	0.4862	1317
DIVID	0						1	0.6826	0.4656	1317
AUDITRISK	0						1	0.1678	0.3738	1317
BIG15	0						1	0.7191	0.4496	1317
Panel B: Summary Statistics for the ALL LISTED Sample										
Q	0.9545	0.9545	0.9545	1.5684	4.0016	4.0016	4.0016	1.8453	0.8444	6782
SIZE	18.5160	19.6445	20.1611	21.6396	24.0906	25.5108	28.2729	21.811	1.2205	6782
GROWTH	-0.2427	-0.2427	-0.2427	0.1635	0.8396	0.8396	0.8396	0.1996	0.2667	6782
LEV	0.0647	0.0647	0.0647	0.4231	2.0034	2.0034	2.0034	0.6112	0.5372	6782
MARKETINDEX	7.3693	7.3693	7.3693	8.0756	8.3591	8.3591	8.3591	7.8519	0.3675	6782
NERI	0.2900	4.5800	5.5600	8.9300	11.8000	11.8000	11.8000	8.7529	2.0130	6782
FOCUS	0.1844	0.2634	0.3547	0.8186	1.0000	1.0000	1.0000	0.7514	0.2350	6782
OPACITY	0.0000	0.0000	0.0000	0.0277	0.1462	0.2999	0.8400	0.0450	0.0662	6782
NATURE	0						1	0.6444	0.4787	6782
CR	0						1	0.4801	0.4996	6782
DIVID	0						1	0.6862	0.4641	6782
AUDITRISK	0						1	0.0871	0.2821	6782
BIG15	0						1	0.4851	0.4998	6782

Note: for dummy variables, we only report min, max, mean, standard deviation and the number of observations.

Table 3: Means Test for Key Variables

VARIABLES	TOTAL	ERM=0	ERM=1	DIFFERENCE
Panel A: The SOECG Sample				
Q	1.7957	1.8123	1.7693	0.0430
SIZE	22.2550	21.9063	22.8121	-0.9058***
GROWTH	0.2641	0.2675	0.2586	0.0089
LEV	0.8662	0.7743	1.0129	-0.2386***
CR	0.6173	0.5753	0.6844	-0.1091***
DIVID	0.6826	0.6580	0.7219	-0.0639**
MARKETINDEX	7.8508	7.8265	7.8896	-0.0631***
NERI	8.4871	8.1970	8.9505	-0.7535****
FOCUS	0.7640	0.7839	0.7321	0.0518***
OPACITY	0.0338	0.0322	0.0362	-0.0040*
AUDITRISK	0.1678	0.1827	0.1440	0.0387*
BIG15	0.7191	0.6383	0.8481	-0.2098***
No. of Obs.	1317	810	507	
Panel B: The ALL LISTED Sample				
Q	1.8453	1.8542	1.7790	0.0752**
SIZE	21.8110	21.6936	22.6828	-0.9892***
GROWTH	0.1996	0.1973	0.2166	-0.0193*
NATURE	0.6444	0.6144	0.8671	-0.2527***
LEV	0.6112	0.5911	0.7599	-0.1688***
CR	0.4801	0.4613	0.6199	-0.1586***
DIVID	0.6862	0.6776	0.7503	-0.0727***
MARKETINDEX	7.8519	7.8470	7.8886	-0.0416***
NERI	8.7529	8.7241	8.9674	-0.2433***
FOCUS	0.7514	0.7546	0.7276	0.0270***
OPACITY	0.0450	0.0444	0.0495	-0.0051**
AUDITRISK	0.0871	0.0840	0.1106	-0.0266**
BIG15	0.4851	0.4531	0.7230	-0.2699***
No. of Obs.	6782	5977	805	

Notes：The means test is a two-sided t-test. T-stats along with significance levels are presented for the differences in mean values. *** (**, or *) indicates significance at the 1% (5% or 10%) level. Tobin's Q = (market value of equity + book value of liability)/(book value of total assets – intangible assets). ERM is a dummy variable which is set to 1 for the firm-year when and after the first ERM activity was identified and 0 otherwise. SIZE = log (book value of

total assets). GROWTH = (sales at time t – sales at time t-1)/sales at time t-1. NATURE is a dummy variable, which is set to 1 if the firm is state-owned and 0 otherwise. LEV = book value of liability/market value of equity. CR is a dummy variable, which is set to 1 if the number of shares held by the largest shareholder is greater than a certain threshold and 0 otherwise. The threshold in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. DIVID is a dummy variable, which is set to 1 for the year when dividends are paid and 0 otherwise. NERI is a variable measuring the financial and economic development of different provinces in China, which is drawn from Fan et al. (2011). MARKETINDEX = log (the closing value of CNI A-share index). FOCUS is the Herfindahl index of income. OPACITY= Intangible assets/Total assets. AUDITRISK is a dummy variable, which is equal to 1 if the firm switched auditor or the audit opinion is modified; 0 otherwise. BIG15 is a dummy variable, which is equal to 1 if the company choose a big 15 auditor and 0 otherwise. All variables except NERI and BIG15 come from the CSMAR database. NERI is from Fan et al. (2011), BIG15 is from “The Chinese Institute of Certified Public Accounts”, http://www.cicpa.org.cn/ .

Table 4: Means Test for Key Variables after Propensity Score Matching

VARIABLES	Total	ERM=0	ERM=1	DIFFERENCE
Panel A：The SOECG Sample				
Q	1.8279	1.8019	1.8540	-0.0521
SIZE	22.3246	22.3269	22.3224	0.0045
GROWTH	0.2870	0.2970	0.2771	0.0199
LEV	0.8508	0.8125	0.8892	-0.0767
CR	0.6228	0.6087	0.6368	-0.0281
DIVID	0.7020	0.7059	0.6982	0.0077
MARKETINDEX	7.8831	7.8934	7.8728	0.0206
NERI	8.6882	8.7312	8.6453	0.0859
FOCUS	0.7519	0.7528	0.7510	0.0018
OPACITY	0.0336	0.0345	0.0326	0.0019
AUDITRISK	0.1611	0.1560	0.1662	-0.0102
BIG15	0.8005	0.7928	0.8082	-0.0154
Observations	782	391	391	
Panel B：The ALL LISTED Sample				
Q	1.7919	1.7666	1.8173	-0.0507
SIZE	22.5051	22.5316	22.4786	0.0530
GROWTH	0.2239	0.2311	0.2167	0.0144
NATURE	0.8561	0.8528	0.8594	-0.0066
LEV	0.7261	0.7170	0.7351	-0.0181
CR	0.5900	0.5769	0.6032	-0.0263
DIVID	0.7365	0.7306	0.7424	-0.0118
MARKETINDEX	7.8971	7.9052	7.8889	0.0163
NERI	8.9299	8.9427	8.9171	0.0256
FOCUS	0.7377	0.7410	0.7343	0.0067
OPACITY	0.0475	0.0462	0.0489	-0.0027
AUDITRISK	0.1104	0.1104	0.1104	0.0000
BIG15	0.6965	0.6859	0.7070	-0.0211
Observations	1522	761	761	

Notes：The means test is a two-sided t-test. T-stats along with significance levels are presented for the differences in mean values. *** (**, or *) indicates significance at the 1% (5% or 10%) level. Tobin's Q = (market value of equity + book value of liability)/(book value of total assets – intangible assets). ERM is a dummy variable which is set to 1 for the firm-year when and after the first ERM activity was identified and 0 otherwise. SIZE = log (book value of total assets). GROWTH = (sales at time t – sales at time t-1)/sales at time t-1. NATURE is a dummy variable, which is set to 1 if the firm is state-owned and 0 otherwise. LEV = book value of liability/market value of equity. CR is a

dummy variable, which is set to 1 if the number of shares held by the largest shareholder is greater than a certain threshold and 0 otherwise. The threshold in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. DIVID is a dummy variable, which is set to 1 for the year when dividends are paid and 0 otherwise. NERI is a variable measuring the financial and economic development of different provinces in China, which is drawn from Fan et al. (2011). MARKETINDEX = log (the closing value of CNI A-share index). FOCUS is the Herfindahl index of income. OPACITY= Intangible assets/Total assets. AUDITRISK is a dummy variable, which is equal to 1 if the firm switched auditor or the audit opinion is modified; 0 otherwise. BIG15 is a dummy variable, which is equal to 1 if the company choose a big 15 auditor and 0 otherwise. All variables except NERI and BIG15 come from the CSMAR database. NERI is from Fan et al. (2011), BIG15 is from "The Chinese Institute of Certified Public Accounts", http://www.cicpa.org.cn/

Table 5: Regression Results

VARIABLES	SOECG OLS	SOECG PSM		ALL LISTED PSM		ALL LISTED PSM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Tobin's Q	ERM	Tobin's Q	ERM	Tobin's Q	ERM	Tobin's Q
ERM	0.1042**		0.0904**		0.0721**		0.0650**
	(0.0411)		(0.0451)		(0.0315)		(0.0322)
SIZE	-0.2018***	0.1710***	-0.1977***	0.2448***	-0.0852***	0.2405***	-0.1110***
	(0.0142)	(0.0310)	(0.0184)	(0.0212)	(0.0147)	(0.0223)	(0.0161)
GROWTH	0.0135	-0.0700	0.0005	0.0234	0.0889*	-0.0039	0.1320**
	(0.0272)	(0.0601)	(0.0317)	(0.0816)	(0.0537)	(0.0861)	(0.0571)
NATURE				0.5144***	0.0102		
				(0.0550)	(0.0515)		
SOECG						1.1581***	0.0880*
						(0.0622)	(0.0494)
SOELG						0.0334	0.0503
						(0.0619)	(0.0549)
LEV	-0.1842***	0.0239	-0.2154***	-0.0834*	-0.6837***	-0.0280	-0.6525***
	(0.0228)	(0.0418)	(0.0307)	(0.0468)	(0.0303)	(0.0495)	(0.0318)
CR	-0.0867**	0.0678	-0.0779	0.0987**	-0.1010***	0.0917*	-0.0798**
	(0.0413)	(0.0798)	(0.0517)	(0.0445)	(0.0341)	(0.0468)	(0.0346)
DIVID	0.0667	0.0093	0.0327	-0.0273	-0.0285	0.0173	-0.0530
	(0.0424)	(0.0858)	(0.0553)	(0.0508)	(0.0357)	(0.0537)	(0.0379)
NERI	0.0313***	0.1110***	0.0390***	0.0337***	-0.0119	0.0343***	-0.0088
	(0.0104)	(0.0212)	(0.0130)	(0.0113)	(0.0085)	(0.0120)	(0.0086)
MARKETINDEX	0.8712***	0.2061*	0.8237***	0.0933	0.6007***	0.1270*	0.7047***
	(0.0478)	(0.1064)	(0.0590)	(0.0655)	(0.0461)	(0.0688)	(0.0475)
FOCUS	-0.1230	-0.5180***	-0.0567	-0.2627***	-0.0152	-0.2731***	-0.0518
	(0.0805)	(0.1554)	(0.1019)	(0.0898)	(0.0673)	(0.0944)	(0.0687)
OPACITY		1.1962		0.2936		1.2140***	
		(0.8688)		(0.2883)		(0.2957)	
AUDITRISK		-0.0666		0.1046		-0.0491	
		(0.1002)		(0.0707)		(0.0755)	
BIG15		0.5127***		0.4056***		0.1720***	
		(0.0899)		(0.0451)		(0.0487)	
CONSTANT	-0.5997	-6.7455***	-0.3847	-8.0395***	-0.4055	-8.1679***	-0.7409*
	(0.4015)	(1.0028)	(0.5171)	(0.6183)	(0.4085)	(0.6510)	(0.4120)
Observations	1317	1317	782	6782	1522	6782	1392
Adjusted R^2	0.429		0.448		0.460		0.476

Notes: This table reports the ordinary least square (OLS) and propensity score matching (PSM) results for the SOECG sample and PSM results for the ALL LISTED sample from 2006 to 2011. Tobin's Q = (market value of equity + book value of liability)/(book value of total assets – intangible assets). ERM is a dummy variable which is set to 1 for the firm-year when and after the first ERM activity was identified and 0 otherwise. SIZE = log (book

value of total assets). GROWTH = (sales at time t – sales at time t-1)/sales at time t-1. NATURE is a dummy variable, which is set to 1 if the firm is state-owned and 0 otherwise. As a robust check, we classify the listed firms based on their ownerships to three categories: SOECG, SOELG and Non-SOEs. SOECG is set to 1 if the firm is owned by the central government and 0 otherwise. SOELG is set to 1 if the firm is owned by local governments and 0 otherwise. Non-SOEs is the omitted group in the regression. LEV = book value of liability/market value of equity. CR is a dummy variable, which is set to 1 if the number of shares held by the largest shareholder is greater than a certain threshold and 0 otherwise. The threshold in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. DIVID is a dummy variable, which is set to 1 for the year when dividends are paid and 0 otherwise. NERI is a variable measuring the financial and economic development of different provinces in China, which is drawn from Fan et al. (2011). MARKETINDEX = log (the closing value of CNI A-share index). FOCUS is the Herfindahl index of income. OPACITY= Intangible assets/Total assets. AUDITRISK is a dummy variable, which is equal to 1 if the firm switched auditor or the audit opinion is modified; 0 otherwise. BIG15 is a dummy variable, which is equal to 1 if the company choose a big 15 auditor and 0 otherwise. All variables except NERI and BIG15 come from the CSMAR database. NERI is from Fan et al. (2011), BIG15 is from “The Chinese Institute of Certified Public Accounts”, http://www.cicpa.org.cn/. Standard errors are heteroskedasticity adjusted and reported in parentheses. *** (**, or *) indicates significance at the 1% (5% or 10%) level.

Table 6: Means of NERI in the EAST and NONEAST Regions

	NONEAST	EAST	DIFFERENCE
SOECG Sample	6.717	9.683	-2.965***
ALL LISTED Sample	6.645	9.945	-3.300***

Notes: This table reports the mean of NERI for the SOECG sample and the ALL LISTED sample according to the location (EAST or NONEAST) in the time period of 2006-2011. The means test is a two-sided t-test. T-stats along with significance level are presented for the differences in mean values *** (**, or *) indicates significance at the 1% (5% or 10%) level. NERI is from Fan et al. (2011).

Table 7: ERM Adoption in the EAST and NONEAST Regions

	EAST	NONEAST	TOTAL
Panel A： Firm-year distribution for the SOECG Sample			
ERM=0	441(33%)	369(29%)	810(62%)
ERM=1	345(26%)	162(12%)	507(38%)
TOTAL	786(59%)	531(41%)	1317(100%)
Panel B: Firm distribution for the SOECG Sample			
ERM=0	47(19%)	44(17%)	91(36%)
ERM=1	105(41%)	58(23%)	163(64%)
TOTAL	152(60%)	102(40%)	254(100%)
Panel C： Firm-year distribution for the ALL LISTED Sample			
ERM=0	3788(56%)	2189(32%)	5977(88%)
ERM=1	544(8%)	261(4%)	805(12%)
TOTAL	4332(64%)	2450(36%)	6782(100%)
Panel D: Firm distribution for the ALL LISTED Sample			
ERM=0	801(53%)	406(27%)	1207(80%)
ERM=1	191(13%)	108(7%)	299(20%)
TOTAL	992(66%)	514(34%)	1506(100%)

Notes: This table reports the sample distribution for the SOECG sample and the ALL LISTED sample according to the location (EAST or NONEAST) in the time period of 2006-2011.

Table 8: PSM Results for the SOECG Sample Partitioned into EAST and NONEAST

VARIABLES	SOECG EAST		SOECG NON-EAST	
	ERM equation	Q equation	ERM equation	Q equation
ERM		0.0589		0.1436**
		(0.0612)		(0.0715)
SIZE	0.2108***	-0.1789***	0.1213**	-0.3462***
	(0.0382)	(0.0215)	(0.0618)	(0.0418)
GROWTH	-0.1283	0.0102	-0.0186	-0.0037
	(0.0859)	(0.0414)	(0.0856)	(0.0553)
LEV	-0.0723	-0.1855***	0.0936	-0.1179***
	(0.0611)	(0.0459)	(0.0615)	(0.0395)
CR	0.4154***	-0.0841	-0.3873***	0.0215
	(0.1066)	(0.0736)	(0.1249)	(0.0759)
DIVID	-0.0826	0.0703	0.1032	0.0275
	(0.1148)	(0.0779)	(0.1339)	(0.0804)
NERI	0.2044***	0.0264	0.1486**	0.0978***
	(0.0442)	(0.0296)	(0.0649)	(0.0375)
MARKETINDEX	0.1338	0.8128***	0.2274	0.9579***
	(0.1386)	(0.0832)	(0.1767)	(0.1154)
FOCUS	-0.3660*	-0.1062	-0.6615***	-0.0794
	(0.2047)	(0.1394)	(0.2473)	(0.1422)
OPACITY	1.2755		1.6015	
	(1.0619)		(1.5673)	
AUDITRISK	-0.0818		-0.0626	
	(0.1347)		(0.1560)	
BIG15	0.5034***		0.5695***	
	(0.1197)		(0.1425)	
CONSTANT	-8.2059***	-0.6164	-5.8407***	1.2988
	(1.3219)	(0.6390)	(1.7777)	(1.0540)
Observations	786	460	531	262
Adjusted R^2		0.403		0.508

Notes: This table reports the propensity score matching (PSM) results for the SOECG sample in the EAST and NONEAST regions from 2006 to 2011. Tobin's Q = (market value of equity + book value of liability)/(book value of total assets – intangible assets). ERM is a dummy variable which is set to 1 for the firm-year when and after the first ERM activity was identified and 0 otherwise. SIZE = log (book value of total assets). GROWTH = (sales at time t – sales at time t-1)/sales at time t-1. LEV = book value of liability/market value of equity. CR is a dummy variable, which is set to 1 if the number of shares held by the largest shareholder is greater than a certain threshold

and 0 otherwise. The threshold in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. DIVID is a dummy variable, which is set to 1 for the year when dividends are paid and 0 otherwise. NERI is a variable measuring the financial and economic development of different provinces in China, which is drawn from Fan et al. (2011). MARKETINDEX = log (the closing value of CNI A-share index). FOCUS is the Herfindahl index of income. OPACITY= Intangible assets/Total assets. AUDITRISK is a dummy variable, which is equal to 1 if the firm switched auditor or the audit opinion is modified; 0 otherwise. BIG15 is a dummy variable, which is equal to 1 if the company choose a big 15 auditor and 0 otherwise. All variables except NERI and BIG15 come from the CSMAR database. NERI is from Fan et al. (2011), BIG15 is from "The Chinese Institute of Certified Public Accounts", http://www.cicpa.org.cn/. Standard errors are heteroskedasticity adjusted and reported in parentheses. *** (**, or *) indicates significance at the 1% (5% or 10%) level.

Table 9: PSM Results for the ALL Listed Sample Partitioned into EAST and NONEAST

VARIABLES	ALL LISTED EAST		ALL LISTED NON-EAST	
	ERM equation	Q equation	ERM equation	Q equation
ERM		0.0738*		0.1552***
		(0.0377)		(0.0520)
SIZE	0.2950***	-0.0951***	0.1151***	-0.1021***
	(0.0261)	(0.0159)	(0.0401)	(0.0292)
GROWTH	0.0608	0.1107*	-0.0233	0.0287
	(0.1043)	(0.0660)	(0.1357)	(0.0925)
NATURE	0.6022***	0.0954*	0.2880***	0.0073
	(0.0687)	(0.0570)	(0.0949)	(0.0902)
LEV	-0.2242***	-0.5963***	0.1931**	-0.7325***
	(0.0598)	(0.0352)	(0.0810)	(0.0530)
CR	0.2686***	-0.0784*	-0.1732**	-0.0273
	(0.0566)	(0.0431)	(0.0754)	(0.0535)
DIVID	-0.1044	-0.0769*	0.1071	-0.0271
	(0.0660)	(0.0464)	(0.0823)	(0.0568)
NERI	0.0503**	0.0046	0.1030***	0.0002
	(0.0239)	(0.0166)	(0.0327)	(0.0245)
MARKETINDEX	-0.0048	0.6703***	0.2747**	0.5862***
	(0.0832)	(0.0535)	(0.1129)	(0.0864)
FOCUS	-0.0604	0.0270	-0.6196***	-0.0599
	(0.1142)	(0.0821)	(0.1523)	(0.1069)
OPACITY	1.0469***		-1.4772**	
	(0.3824)		(0.6458)	
AUDITRISK	0.0512		0.1951*	
	(0.0914)		(0.1155)	
BIG15	0.4233***		0.4088***	
	(0.0582)		(0.0750)	
CONSTANT	-8.7760***	-1.0665**	-6.6668***	-0.0247
	(0.8003)	(0.4677)	(1.0920)	(0.7545)
Observations	4332	994	2450	500
Adjusted R^2		0.434		0.528

Notes: This table reports the propensity score matching (PSM) results for the ALL LISTED sample in the EAST and NONEAST regions from 2006 to 2011. Tobin's Q = (market value of equity + book value of liability)/(book value of total assets – intangible assets). ERM is a dummy variable which is set to 1 for the firm-year when and after the first ERM activity was identified and 0 otherwise. SIZE = log (book value of total assets). GROWTH = (sales at

time t – sales at time t-1)/sales at time t-1. NATURE is a dummy variable, which is set to 1 if the firm is state-owned and 0 otherwise. LEV = book value of liability/market value of equity. CR is a dummy variable, which is set to 1 if the number of shares held by the largest shareholder is greater than a certain threshold and 0 otherwise. The threshold in any given year is defined as the average number of shares held by the largest shareholder across all listed nonfinancial firms in our sample. DIVID is a dummy variable, which is set to 1 for the year when dividends are paid and 0 otherwise. NERI is a variable measuring the financial and economic development of different provinces in China, which is drawn from Fan et al. (2011). MARKETINDEX = log (the closing value of CNI A-share index). FOCUS is the Herfindahl index of income. OPACITY= Intangible assets/Total assets. AUDITRISK is a dummy variable, which is equal to 1 if the firm switched auditor or the audit opinion is modified; 0 otherwise. BIG15 is a dummy variable, which is equal to 1 if the company choose a big 15 auditor and 0 otherwise. All variables except NERI and BIG15 come from the CSMAR database. NERI is from Fan et al. (2011), BIG15 is from "The Chinese Institute of Certified Public Accounts", http://www.cicpa.org.cn/. Standard errors are heteroskedasticity adjusted and reported in parentheses. *** (**, or *) indicates significance at the 1% (5% or 10%) level.