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Document Version

Final published version

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Citation for published version (APA):

Li, Z., Wang, Y., Yu, L., & An, H. (2015). Relationship between initiative risk management and firm value: Evidence from Chinese financial listed companies. *Applied Economics*, 48(8), 658-668.
<https://www.tandfonline.com/doi/abs/10.1080/00036846.2015.1085639?journalCode=raec20>

Published in:

Applied Economics

Citing this paper

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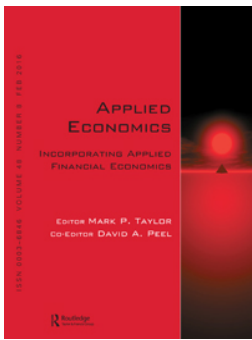
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To cite this article: Zhuwei Li, Yucheng Wang, Lijie Yu & Hui An (2016) Relationship between initiative risk management and firm value: evidence from Chinese financial listed companies, *Applied Economics*, 48:8, 658-668, DOI: [10.1080/00036846.2015.1085639](https://doi.org/10.1080/00036846.2015.1085639)

To link to this article: <https://doi.org/10.1080/00036846.2015.1085639>



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Relationship between initiative risk management and firm value: evidence from Chinese financial listed companies

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ABSTRACT

This study considers 189 Chinese financial listed companies between 2009 and 2013 as research samples to establish indicators for evaluating the initiative risk management behaviour of financial enterprises. This work further examines the relationship between initiative risk management and firm value. Results show that financial enterprises could effectively increase firm value by taking initiative risk management measures, such as setting up departments or positions that specialize in risk management, using financial derivative instruments or engaging popular international accounting firms as audit institutions. Moreover, results reveal that the permeability of initiative risk management has an unstable effect on firm value, that is, a nonlinear relationship exists between the permeability of initiative risk management and firm value.

KEYWORDS

Initiative risk management; firm value; financial enterprises; corporate finance

JEL CLASSIFICATION

G20; G30; G38

1. Introduction

The subprime crisis that started in 2007 among US financial institutions caused panic across global markets and caused a large number of people to realize the incompleteness of financial regulatory systems and the lack of self-risk management awareness in the financial industry. Compared with other enterprises, financial enterprises not only operate but also manage risks. After the subprime crisis, scholars and experts found that traditional passive risk management solutions have certain limitations. Thus, interest in initiative risk management has continued to grow in recent years.

The Chinese government and financial enterprises have become concerned about how Chinese financial listed companies could operate risks while managing self-risks actively under the internationalization development strategy of the financial industry.

The development of the financial industry serves a crucial function in the progress of contemporary economic societies, and financial companies are among the fastest growing enterprises. A widely accepted belief is that the primary objective of an enterprise is to increase firm value to the largest extent. Enterprises usually add firm value by

extending the scale of operation and cutting costs. However, both ways of adding value are associated with uncertain factors, which are collectively referred to as risks. As long as an enterprise aims to raise firm value, risk management should exist in all departments and throughout the operating process, which is an inherent characteristic of current uncertain environments.

Compared with common enterprises, financial enterprises are highly similar to risk collecting and distributing centres. Financial enterprises collect risks from both outside (from clients) and inside (from financial institutions) of enterprises, thereby operating and confronting risks at the same time. Therefore, unlike other enterprises that mainly implement passive risk management solutions, financial enterprises place more emphasis on cultivating self-risk management awareness, taking initiative risk management measures and actively avoiding or transferring various risks that may cause value losses. These characteristics of financial enterprises raise questions on how to take initiatives to face unknown risks and increase firm value for financial enterprises, as well as how to embody the influence of different initiative risk management methods on firm value.

Given this background, this study chooses financial enterprises with relative strong risk management awareness as research subjects, collects related data from 189 Chinese financial listed firms between 2009 and 2013, and observes the effects of initiative risk management measures on firm value. The four measures are the establishment of departments or positions that specialize in risk management, the use of financial derivative instruments, the employment of international professional audit institutions and the permeability of the initiative risk management. We find that initiative risk management activities indeed help to add firm value. Financial enterprises that establish departments or positions that specialize in risk management, use financial derivative instruments or employ one of the big four¹ international accounting firms as an audit institution are more likely to gain larger firm value than that of companies that do not. In addition, some initiative risk management methods have an unstable influence on firm value. For example, the permeability² of initiative risk management is an indicator which shows that a larger proportion of financial derivative of the total assets of an enterprise does not necessarily guarantee greater firm value. A nonlinear relationship exists between the permeability of risk management and firm value.

The remainder of this article is divided into four parts. Section II reviews existing literature on risk management. Section III discusses related conceptions and research assumptions. Section IV presents the empirical analysis and results. Section V is the conclusion.

II. Related literature

In recent years, considerable research has been conducted with a focus on enterprise risk management. To better understand the influence of enterprise risk management on firm value, we explore existing relevant studies from three perspectives, namely the target of risk management, the effectiveness of risk management and the instruments of risk management.

For the first perspective, the target of risk management, we discuss the relevant literatures from two

aspects. One is that most researchers have reached an agreement that the primary target for an enterprise to implement risk management is to maximize firm value, that is, whether an enterprise realizes value maximization could be an important criterion to determine the effectiveness of risk management. Stulz (1996) highlights that firms are financially distressed because of high cost and are thus forced to pass up valuable investment strategies. Risk management provides a form of protection for firms to deal with such adverse possibility. Thus, the primary aim of risk management is to reduce enterprise cash flow volatility and then increase firm value. Curell (2008) points out that risk management enables firms to reach a balance between sales and risks, and guarantee the stakeholders of the firm that the firm value could be maintained or increased.

The other is that from the perspective of strategic risk management, Beasley and Frigo (2007) argue that the target of risk management is to increase the likelihood of an enterprise to achieve its goals on the basis of shareholder risk preference. He therefore concludes that risk management could protect or even add to shareholder interests. Manab, Kassim, and Hussin (2010) believe that the importance of risk management practices to the companies' performances and value creation have encouraged the companies to continuously improve their risk management efforts. By studying the objectives and effects of risk management, Lien and Li (2013) and Bose and Leung (2014) propose that risk management may have protective effects on firm value, but such effects will vary with risk management measures. From the aforementioned literature, we can conclude that a correlation exists between risk management and firm value. However, establishing a consensus on whether risk management could definitely increase firm value is difficult.

Secondly, another key issue that academics are concerned about is the effectiveness of risk management. By considering whether they approve of the optimal market hypothesis, we divide the academics into two groups. The first group takes MM³ theory as a study premise. According to the first group, risk

¹Big four international accounting firms refer to PricewaterhouseCoopers (PWC), Klynveld, Peat, Marwick, & Goerdeler (KPMG), Deloitte & Touche (DTT) and Ernst & Young (EY). In this article, we mainly examine whether Chinese financial listed companies employ one of these accounting firms as an audit institution.

²The permeability is the ratio between financial derivatives and total enterprise assets by value.

³MM denotes Modigliani and Miller.

management is conducted under a perfect environment with no tax, no transaction cost, no information asymmetry and a lending rate that is the same for individuals and enterprises. This group holds that an enterprise is a collection of various projects associated by cash flow and that every enterprise could find and realize its own optimal strategy to maximize firm value under a certain level of risk premium. However, when the pricing of risk changes, enterprises have to improve their asset allocation structure, thus increasing costs. Using different risk management methods flexibly could help enterprises coordinate the combination of risk projects. Therefore, enterprises could save cost, eventually raising firm value and realizing value maximization (Boyer, Boyer, and Garcia 2005). The second group denies the MM hypothesis and believes that risk management is conducted under an imperfect market with tax, transaction cost, information asymmetry and principal-agent cost. This group argues that risk management could mitigate these adverse factors and therefore increase firm value (Froot, Scharfstein, and Stein 1993). A typical empirical study is from the perspective of comprehensive risk management by Hoyt and Liebenberg (2011), who consider the enterprise as a whole (neglecting the influence of specific business). They find that the firm value of enterprises that conduct risk management is, on average, 3.6% higher than the firm value of enterprises that do not. This result is significant both in economic and statistical terms. In summary, risk management significantly influences firm value in either market condition.

Thirdly, risk management instruments are specific tools by which to add firm value. Many studies choose the use of financial derivative instruments as an indicator to evaluate risk management measures. For instance, Panaretou (2014) uses a sample of large UK nonfinancial firms to evaluate the effect of risk management practices. The results show that by now 86.88% firms in total use derivatives to manage various risks and foreign exchange hedge is both statistically and economically significant. Allayannis, Ihrig, and Weston (2001) study nearly 1000 nonfinancial enterprises in the United States between 1990 and 1995 to examine how a financial derivative, that is, foreign exchange future, influences firm value. The

results show that firm value grows at an average of 4.87% because of the hedging function of foreign exchange. Belghitar, Clark, and Judge (2008) conduct an empirical research on the influence of foreign exchange and interest rate on firm value and debt paying capability. After controlling for other hedging instruments, they discover that foreign exchange and interest rate could respectively increase firm value by 72% and 54%. Godfrey, Merrill, and Hansen (2009) assess the link between corporation social responsibility and firm value, discovering that participation in social responsibility activities could increase shareholder interest and firm value. Furthermore, Hoyt and Liebenberg (2011) introduce a new risk management instrument, that is, the chief risk officer (CRO) of the enterprise, to measure the risk management behaviour. Although scholars are continuously exploring new risk management instruments, no clear uniform standard instruments exist for measuring risk management, especially initiative risk management.⁴

In sum, although sufficient research has been conducted on the relationship between risk management and firm value, measures to evaluate risk management, especially initiative risk management, remain lacking. Most researchers study the link between risk management and firm value but failed to categorize risk management measures or only used a single indicator to measure risk management. Hence, the conclusions are not always the same. Compared with existing studies, our analyses take the perspective of initiative risk management, construct multidimensional initiative risk management instruments and systematically investigate whether Chinese financial listed enterprises could implement risk management to improve firm value.

III. Theoretical foundation and assumption

Theory and definition

Value maximization theory⁵ holds that initiative risk management will have direct influence on firm's operating activities. Specifically, it lowers the loss from market volatility and decreases the cost of

⁴Some studies also use risk communication as a research object; see Kallenberg (2007).

⁵Besides value maximization theory, risk management can also increase firm value through three ways: (1) optimize capital allocation (see Tufano 1996); (2) sharpen the strategic decision ability (see Doherty and Smetters 2005); and (3) strengthen the incentive of management and enhance the performance level (see Aggarwal and Simkins 2001).

market friction, followed by the reduction of the volatility of cash flow and improvement of firm's financial situation and business performance. Eventually, firm value is increased.

In this study, we begin to clearly define two main concepts, namely initiative risk management and firm value. From the perspective of the cause of an event, we could divide risk management into initiative risk management and passive risk management. Initiative risk management refers to risk management measures promoted by enterprises themselves according to their current financial position, operating situation and risk condition. For example, enterprises may establish risk management departments to deal with risks professionally or use financial derivative instruments flexibly to hedge against capital market risks. By contrast, passive risk management mainly refers to management measures that are significantly influenced by external factors. This behaviour is based on the supervision of related departments, the rules in laws and regulations or the restraint from moral principles. Therefore, enterprises conduct these risk management activities passively. For example, companies have to set aside a risk-reserve fund and satisfy the capital adequacy requirement of banks. Passively accepting regulations from related departments is the foundation for ensuring the normal operation of an enterprise. Meanwhile, transforming passivity into initiative, taking risk management measures actively and working aggressively to combat risks are the only ways to reduce the possibility for an enterprise to face losses effectively.

Risk management guidelines (AS/NZS 4360) issued by Australia and New Zealand jointly in 2004 are the first risk management rule in the world. These guidelines put forward seven elements of risk management: communication and consultation, establishing risk management environment, risk identification, risk analysis, risk assessment, risk treatment, and monitoring and review.

In light of the seven elements in the guidelines, this study sets up four indicators, namely the establishment of specialized risk management departments, the use of financial derivative instruments, the employment of international famous auditing institutions and the permeability of the initiative risk management, to evaluate initiative risk management activities.

The economic description of firm value is the discounted value of the future expected cash flow of an enterprise. Firm value is closely related to risk management, not only reflecting that firm assets have time value, but also illustrating that firm assets will change along with the types of risk. The most common method uses the Tobin's Q value (Tobin's Q) to measure firm value (McConnell and Servaes 1990). For example, Smithson and Simkins (2005) use Tobin's Q to measure firm value when studying the effectiveness of financial risk management. Other scholars adopt total market value to represent firm value. For instance, Callahan (2002) employs the price fluctuations of enterprise stocks in studying risk management in mineral enterprises. In this study, we use Tobin's Q to measure firm value.

Assumption

On the basis of the value maximization theory and existing studies, this article integrates concrete initiative risk management measures that Chinese financial enterprises use with the aim of identifying how firm value is influenced by four initiative risk management solutions. The specific assumptions are as follows:

Assumption 1: *Enterprises that set-up specialized risk management departments or positions have larger firm value than those that do not. Thus, a positive correlation exists between the establishment of departments or positions specializing in risk management and firm value.*

This assumption refers to the study of Hoyt and Liebenberg (2011), who adopt CRO as an indicator to measure initiative risk management behaviour and assume that enterprises that set-up CRO have a higher level of risk management than those that do not. This measure is relatively reasonable because enterprises that set-up CRO usually place great importance on risk management. Hoyt and Liebenberg (2011) document CRO could integrate risks together and use a consistent approach to manage risks. Accordingly, this article further considers two aspects, namely the establishment of risk management departments and the establishment of the leadership of risk management like CRO, as

aggregative indicators to measure the establishment of risk management departments.

Assumption 2: *Enterprises that use financial derivatives have higher firm value than those that do not. A positive correlation thus exists between the use of financial derivatives and firm value.*

At the early stage, enterprises buy insurance to transfer risks of their assets. After the 1970s, as the operating environment became increasingly complex and fierce, enterprises began to face more noninsurable risks. Thus, single insurance products have failed to meet the need of enterprises to conduct risk management. An increasing number of enterprises have turned to the use of financial derivative instruments as a control method of risk management (Allayannis, Ihrig, and Weston 2001). The purpose of this initiative risk management is to cover the deficit in the spot market by making profits in derivative markets. Therefore, enterprises could avoid or reduce the losses and transfer or spread the risk caused by price fluctuation.

Assumption 3: *Enterprises that hire one of the big four international accounting firms as an auditing institution have higher firm value than those that do not. A positive correlation thus exists between the employment of international big four accounting firms and firm value.*

The big four international accounting firms are associated with firm value for several reasons. First, these professional institutions could provide high-quality auditing service. For financial listed companies, choosing one of these four professional institutions could add credibility to information disclosure, help recognize finance risks in time, and reduce principal-agent cost effectively. Thereby, the firm value of the enterprises grows. Furthermore, auditing costs are relatively high in these four professional institutions, and such high costs could reveal the operating condition of the enterprise to some extent.

Assumption 4: *A high degree of permeability of initiative risk management does not necessarily add firm value, which implies that a nonlinear relationship may exist between the permeability of initiative risk management and firm value.*

Various risk management strategies influence firm value, and the permeability of risk management is likewise important. The implementation of initiative risk management will pervade throughout enterprise management and operational activities. However, given that initiative risk management has inherent risks, a high degree of permeability does not guarantee large firm value. Different enterprises may have different reasonable scopes of permeability. Hence, a nonlinear relationship should exist between the permeability of initiative risk management and firm value. Since the total enterprise assets are important indicators for evaluating enterprise operation conditions, this article chooses the weight of financial derivative positions in total enterprise assets to reflect the permeability of initiative risk management.

IV. Empirical studies

Sample selection and data source

This study considers financial enterprises with relatively strong risk management awareness as research subjects and takes financial listed companies in Shanghai stock exchange and Shenzhen stock exchange⁶ as research samples. The sample period is from 2009 to 2013. After selection, we obtained 189 research samples⁷: 30 in 2009, 38 in 2010, 42 in 2011, 43 in 2012 and 36 in 2013. The established indicators of initiative risk management come from the websites, corporate annual reports and related firm reports. Controlled variables and other data come from two financial analysis databases called CSMAR and Resset.⁸

Variables and model

Variables

This study sets up the following variables for empirical analyses (see Table 1): we consider one

⁶Shanghai Stock Exchange and Shenzhen Stock Exchange are the only two Stock Exchanges in the Chinese mainland, where Taiwan, Hong Kong and Macao are not included.

⁷This sample size satisfies the test requirements in econometrics.

⁸CSMAR and Resset are two professional analysis databases in the field of finance in China.

Table 1. Variables and measurement.

Variable type	Variable name	Code	Measurement
Dependent variable	Firm value	VAL	Tobin's Q value = market value of asset/ replacement value of asset, where market value = market value of equity + market value of net liabilities
Independent variable	The establishment of specialized risk management department	RMDP	Establish specialized risk management department or CRO position is 1; otherwise, 0
	The use of financial derivative instruments	FD	Use financial derivative instruments is 1; otherwise, 0
	The employment of auditing institution	BIG4	Employ one of international big four accounting firms is 1; otherwise, 0
	The permeability of risk management	PER	The ratio between financial derivatives and total enterprise assets
Controlled variable	Shareholding structure	TOP	Proportion of the largest shareholder
	The size of the firm	SIZE	The logarithm of terminal total asset
	Return on asset	ROA	Profit ratio of total asset = net profit/total asset
	The structure of the board of directors	BOR	The proportion of independent directors
	Financial leverage	LEV	Book value of terminal total asset/book value of liabilities
	Annual dummy variable	YEAR	Set four dummy variables based on 2009

dependent variable, that is, firm value; four independent variables, such as the establishment of specialized risk management department, the use of financial derivative instruments, the employment of auditing institution and the permeability of risk management, are used to measure the behaviour of initiative risk management; and we establish six variables to control the effects of relative factors, such as the shareholding structure, the size of the firm, the return on asset, the structure of the board of directors, the financial leverage and the year of sample period.

Model

Based on the characteristics of our data⁹ and the methodology of econometrics, we use multiple linear regression analysis in this study which is one of the most popular and widely used in the field of traditional and modern corporate finance.

To investigate how firm value is affected by the four types of initiative risk management behaviour, we establish model (1) and model (2) as follows:

$$\text{VAL} = \alpha + \beta_1 \times \text{RMDP} + \beta_2 \times \text{FD} + \beta_3 \times \text{BIG4} + \beta_4 \times \text{PER} + \gamma \text{Control} + \varepsilon \quad (1)$$

$$\text{VAL} = \alpha' + \beta'_1 \times \text{RMDP} + \beta'_2 \times \text{FD} + \beta'_3 \times \text{BIG4} + \beta'_4 \times \text{PER} + \beta'_5 \times \text{PER} \times \text{PER} + \gamma' \text{Control} + \varepsilon \quad (2)$$

where α and α' are the intercept terms, and $\beta_1 - \beta_4$, $\beta'_1 - \beta'_5$, γ , γ' are the regression coefficients. Control contains all controlled variables.

We adopt the weighted least-square (WLS) method to conduct tests. When the coefficient of the independent variable, RMDP, is positive and passes the significance test, Assumption 1 is verified. When the coefficient of the independent variable, FD, is positive and passes the significance test, Assumption 2 is verified. When the coefficient of the independent variable, BIG4, is positive and passes the significance test, Assumption 3 is verified. When the coefficient of the independent variable, PER, does not pass the significant test, we add the quadratic term, PER*PER (see model 2). If the coefficient of the quadratic term, β'_5 , is significant, Assumption 4 is verified.

Empirical analysis

Descriptive statistics

From the results of the descriptive statistics in Table 2, we find that the mean value of RMDP is 0.98, which indicates that most financial listed enterprises have already set-up a department or position specializing in risk management and have placed great importance to risk management. The mean value of FD and BIG4 is approximately 0.5, which implies that nearly half of the financial listed companies use financial derivative instruments or hire one of the big four international accounting firms. Meanwhile, the mean value of PER is 0.001, which indicates that initiative risk management does not widely pervade total enterprise assets. These indicators reflect the general situation of initiative risk management in financial enterprises. Other factors

⁹The cross-sectional data are mixed by different years together.

Table 2. Descriptive statistics of variables.

Variables	Minimum	Maximum	Mean value	25% quantile	Median	75% quantile	SD
VAL	0.82	9.04	1.37	1.00	1.08	1.32	0.97
RMDP	0.00	1.00	0.98	1.00	1.00	1.00	0.13
FD	0.00	1.00	0.51	0.00	1.00	1.00	0.50
BIG4	0.00	1.00	0.55	0.00	1.00	1.00	0.50
PER	0.000	0.020	0.001	0.000	0.001	0.003	0.002
TOP	0.06	0.68	0.30	0.18	0.26	0.40	0.17
SIZE	8.84	13.28	11.32	10.39	11.23	12.32	1.16
ROA	-0.01	0.65	0.03	0.01	0.01	0.03	0.05
BOR	6.25	62.50	32.12	26.58	33.33	38.46	9.87
LEV	1.04	38.55	1.91	1.07	1.21	1.74	3.35

Notes: BOR is a percentage value. ROA is denoted as a decimal number, but as a percentage number in regression analysis. For the other units of variables, refer to the measurement in Table 1.

show the special characteristics of financial enterprise. For instance, the mean value of LEV is 1.07, which means there is a much higher financial leverage in financial enterprise than that in common enterprise.

Empirical results

First, this study conducts correlation tests between variables. The results (see Table 3) show that the relativity among all variables is not significant. Thus, no multicollinearity problem exists.¹⁰ We then perform stepwise regressions, conduct six multiple regressions on the basis of model (1) and model (2),¹¹ and apply one-tailed tests to coefficients to verify the validity of Assumptions 1–4. Table 4 provides the results (based on model (2)) of stepwise regressions relative to the effects of initiative risk management on firm value.

Basing from the test results, we perform the following analyses on independent variables:

- (1) The establishment of a department or position specializing in risk management will increase the firm value of financial enterprises. After controlling for the structure of

equity, the return on asset, the structure of the board of directors and year, we find that the indicator, RMDP, passes the significant tests at the 5%, 10% and 10% levels of significance and has a positive coefficient (see the first, fifth and sixth columns of Table 4). This result shows that this kind of risk management has positive effects on a firm and that a higher level of enterprise risk management (establishment of a specialized risk management department or position) facilitates a larger firm value. Hence, initiative risk management activities, such as setting up a specialized risk management department or positions, are effective to the growth of the firm value and beneficial to the healthy development of enterprises. These results agree with Assumption 1.

- (2) The use of financial derivative instruments could raise the firm value of financial enterprises. The indicator, FD, passes the significant tests at the 1%, 5% and 1% levels of significance and has a positive coefficient (see the second, fifth and sixth columns of

Table 3. Results of correlation tests.

Variables	VAL	CRO	FD	BIG4	PER	TOP	SIZE	ROA	BOR	LEV
VAL	1.00									
RMDP	0.04	1.00								
FD	-0.28	0.13	1.00							
BIG4	-0.30	0.14	0.64	1.00						
PER	-0.02	0.01	0.08	0.06	1.00					
TOP	0.01	0.07	-0.05	0.13	0.00	1.00				
SIZE	-0.16	0.07	0.48	0.46	-0.01	0.36	1.00			
ROA	0.28	-0.48	-0.26	-0.27	-0.01	-0.07	-0.16	1.00		
BOR	-0.06	-0.15	-0.29	-0.25	0.04	-0.21	-0.54	0.05	1.00	
LEV	0.05	-0.47	-0.23	-0.24	-0.01	-0.12	-0.13	0.09	0.23	1.00

¹⁰We also use White tests for the heteroscedasticity, and we use WLS to eliminate heteroscedasticity.

¹¹We find that PER does not pass the significant test by 90% probability in model (1), so we use model (2) to do the stepwise regressions again (see Table 4).

Table 4. Results of stepwise regressions.

Independent variables	Dependent variable: firm value (VAL)					
	1	2	3	4	5	6
RMDP	1.757** (2.82)				1.485* (1.59)	1.484* (1.62)
FD		0.761*** (26.07)			0.657** (2.69)	0.661*** (12.54)
BIG4			0.645*** (14.54)		0.523** (2.79)	0.526** (2.73)
PER				11.827 (1.02)		-10.470 (-1.17)
PER*PER				-0.524* (-2.12)		-0.377* (-2.68)
TOP	0.188 (0.14)	0.421 (0.16)	0.623 (0.49)	0.458 (0.08)	0.333 (0.33)	0.330 (0.21)
SIZE	-0.316*** (-12.33)	-0.453*** (-8.39)	-0.431*** (-13.49)	-0.334*** (-12.98)	-0.500*** (-13.19)	-0.501*** (-12.09)
ROA	3.199* (1.56)	0.411 (1.11)	0.666* (1.95)	1.030** (3.29)	2.032** (3.32)	2.028** (3.17)
BOR	-0.043*** (-10.37)	-0.047*** (-26.08)	-0.049*** (-39.28)	-0.046*** (-9.29)	-0.048*** (-39.34)	-0.047*** (-39.24)
LEV	0.003 (-1.15)	-0.030 (-0.47)	-0.027 (-1.24)	-0.036 (-1.24)	-0.013 (-0.86)	-0.003 (-1.17)
Constant term	8.981** (3.11)	14.014** (3.61)	13.629** (4.81)	11.381*** (15.07)	13.449*** (9.20)	13.472*** (9.04)
YEAR	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Adjusted R ²	0.337	0.354	0.347	0.323	0.374	0.371
p-Value	0	0	0	0	0	0
Sample number	189	189	189	189	189	189

Notes: The numbers in parentheses are *t*-values.

*, ** and *** respectively represent the significance of variables under 10%, 5% and 1% levels of significance (one-tailed test).

Table 4), which indicates that actively using a financial derivative could raise firm value. This result supports the study by Allayannis, Ihrig, and Weston (2001) and agrees with Assumption 2.

- (3) Hiring one of the international big four accounting firms as a firm audit institution helps add firm value. The indicator, BIG4, passes the significant tests at the 1%, 5% and 5% levels of significance and has a positive coefficient (see the third, fifth and sixth columns in Table 4), which proves that hiring one of the international big four accounting firms could provide high-quality auditing service and eventually increase firm value. This result corresponds to Assumption 3.
- (4) A high degree of risk management permeability is not necessarily beneficial to firm value because a nonlinear relationship exists between these factors. Table 4 shows that the indicator, PER, does not pass the significant tests and that the sign of its coefficient is uncertain (see the fourth and sixth columns of Table 4), which suggests that PER could

increase firm value but could also decrease it. After adding the quadratic term, PER*PER, we find that the coefficient of the quadratic term is significantly negative at the 10% level of significance. This finding verifies the non-linear relationship (inverted U-shape) between the ratio of financial derivatives and an enterprise's total assets and firm value, thereby suggesting that a reasonable interval of permeability may exist and thus requires further study. This result agrees with Assumption 4.

In addition, we have the following analyses of the regression results of the controlled variables:

- (1) The coefficient of TOP is positive, but not significant, which indicates that no significant correlation exists between the proportion of the largest shareholder and firm value.
- (2) A negative correlation exists between SIZE and firm value, which are significant at the 1% level. This finding supports the conclusions of many existing literatures¹² and proves that a larger firm size leads to a lower firm value. Taking Chinese listed banks in stock

¹²See Said, Larry, and Tarek (1998), Kaiser (2014) and so on.

market as examples, China's four¹³ big state-owned listed commercial banks have the lowest valuations (the average *P/E* ratio¹⁴ is lower than 6), whereas the smallest urban commercial banks have the highest valuations (the average *P/E* ratio is higher than 9) throughout the sample period.

- (3) The coefficient of ROA is positive and basically passes the *t*-test, thereby indicating that the return on asset has a positive effect on firm value.
- (4) Although a significant correlation exists between BOR and firm value, the coefficient of this indicator is extremely small (less than 0.05). This observation demonstrates that the structure of the board of directors has a negligible contribution to firm value.
- (5) The coefficients of LEV failed to pass the significant tests. Thus, no significant correlation exists between the financial leverage and firm value.

Table 4 further shows that the adjusted R^2 is approximately 0.3, which is on a general level of the adjusted R^2 value in the regression tests in the field of corporate finance. Other factors, such as enterprise reputation, government regulation, market and legal environment, and operating capability, may also influence firm value.

Robust test

Different methods can be used to conduct a robust test. These methods include replacing variables, changing samples, using an alternative method and so on. In this article, we choose the method of replacing variables. In particular, we replace ROA with ROE¹⁵ and then perform the regression tests again. The results are shown in Table 5.

Compared with the results shown in Table 4, the coefficient of RMDP remains significantly positive and the level of significance has improved from 10% to 1%. The coefficient of FD slightly declines but remains significantly positive. The coefficient of BIG4 is positive and remains at the 5% level of significance. The coefficient of PER is not

Table 5. Results of the robust test.

Variables	Coefficient	SD	t-Value	p-Value
Constant term	13.12***	2.10	6.26	0.00
RMDP	2.44***	0.89	2.94	0.01
FD	0.55**	0.28	1.95	0.05
BIG4	0.53**	0.26	2.03	0.04
PER	1.66	59.10	0.03	0.98
PER*PER	-0.63*	1.39	1.88	0.09
TOP	0.31	2.31	0.13	0.89
SIZE	-0.54***	0.06	-8.44	0.00
ROE	0.24***	0.01	3.02	0.00
BOR	0.04***	0.01	4.54	0.00
LEV	0.01	0.03	0.04	0.97

Notes: The robust test has already controlled the year. *, ** and *** respectively represent the significance of variables at the 10%, 5% and 1% levels of significance (one-tailed test).

significant, but the coefficient of PER*PER is significantly negative at the 10% level of significance. Therefore, the robust test shows that after replacing ROA with ROE the test results in Table 5 are almost similar to those in Table 4, which indicates that our conclusions are stable and believable.

V. Conclusions

Risk management has significant implications in improving financial enterprise's value and realizing sustainable development.¹⁶ The study takes 189 Chinese financial listed companies during 2009 and 2013 as the research samples, adopts the WLS method and examines the effects of initiative risk management on firm value. The results show that initiative risk management indeed has a positive influence on firm value. For instance, financial enterprises that establish a specialized risk management department or position, use financial derivative instruments or hire one of the international big four accounting firms as an audit institution are more likely to gain larger firm value than those that do not. Furthermore, some risk management activities have a nonlinear effect on the increase in firm value. Taking the permeability of risk management as an example, a high degree of permeability does not necessarily add firm value because this factor may reduce firm value as well. A reasonable interval of the permeability of initiative risk management may exist.

¹³The four big nationalized listed commercial banks in china are Industrial and Commercial Bank of China (ICBC), Agricultural Bank of China (ABC), Bank of China (BOC) and China Construction Bank (CCB).

¹⁴*P/E* ration = price/earning.

¹⁵ROE is the rate of return on common stockholders' equity. ROE = net profit/owners' equity. It represents enterprise's earning ability.

¹⁶Our main conclusions that the initiative risk management could increase firm value approve the viewpoints of value maximization theory.

Hence, aside from considering finance management and interior governance, financial enterprises should think more from the perspective of risk management when formulating strategies to increase firm value. Apart from passively accepting the regulations from financial institution regulatory administrations, such as satisfying the requirement of risk reserve, financial enterprises should transform passivity into initiative, take risk management measures actively and use diversified initiative risk management measures to increase firm value effectively. For example, a company can set-up CRO or other risk management-related departments, hire accounting firms that could provide high-quality professional auditing service or use financial derivative instruments reasonably. Admittedly, the Chinese financial derivative market remains in the starting stage. Thus, identifying how to make better use of derivative instruments to avoid risk, reduce transaction cost and specify reasonable intervals of permeability are worth further investigation.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

We appreciate the financial support of the Fundamental Research Funds for the Central Universities of China [grant number DUT15RC (4) 05]; National Social Science Foundation [grant number 11CJY100]; Postdoctoral Science Foundation of China [grant number 2013M541215]; General project of Scientific Research of the Education Department in Liaoning [grant number L2015112]; Project of Economic and Social Development in Liaoning [grant number 2015lslktzjijx-11]; Humanity and Social Science Youth foundation of Ministry of Education of China [grant number 15YJC790051].

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