IMPACT OF RISK MANAGEMENT ON THE VALUE AND PERFORMANCE

Empirical Research Based on the Use of Derivative Financial Instruments

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JIMEI SHEN
20160756

Abstract

This paper takes China's non-financial industry listed companies as the research object, and studies the effect of the company's use of derivative financial instruments on risk management on the company's value and performance. The results show that the nature of the impact of derivative financial instruments on company value and performance is different. The use of derivative financial instruments for risk management by listed companies may have a positive effect on the company's performance improvement, but it has not been recognized by investors and may have a weak negative effect on company value, but all impacts are not significant.

Keywords: derivative financial instruments, risk management, company value, company performance

1 Introduction

Early enterprises purchased insurance to transfer the risk of property. After the 1970s, enterprises faced an increasingly complicated business environment, with more and more uninsured risks, the main way of corporate risk management was transformed into derivative financial instruments (Brealey et al,, 2012) [1]. The most concerned issue in academia and practice is whether the use of derivative financial instruments for risk management can enhance the company's performance and value.

Table 1-1 shows that some financial derivatives transactions have brought huge loss to enterprises or financial institutions since the 1990s. These events are just the tip of the iceberg. Therefore, some scholars and theorists call for: "The rapid development of financial derivatives should be limited to avoid more catastrophic events."

Table 1-1 Loss Triggered by Financial Derivatives Transactions

Subjects	Year	Loss ($ billion)
Metallgesellschaft A.G.	1993	13
Orange County Investment Pool	1994	15
Barings Bank	1995	14
Allied Irish Bank	2002	6.91
China Shaoxing Textile Enterprise	2003	2.37
China Aviation Oil Co., Ltd.	2004	5.5
Societe Generale	2008	71
CITIC Limited	2008	147

The shareholder wealth maximization theory and the management utility maximization theory are inconsistent on this issue. The theory of shareholder wealth maximization believes that the company's use of derivative financial instruments for risk management will have a direct impact on the company's operations. It will change the company's cash flow and affect the company's financial status and policies by reducing market friction costs, ultimately reducing the volatility of the company's operating performance and improving company value. The management utility maximization theory believes that although the use of derivative financial instruments for risk management can increase the company's value by reducing the market friction cost, it will also have a negative impact

on the company's value due to the agency problem caused by the management's pursuit of maximizing its own utility. Therefore, its impact on the value of the company will depend on the trade-offs between the two and may not necessarily have a positive impact. Therefore, it is necessary to explore the relationship between risk management and company value and performance.

2 Related Work

Empirical research on the impact of participation in the derivative financial instrument market on corporate value and performance has focused on foreign countries. Allayannis and Weston (2001) first provided evidence of the relationship between company value and risk management [2]. They surveyed 720 large US non-financial companies with assets totaling more than 500 million in different industries between 1990 and 1995, examined the impact of foreign exchange derivatives hedging on company value (Tobin's Q), and found foreign exchange hedging and company value are positively correlated, and hedging can increase the value of the company by an average of 4.87%. Eiteman (2010) found Hedging will increase value only if benefits are sufficient to cover the costs of hedging[3]. Tessema (2016) reported derivative instruments and hedging activities can help the firm to mitigate potential risks of cash and earnings volatility [4].

Many scholars have the opposite opinion. Guay and Kothari (2003) study concluded that the use of corporate derivatives is too small to explain the value rewards of Allaanninis and Weston (2001) [5]. The positive correlation between derivatives and company value is more of a trend for successful companies to use derivatives. The reflection. Guay and Kothari (2003) argue that risk management, such as exchange rate and interest rate risk management, is a small risk, and managing such a small risk has little impact on the value of the firm, so its premium is not significant. Jin and Jorion (2006) used a sample of 119 US oil and gas production companies in 1998-2001 to study the impact of hedging transactions on company value and found that hedging was negatively correlated with the systemic risk BETA of oil and gas producers. Hedging reduces the sensitivity of the company's stock price to oil and gas prices, while in the oil and gas industry, hedging does not affect company value [6].

This paper attempts to use Chinese non-financial listed companies as research objects to study the impact of the company's use of derivative financial instruments for risk management on company value and performance.

3 Experimental Design

3.1 Sample Selection

This paper use all of A share listed companies in Shanghai and Shenzhen Stock Exchanges as the initial sample. In order to achieve the research objectives, the following screening procedures were implemented: the financial industry is a provider of certain derivative financial instruments, which is quite different from other industries, and these companies are excluded. ST companies have poorer performance and financial status, and there is a strong incentive to manipulate the accounting surplus for the next year, so ST companies are excluded. After the above screening, the final sample company is 3384.

Data is from Wind.

3.2 Variable Definition and Description

This paper selects risk management and company value, performance and related control variables, as defined and described in Table 3-1.

(1) The explained variable. There are two categories: one is the company value variable Tobin's Q. The other is the company's performance variables. This paper selects return on net equity, net asset value, earnings per share, cash flow from operating activities, net sales ratio to reflect the company's operating performance.

(2) Explanatory variable. Explanatory variable is a variable describing the uses of derivative financial instruments for risk management.

(3) Control variables. In order to isolate the impact of risk management on the performance and value of the company using derivative financial instruments, the impact of other factors needs to be excluded. The empirical research results of domestic and foreign literatures show that the company's scale, capital structure, company growth and asset structure have a significant impact on the company's value. Therefore, the above variables are introduced as control variables.

First, the Invisible of the company. It is generally believed that larger companies are in a more mature stage of their life cycle, with less room for growth and thus lower market value. Many foreign literatures have carried out empirical research on the relationship between company Invisible and company value, and found that small enterprises have higher returns, and there is a significant negative correlation between company Invisible and company value. Domestic empirical research also shows that asset Invisible is negatively correlated with company value. The Invisible of the company is expressed in terms of the total assets at the end of the accounting period of the listed company and is used to control the impact of scale factors on the company's performance and value.

Second, the capital structure. Reasonable capital structure arrangement has a non-negligible impact on the company's financial security, performance and external evaluation of its value. Liabilities can help reduce the agency problem between shareholders and management and increase the value of the company; but as the debt ratio increases, the possibility of the company facing financial difficulties gradually increases, which has a negative impact on the company's performance. This suggests that the direction of the impact of debt ratio on company value is uncertain. This paper uses the asset-liability ratio to represent the company's debt financing level, which is used to control the impact of capital structure on company performance and value.

Third, the company's growth. It is generally believed that companies with faster market expansion have higher market value and the expected symbol is positive. This paper selects the growth rate of the main business income to measure the growth of the company, which is defined as the fourth and last year of the company's main business.

Last but not least, Asset composition refers to the proportional relationship between long-term assets and current assets. The composition of fixed costs and variable costs of different assets constitutes different enterprises, which in turn determines the Invisible of the business risks of the company and ultimately affects the company's industry and value. Therefore, this paper adds the proportion of fixed assets and the proportion of intangible assets as a control variable of asset composition.

Table 3-1 Research Variables Description

Research Variable		Symbol	Definition and Description
Explained Variable	Company Performance	ROE	Return on net equity= net profit / current period weighted shareholders' equity
		ROA	Net asset interest rate = net profit / average total assets, average total assets = (initial total assets + total assets at the end of the period) / 2
		ROS	Net sales margin = net profit / main business income
		EPS	Earnings per share = net profit / number of end-of-term common share
		CPS	Net operating cash flow per share = net operating cash flow / end-of-term common stock
	Company Value	Tobin's Q	Q= (liabilities + total Market Value of Stocks)/Assets, the market value of stocks is calculated as follows: (1) only A shares, A share price * circulating A shares + net assets per share * non-circulating stocks; (2) only B shares, B share price * B share * exchange rate + net assets per share * non-circulating stocks; both A shares and B shares, A share price * circulating A shares + B share price * exchange rate * net assets per share * non-circulating stocks; (3) both A shares and B share prices * circulating A shares * circulating A shares * B shares * exchange rate * net assets per share; (4) there are H shares, A shares price * circulating A shares + H shares price * H shares * exchange rate * net assets per share * non-circulating shares.
Explanatory Variable	Risk Management	RM	Whether a company uses derivative financial instruments for risk management virtual variables, when the company uses derivative financial instruments for risk management, the value is 1, otherwise the value is 0.

Table 3-1 Research Variables Description (*continued*)

Research Variable		Symbol	Definition and Description
Control Variable	Company Scale	Invisible	The amount of total assets at the end of the period
	Capital Structure	Leverage	Asset-liability ratio = total liabilities / total assets
	Company Growth	Growth	Increase rate of main business income = current main business income / last year's same period main business income - 1
	Asset composition	Fixed	Fixed assets ratio = net fixed assets / total assets
		Invisible	Intangible assets ratio = net intangible assets / total assets

3.3 Model Setting

In order to quantitatively examine the degree of impact of risk management and related variables on company value and performance, according to the above analysis, this article uses OLS regression analysis to test the relationship between listed companies' use of derivative financial instruments for risk management and company value and performance:

$$\begin{aligned} \text{VALUE} = \beta_0 + \beta_1 \times RM + \beta_2 \times Size + \beta_3 \times Lerverage + \\ \beta_4 \times Growth + \beta_5 \times Fixed + \beta_6 \times Invisible + \mu \end{aligned} \quad (3\text{-}1)$$

where this study uses Tobin's Q as the company's value indicator. performance indicators. Performance indicators are based on the return on net assets, net asset interest rate, net profit margin, earnings per share and cash flow from operating activities. RM is a dummy variable of the company's risk management. When the enterprise uses derivative financial instruments for risk management, the value is 1; otherwise, the value is 0; Leverage is the asset-liability ratio; Invisible is the ending amount of the total assets; and Growth is the main business income growth rate; Fixed is the ratio of fixed assets; Invisible is the proportion of intangible assets; β_0 is the intercept, from β_1 to β_6 is the coefficient, and μ is the residual. This article uses whether β_1 is significantly less than zero to investigate whether the use of derivatives for risk management has an impact on company value. According to relevant theoretical analysis, if listed companies use derivative financial instruments for risk management can enhance the company's value, then $\beta_1 > 0$. Therefore, by examining the significance of the coefficient, it can be verified whether the use of derivative financial instruments for risk management can enhance the company's value.

4 Empirical Results

4.1 Descriptive Statistics

Descriptive statistics showing the company's performance and value for all sample companies. It can be seen that the average return on net equity of the sample company is 9.125%, and the maximum value is 188.298%, and the minimum value is -254.911%, indicating that there is a big gap between the companies; from other indicators, the gap between the sample companies It is also large, which also makes it easy to examine the impact of the company's decision-making on the use of derivative financial instruments for risk management on company value and performance.

Table 4-1 Descriptive Statistics on Company Value and Performance

Index	Count	Mean	Std	Minimum	25%	50%	75%	maximum
ROE	3384	9.125	14.039	-254.911	4.189	8.567	13.558	188.298
ROA	3384	5.484	6.24	-72.546	2.212	4.744	8.253	49.641
ROS	3384	9.415	25.632	-815.641	3.755	8.54	15.175	412.653
EPS	3383	0.479	0.714	-3.482	0.13	0.331	0.65	21.56
CPS	3384	0.367	1.122	-15.301	0.011	0.266	0.67	17.635
Q	3384	2.698	2.182	0.053	1.478	2.159	3.286	44.384

4.2 Single Factor Test

In this paper, the parametric (T-test) and non-parametric (Mann-Whitney test) methods are used to compare the risk management company with other companies for a series of characteristic variables to determine whether it is significantly different from other companies in some respects.

Table 4-2 Parametric and Non-parametric Test sig. Results

Index	Parametric	Non-parametric
ROE	0.760	0.425
ROA	0.538	0.042
ROS	0.483	0.000
EPS	0.518	0.181
CPS	0.000	0.049
Q	0.003	0.000

From Table 4-2 we can conclude that the use of derivative financial instruments significantly impacts CPS and Q in both parametric and non- parametric methods. However, in non- parametric method ROA, ROS are impacted by RM while in parametric method draws inconsistent result.

4.3 Regression Analysis

This paper use python 3.6 as environment to fit the curve. First, divide the dataset into train set and test set with a test Invisible of 0.3. Then, fit the model as Table 4-3 shows:

Table 4-3 Regression Analysis

dependent	Independent	coefficient	std. error	t	sig.
Tobin's Q	constant	4.400026	0.092199	47.72302	0.000
	RM	-0.22498	0.219671	-1.02416	0.3058314
	Size	-1.4E-12	4.71E-13	-3.04595	0.0023374
	Leverage	-0.03352	0.001809	-18.5273	4.636E-73
	Growth	0.000702	0.000177	3.95821	7.707E-05
	Fixed	-1.54115	0.22485	-6.85412	8.495E-12
	Invisible	-0.87564	0.614294	-1.42544	0.1541221
ROE	constant	11.6602	0.630724	18.48702	9.144E-73
	RM	2.242939	1.502742	1.492564	0.1356449
	Size	6.81E-12	3.22E-12	2.111908	0.0347676
	Leverage	-0.05786	0.012376	-4.67557	3.046E-06
	Growth	0.002325	0.001214	1.915639	0.0554955
	Fixed	0.503028	1.53817	0.32703	0.7436653
	Invisible	-11.9653	4.202311	-2.8473	0.0044358
ROA	constant	10.48039	0.262531	39.92058	8.5E-286
	RM	1.125505	0.625499	1.799372	0.0720491
	Size	1.86E-12	1.34E-12	1.389095	0.1648954
	Leverage	-0.11268	0.005151	-21.8744	2.63E-99
	Growth	0.00103	0.000505	2.037873	0.0416405
	Fixed	-1.2696	0.640245	-1.98299	0.0474492
	Invisible	-6.36183	1.749162	-3.63707	0.0002799
ROS	constant	21.29714	1.131651	18.81954	3.252E-75
	RM	2.542452	2.696235	0.942964	0.3457669
	Size	1.17E-11	5.79E-12	2.016686	0.0438073
	Leverage	-0.26806	0.022205	-12.0719	7.007E-33
	Growth	0.003666	0.002178	1.683148	0.0924389
	Fixed	-2.9349	2.759799	-1.06345	0.2876558
	Invisible	-18.804	7.539828	-2.49396	0.0126803
EPS	constant	0.714485	0.031823	22.45178	3.65E-104
	RM	0.10423	0.075789	1.375253	0.1691443
	Size	9.91E-13	1.63E-13	6.091525	1.244E-09
	Leverage	-0.00438	0.000624	-7.01512	2.764E-12
	Growth	2.95E-05	6.12E-05	0.482349	0.6295892
	Fixed	-0.26804	0.077589	-3.4546	0.0005579
	Invisible	-0.56758	0.211945	-2.67798	0.0074427
CPS	constant	0.246046	0.049132	5.007901	5.785E-07
	RM	0.069011	0.117059	0.589542	0.555537
	Size	1.51E-12	2.51E-13	5.995149	2.247E-09
	Leverage	-0.00557	0.000964	-5.77956	8.17E-09
	Growth	-6.6E-05	9.46E-05	-0.69323	0.488212
	Fixed	1.418136	0.119819	11.83566	1.072E-31
	Invisible	0.981837	0.327348	2.999372	0.0027251

From Table 4-3, we can find that (1) RM have no significant impact on company's performance and value. We cannot avoid more catastrophic events by limiting the rapid development of financial derivatives in China. (2) The results of the rest of the variables on the company's value (Tobin's Q) show that the asset size is significantly negatively

correlated with Tobin's Q at 0.002, indicating that small-scale companies perform better than large companies, which is consistent with domestic and foreign results; the asset-liability ratio is significantly negatively correlated with the company value at the level of <0.001, which is consistent with the findings of many empirical studies; the growth rate of the main business income is significantly positive for the company value at <0.001 level. The impact of fixed assets ratio has a significant negative impact on the company's value at <0.001, and the impact of intangible assets on company value is not significant. (3) Company's size affect EPS have CPS only, and the lager the company is, the more EPS and CPS it will earn. (4) The asset-liability ratio have outstanding significantly negative relationship with company's performance and value. (5) The growth only have a significant impact on ROA, which is in consist with the reality. Because of the rapid development of some company, the return per asset is quite remarkable. (6) The fixed assets counts concerning ROA, EPS and CPS while invisible assets impacts every index significantly.

5 Conclusion

This paper takes Chinese non-financial listed companies as the research object, and studies the relationship between risk management and company value and performance of listed companies in China using derivative financial instruments. The results show that, in general, the use of derivative financial instruments for risk management has different effects on the performance and value of listed companies in China. The use of derivative financial instruments for risk management in China's listed companies has a certain effect on the company's performance, but it has not been recognized by investors. The use of derivative financial instruments has a weak negative effect on the market value of listed companies. After controlling the company's size, asset-liability ratio, main business income growth rate, fixed assets ratio and intangible assets ratio, China's listed companies use derivative financial instruments to conduct risk management on the company's return on assets, main business income and cash flow. Influence. After controlling the company's size, asset-liability ratio, main business income growth rate, fixed assets ratio and intangible assets ratio, China's listed companies use derivative financial instruments for risk management has no significant impact on company value (Tobin's Q).

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