The Difference of Chinese Listed Companies' Risk Defense Ability under Systemic Risk

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Abstract: The systemic risk of the capital market, also known as non-dispersible risk, is difficult for investors to deal with and cannot be dispersed. But facing the systemic risk, the risk resisting ability of each listed company is not the same. From the prospective of individual listed company, what factors affect the systemic risk reaction and what extent does they affect the company? From the beginning of 2015 to early 2016, the overall stock price volatility occurred several times in the Chinese stock market, which is a typical capital market systemic risk performance. Based on the study of the events during this period, it is found that the risk resistance of the listed companies is different under the stock market systemic risk, and the listed companies with different systemic risk resistance have shown significant differences in many financial factors. The extent of these financial factors' impact on the systemic risk resistance is also different. These findings provide a reference for investors to evaluate the investment risk level of listed companies.

1. Introduction

The systemic risk of the capital market is the external risk that all listed companies must face. There are many factors that cause the systemic risk, including interest rate, current exchange rate, inflation, macroeconomic policy and monetary policy. Facing with systemic risk, the market participants are passive, and have difficulty to reverse the impact of systemic risk trends. But in fact, because the characteristics and ability of each listed company vary, the impact of the systemic risk on companies is different. The systemic risk of low-sensitivity listed companies affected by the systemic risk is small, low investment risk. What factors will affect the systemic risk resistance of listed companies, is the most concerned issue of investors.

The outstanding expression of the listed company's systemic risk resistance ability is the degree of the listed company's stock price response when the systemic risk occurs. The research on the relationship between the stock price of the listed company and the financial performance of the company has aroused the attention of the scholars very early. Ball and Brown (1968) were the first to study the correlation between stock price volatility and financial indicators, and they found that the direction of changes in financial indicators had a significant impact on stock price volatility. In exploring the correlation between cash flow and stock prices, Monahan (2002) found that the correlation between cash flow and stock prices of high-tech listed companies was most significant, while the relevance of other industries was not significant. Fernandez (2011) found that judgments about the volatility of a company's stock price should pay more attention to capital turnover rate, accounts receivable turnover, financial leverage and ROI.

Yulong Zhao (1998) confirmed that the financial data published by listed companies was a certain information content, and could be part of the market interpretation. Hai yanYu and Yiming Huang (2005) found that different types of financial indicators and stock price correlation was significantly different, the correlation between stock price and profitability financial index was the strongest, and the correlation between liquidity ratio and asset-liability ratio was the weakest. In the research of Yinghan Ren (2014), profitability, development ability of a company had a strong correlation with its stock price and the correlation between stock price and cash flow financial index is weak.

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On the basis of the existing literature research, this paper chooses two groups of sample enterprises under the systemic risk, which are the companies with strong stock price stability and the companies with weak stock price stability. Based on the event research, considering the debt paying ability, operating ability, profitability, development ability, cash flow and cash dividends, the difference of the financial characteristics of listed companies with different systemic risk ability is studied in this paper. Factor analysis and Logistics model were also used to sort out the influence capacity of the influential financial factors.

2. Research design

2.1 The event background and window period

The overall price crash especially the overall stock price crash in capital market is the most important and common expression of capital market systemic risk. From the beginning of 2015 to the beginning of 2016, the stock price of listed firms in Shenzhen and Shanghai fluctuate wildly. The highest fluctuation rate is as high as 8.49%, which is relatively rare phenomenon in Chinese capital market. The stock price of listed companies face the challenges of systemic risk. This paper takes the stock market in Shanghai and Shenzhen as the research object, from the beginning of 2015 to early 2016 a substantial stock price fluctuations for the study of events and analyzes the difference of stock price stability of listed companies under systemic risk during the event, and then explores the difference of financial characteristics of different systemic risk resistance companies.

The statistics of daily stock price decline higher than 5% in Shanghai and Shenzhen from 2015 to 2016 is shown in Table I.

TABLE I. Summary

Day decline> 5% of the date	Down range	Day decline> 5% of the date	Down range
01/19/15	7.70%	08/24/15	8.49%
05/28/15	6.50%	08/25/15	7.63%
06/19/15	6.42%	11/27/15	5.48%
06/26/15	7.40%	01/04/16	6.86%
07/01/15	5.23%	01/07/16	7.04%
07/03/15	5.77%	01/11/16	5.33%
07/08/15	5.90%	01/26/16	6.42%
07/27/15	8.48%	02/25/16	6.41%
08/18/15	6.15%		

Analyzing the time distribution of the stock price fluctuations, In order to avoid the mutual influence of frequent huge drop in stock prices during the window period, which could affect the test results. This paper chooses three events window. The range of one window period is one day before the event and ten days after the event date. The first event date is 2015.08.24, whose event window period is from 2015.08.21 to 2015.09.09. The second event date is 2015.11.27, whose event window period is from2015.11.26 to 2015.12.11. The third event range is 2016.01.26, whose event window period is from 2016.01.25 to 2016.02.16.

2.2 Sample selection and data sources

This paper selects the listed companies that rank top 800 or rank last 800 of listed companies in all the three event windows in the Shenzhen and Shanghai stock market during the period.

Excluding the ST and ST * and data loss companies, finally we got 101 listed company samples with strong systemic risk defense ability and 94 listed company samples with weak systemic risk defense ability. The total sample size is 195.

2.3 Variable definitions

2.3.1 The Definition of Systemic risk Defense Ability of Listed Companies

Risk defense ability is the ability of avoiding or being less affected by risk factors. This article defines the listed company's systemic risk defense ability as an overall quality to maintain normal operation and keep less affected facing systemic risk. Under the capital market systemic risk, listed companies are inevitably affected, whose prominent performance is the emergence of a larger range of stock price volatility. But the companies with strong risk defense ability can be less affected by the risk, which could perform low stock price volatility, or adjusted the stock price back to the level before the systemic risk in a relatively short time. Therefore, in this paper, the stock price stability is selected as the indicators of listed companies systemic risk defense ability.

Based on this definition, this paper chooses the ratio of 5-day average price of the tenth trading day after the event and the 5-day average price of the previous trading day before the event as the measure of stock price stability.

In order to compare the stock price stability under systemic risk, the stock price stability of listed companies was sorted for the three event separately. In order to avoid the influence of the contingent factors, the companies ranked in the top 800 in all the three events are defined as companies with strong stock price stability, which are described as 1with a dummy variable. The companies ranked the last 800 in all the three events are defined as companies with weak stock price stability, which are described as 0 with a dummy variable. The descriptive statistics of the samples selected from the three event center days are shown in the table.

TABLE II. Descriptive statistics of related indexes in three event center days

	Number of samples	Average	Median number	Count	Minimum	maximum
The first event center day	2824	0.7314	0.7251	0.6671	0.2527	1.4034
The second event center day	2824	0.9614	0.9425	0.9219	0.6922	1.7403
The third event center day	2824	0.9534	0.9466	0.9318	0.6766	1.6900

2.3.2 Selection of financial characteristics index

In order to analyze the factors that affect the stock price stability of listed companies in the financial point of view, this paper chooses the relevant indicators from the aspects of long and short term debt paying ability, operating ability, profitability, development ability, cash flow and dividend distribution. The specific indicators are shown in Table

TABLE III. Selection and definition of independent variables

Index category	Variable name	Index category	Variable name
Short term solvency index	Liquidity ratio, quick ratio, cash ratio	Profitability index	Operating profit margin, cost profit margin, net asset yield, earnings per share
Long term solvency index	Asset liability ratio, equity multiplier and long-term capital debt ratio		
Operation capability index	Accounts receivable turnover rate, turnover rate of current assets, turnover rate of fixed assets and turnover rate of total assets	Development capability index	The growth rate of total assets, the growth rate of operating profit and the growth rate of net profit
Cash flow index	Net cash profit, total cash recovery and net cash flow arising from operating activities per share	Dividend distribution index	Pre-tax cash dividend, dividend payout ratio and cash dividend guarantee ratio

3. Empirical results analysis

3.1 Analysis of the relationship between stock price stability and financial characteristics

3.1.1 Relevant financial indicators independent sample T test

In order to analyze the differences in the financial performance of firms with different stock price stability, firstly, the independent sample T test method was used. Based on the seven aspects of financial indicators selected, the financial differences for these two sample groups including strong and weak stock price stability are analyzed. The independent sample T test result show that, for strong and weak systemic risk defense ability companies, the total asset growth rate, net profit growth rate and operating profit growth rate did not show significant differences but the other 17 indicators showed significant differences.

3.1.2 Factor analysis

In order to facilitate the comparison of different types of financial indicators and eliminate the influence of co linearity between similar financial indicators, factor analysis is needed to reduce the dimension of financial indexes.

KMO test found that KMO statistical value was 0.734 which is between 0.7 and 0.8. Bartlett test showed that Bartlett detection value was 4221.018. The Bartlett test significance level was 0.000 which is less than 0.05. These finding indicated that the selected sample enterprises suitable for factor analysis.

Six factors were extracted by factor analysis, and the cumulative variance contribution of these six factors was 80.087% which is greater than 80%.

For factor 1, which includes operating margin, cost profit margin, net asset yield and earnings per share, the profitability indicators have a larger number of loads, so we call factor 1 as profitability factor, labeled as F1.

For factor 2, which includes the ratio of quick current ratio, current ratio and cash ratio, the short-term solvency indicators have a larger number of loads, so we called the factor 2as short-term solvency factor, labeled as F2.

For factor 3, which includes equity multiplier, long-term capital debt ratio, asset liability ratio, the long-term solvency indicators have a larger number of loads, so we call factor 3 as the long-term solvency factor, labeled as F3.

For factor 4, which includes turnover rate of current assets, accounts receivable turnover rate, total assets turnover rate, the operational capacity indicators have a larger number of loads, so we called the factor 4 as the operational capacity factor, labeled as F4.

For factor 5, which includes pre-tax cash dividend and dividend payout rate, the cash dividend indicators have a larger number of loads, so we called the factor 5 as the cash dividend factor, labeled as F5.

For factor 6, which includes all cash recovery, net cash flow from operating activities per share, the cash flow indicators have a larger number of loads, so we called the factor 6 as the cash flow factor, labeled as F6.

The factor score of F1 to F6 can be calculated by the component coefficient score matrix:

$F1=-0.048\times X1-0.055\times X2+\ldots\ldots-0.094\times X21-0.029\times X17$

$F2=0.333\times X1+0.341\times X2+\ldots\ldots-0.014\times X21-0.084\times X17$

$F3=0.095\times X1+0.096\times X2+\ldots\ldots-0.003\times X21-0.151\times X17$

$F4=0.021\times X1+0.045\times X2+\ldots\ldots-0.052\times X21-0.089\times X17$

$F5=0.050\times X1+0.045\times X2+\ldots\ldots+0.442\times X21+0.283\times X17$

$F6=-0.092\times X1-0.072\times X2+\ldots\ldots+0.009\times X21-0.154\times X17$

Through the calculation of the above factor scores, six new variables can be re-generated in order to explore the impact of financial indicators on the stability of stock prices.

3.2 Strength analysis of the influence of financial characteristics

There are significant differences in the specific six types of financial indicators between the firms with different stock price stability. But the degree of correlation between different types of indicators and stock price stability is different. In order to explore the strength of the impact of various financial indicators on the stability of the company stock price, Logistic model is used to do regression analysis of various financial indicators. Before the Logistic regression analysis, the correlation test is needed to verify whether the stability degree of stock price is related to the six kinds of financial indicators calculated by factor analysis.

It can be seen from Table IV that systemic risk defense ability(SRDA) is significantly correlated with short-term debt paying ability, long-term paying ability, operating capacity, profitability, cash flow and cash dividends at 1% confidence level. Because there is no significant correlation between the independent variables, so binary logic regression can be used for empirical analysis.

Based on the analysis of the relationship between variables, the Logistic model is designed as follows. $Ln(p/1- p)=a_0+a_1\times F_1+a_2\times F_2+a_3\times F_3+a_4\times F_{4+}a_5\times F5+a_6\times F_6+\varepsilon$

In the formula above, p is the probability that systemic risk defense ability is strong, a0 is a constant term, a1 to a6 is the regression coefficient, ε is the random error term. The explanatory variable is the logarithm of the probability ratio of strong risk defense ability and weak risk defense ability o of the listed companies.

3.2.1 Model overall evaluation

Variable selection in this paper adopts entry method, so the model will introduce all the variables at the same time.

Omnibus test results of model coefficients is shown in table V. The chi-square value here which is 266.842 is the likelihood of the square chi-square, which indicates that there is a statistically significant difference between the current model and the invalid model of "block 0", and the model study is meaningful. The significance of the fitting degree test of the regression model established by the six independent variables was 0, which is less than0.05. The test result reaches the significant level.

TABLE IV. Relevance analysis

		SRDA	F1	F2	F3	F4	F5	F6
SRDA	Pearson correlation	1	.149**	-.136**	.178**	.203**	.290**	.136**
	significance		.000	.001	.000	.000	.000	.001
	N	585	585	585	585	585	585	585
F1	Pearson correlation	.149**	1	.000	.000	.000	.000	.000
	significance	.000		1.000	1.000	1.000	1.000	1.000
	N	585	585	585	585	585	585	585
F2	P Pearson correlation	-.136**	.000	1	.000	.000	.000	.000
	significance	.001	1.000		1.000	1.000	1.000	1.000
	N	585	585	585	585	585	585	585
F3	Pearson correlation	.178**	.000	.000	1	.000	.000	.000
	significance	.000	1.000	1.000		1.000	1.000	1.000
	N	585	585	585	585	585	585	585
F4	Pearson correlation	.203**	.000	.000	.000	1	.000	.000
	significance	.000	1.000	1.000	1.000		1.000	1.000
	N	585	585	585	585	585	585	585
F5	Pearson correlation	.290**	.000	.000	.000	.000	1	.000
	significance	.000	1.000	1.000	1.000	1.000		1.000
	N	585	585	585	585	585	585	585
F6	Pearson correlation	.136**	.000	.000	.000	.000	.000	1
	significance	.001	1.000	1.000	1.000	1.000	1.000	
	N	585	585	585	585	585	585	585

TABLE V. Omnibus test of model coefficients

Step number		Chi square	df	Sig.
1	Step	266.842	18	.000
Step 1	block	266.842	18	.000
	Model	266.842	18	.000

3.2.2 Model summary

The statistical value in TableVI is used to explain the correlation between the six independent variables and dependent variables. According to the data in the table, the Cox & Snell R^2 value is 0.366. In view of Logistics regression, the pseudo-decision coefficient of the model is not as large as the coefficient of decision in the linear regression model. Therefore, the decision coefficient of 36.6% -48.9% is in the middle of the Logistic regression effect, that is, the correlation degree between the six independent variables and the dependent variable is moderate.

TABLE VI. model summary

step	-2 log likelihood	Cox & Snell R^2	Nagelkerke R^2
1	543.386a	.366	.489

3.2.3 Hosmer-Lemeshow test

Since the -2 logarithmic likelihood values shown in Table 4-8 above are sensitive to the number of samples, a further Hosmer-Lemeshow test is required, that is, the fitting degree of the regression model is tested again. According to the data in Table VII, the level of significance was 0.958>0.05. It also shows that the regression model has a good overall fit.

TABLE VII. Hosmer-Lemeshow test

step	Chi square	df	Sig.
1	*288.635*	*22*	*.958*

3.2.4 Classification prediction results

The classification results of discriminant analysis is shown in tableVIII. Based on the definition of system risk defense ability, there are 101 listed companies in our sample having strong system risk resistance ability, and 94 listed companies having weak system risk resistance ability.

Classified by the logistic model, there are 95 listed companies was classified as with strong systemic risk defense ability, 90 of listed companies was classified as with weak systemic risk defense ability. 6 of listed companies with strong systemic risk defense ability were assigned to the weak systemic risk defense group. 4 of the listed companies with weak systemic risk defense ability are assigned to strong systemic risk defense ability group. The correct classification ratio is 94.9%. That is to say, most of the listed companies have a correct prediction of the systemic risk defense ability by the model.

TABLE VIII. Classification tablea

Observed		Observed		
		Defense ability		Percentage correction
		0=weak	1=strong	
Defense ability	0=weak	90	4	95.7
	1=strong	6	95	94.1
Total percentage				94.9

3.2.5 Regression coefficients

The partial regression coefficients and their standard errors, Wald chi-square, degrees of freedom,

and P values for each of the independent variables in the model are given in Table IX. It can be seen from the P value, after being included in the model at the same time, because the P value of each independent variables is less than 0.05, so the six variables are all included in the equation. That is, short-term debt solvency, long-term debt solvency, profitability, cash flow and cash dividend have an impact on the systemic risk defense ability of listed companies and there is a significant positive correlation.

TABLE IX. Variables In Equations

		B	S.E,	Wals	df	Sig.	Exp (B)
Step 1	F1	.494	.107	21.133	1	.000	1.639
	F2	.415	.125	15.944	1	.001	1.560
	F3	.569	.109	27.119	1	.000	1.767
	F4	.894	.125	50.858	1	.000	2.445
	F5	1.053	.182	33.343	1	.000	2.867
	F6	.414	.112	13.653	1	.000	1.513
	constant	.117	.119	.969	1	.000	0.000

a. Variables entered in step 1: short term solvency factor, long-term solvency factor, operating capacity factor, profitability factor, cash flow factor, cash dividend factor

The results of comprehensive regression analysis show that the six kinds of analysis factors have significant positive correlation with the systemic risk defense ability of the listed company's, that is to say, the stronger the index of the six factors, the stronger the risk defense ability of the capital market systemic risk.

The regression equation between the six kinds of financial indicators and the systemic risk defense ability of listed companies is as follows:

$$Ln(p/1-p)=0.117+0.494F_1+0.415\ F_2+0.569\ F_3+0.894\ F_4+1.053\ F_5+0.414\ F6$$

From the regression coefficients of the 6 types of financial indicators in the analysis table, we can see among the six factors influencing the systemic risk defense ability, cash flow indicators has the greatest impact, followed by profitability indicators, operating ability indicators, long-term and short-term solvency index, and cash dividend index has the least impact.

4. Conclusion

The stability of the stock price of listed companies under the systemic risk, is an important factor in choosing an investment target. According to the research results of this paper, although under the systemic risk, all listed companies cannot avoid being affected by it, but the individual characteristics of the company determine its ability to withstand the systemic risk is different. From the angle of risk aversion, investors should focus on analyzing the cash flow index of Listed Companies in the selection of investment objects. The profitability, operational capacity and solvency will also have a significant impact on the stability of the stock price of listed companies. Although the cash dividend payment ability has influence, but the degree is relatively weak. Listed companies should strive to improve the company's financial capacity in the above six aspects, so as to enhance their own risk defense ability.

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