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Full length research paper

Empirical study on financial risk factors: Capital structure, operation ability, profitability, and solvency ——evidence from listed companies in China

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This study analyzes financial risk factors of China's Small and medium-sized enterprises (SMEs), employing Alexander Bathory model for the currently available data on the small and medium enterprise board in Shenzhen Stock Exchange. Financial risk is measured by the Alexander Bathory model. The financial risk was found to be significant and negative correlation with the current ratio, net profit margin, net asset ratio, fixed assets ratio, and to weakly relate with fixed asset turnover, total asset turnover, while there are no significant correlation between financial risk and debt structure, inventory turnover, accounts receivable turnover.

Key Words: Financial risk; Capital structure.

Introduction

Small and medium-sized enterprises are increasingly important in the national economy of China. At the present time, small and medium-size enterprises constitute 99% of the registered enterprises of the Chinese industry and commerce, and provide over 75% of urban employment opportunities. After the financial crisis in 2008, China is facing huge inflationary and liquidity pressure. In 2010, the central bank raised interest rates after many times failing to raise the deposit reserve rate. As a result, the largest group affected is small and medium-size enterprises. Weak in China's banking system, small and medium-sized enterprise will find it more difficult to lend after the banks' tighten monetary policy. Severe challenges now facing small and medium-sized enterprises are: price rises in production material and labor, appreciation of the RMB, rise in lending interest rates and increase in finance costs.

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Paying attention to the small and medium enterprises financial risk is not only of theoretical meaning, but also a realistic significance.

Literature Review

Financial risk is a crucial issue for both managers and researchers. Managers have to control financial risk for long-term development of companies, and researchers are also interested in the theoretical and practical issue. In the past decades, numerous scholars devoted themselves to researching the enterprise financial risks from different angles. Zhou and Zhao (2006) researched the financial risks of listed private enterprise with Z value by an empirical method, and found that average level of private listed companies' financial risk are significantly higher than that of state-owned listed companies. Barbro and Bagajewicz(2004) put forward a new two-stage random management pattern based on the angle of management to decrease financial risk. For the study on financial risk of small and medium-sized enterprises,

Wang and Chen (2010) investigated financial risk under financing restricted condition with the unbalanced panel data and found that financial risk of constrained companies are higher than those of unconstrained companies. And Hu (2005), by survey, analyzed the small and medium-sized enterprises in central Taiwan with multivariable analysis and Logit regression. A financial preparing model has been built and four conclusions were drawn to decrease financial risk: (1)the company leaders should own multiple professional knowledge;(2) the company must focus on significant environmental change, which may cause poor management of small and medium-sized enterprise (such as the change of government policy);(3) the sound financial system is needed; and(4) the company would perfect the good monitoring system. If the company has done the four aspects well, the probability of company financial crisis would be reduced largely. Liao (2006) used the small and medium-sized enterprise material offered by a financial institution to study the characteristics of this kind of enterprises, with the Logistic regression and factor analysis, in which the variable contains financial variables and the non-financial variables. The conclusions are as follows: (1) when the model considers the financial and non-financial variables, the predictive ability of model is superior to the model that only uses financial variables; (2) it is more difficult to predict financial risk of young small and medium-sized companies (less than 7 years) than that of the older companies. Cao and Zeng(2005) used financial leverage as dependent variable to studyempirically financial risk of large enterprises. They asserted that financial risk of enterprises have a positive
correlation with liabilities scale and liabilities structure, a negative correlation with profitability and operation ability, and no obvious linear correlation with interest rate and solvency. From prior studies, we find that the majority of researchers mainly focus on the concept of financial risk for SMEs, early warning models, strategies, management of financial risk. The minority of scholars have done the empirical studies on financial risk at present especially on financial risk for SMEs. The global financial crisis occurred since 2008, and numerous enterprises, including large enterprises and SMEs, have been influenced by the continuing crisis. What level is the financial risk of small and medium-sized enterprises? Which factors are influencing financial condition of SMEs? Deep researching factors will contribute to control financial risk of SMEs and promote the development of enterprises in China.

Methodology

Generally speaking, financial risk includes broad and narrow risks. Broad risk refers to the possibility of the actual financial conditions deviating from the expected and it reflects all risk factors in the enterprise financial, including financing risk and investment risk and profit distribution risk et al. Narrow risk refers to the possibility of debt that cannot be afforded, which is caused by the liabilities when it matures (Cao, 2005). The financial risk in this paper is narrow financial risk.

In this paper, the sampling frame consisted of 216 companies that were drawn from small and medium-sized board listed enterprises and all data come from annual financial statements of 2010 year in China. Because of the particularity of the small and medium-sized enterprises, Alexander Bathory model was used to measure financial risk.

Dependent variable

From the previous research, methods of measuring financial risks include the asset-liability ratio, probabilistic analysis, financial leverage coefficient, etc. Financial risk measured by asset-liability ratio method is vague, and it still needs to combine with return on assets. Probability analysis is greatly subjective about the calculation, and the operation is much difficult. Financial leverage is a common method used by many scholars for its simple calculation .But in the study. Alexander Bathory model was adopted to measure the financial risk. The model can be expressed as below: Where is the measure of financial risk, and is dependent variable in this paper; is equal to“(earnings before tax + depreciation + deferred tax) / current liabilities”, is equal to “Pre-tax profit/operating capital”, is equal to “Shareholders' equity / current liabilities”, is equal to “Net tangible assets / total liabilities”, is equal to “Working capital / total assets”. Bathory model has the following characteristics: (1) simple calculation,(2) being applicable to all industries, and (3) both predicting the bankruptcy probability and measuring the strength of the company(Wang and Chen,2010). According to Alexander Bathory’s view, the smaller the value of FRit is, the weaker the enterprise strength is, and the higher financial risk of enterprise is.

Independent variables

Chao and Zeng(2005) employed liabilities scale, interest rate, debt structure, profitability, operation ability and solvency as the factors. Wang and Chen (2010) selected solvency, profitability and operation management to investigate financial risk and the financing of SMEs. In this study, we summarized in five main factors that affect SME's financial risk, which are debt structure, solvency, performance, operation ability, and capital structure. The total of 12 measures(x1~x12) as independent variables expresses the five factors. The detail is shown in table 1.

Table 1: Definition of variables

Variable	Code	Definition	Notes
Financial risk	FR	Bathory's model metrics	Financial risk metric values
Debt structure	x1	Liability structure ratio	Current liabilities / non-current liabilities
Solvency	x2	Current Ratio	Current assets/ current liabilities
	x3	Quick Ratio	(Current assets-inventory)/ current liabilities
	x4	Asset-liability ratio	Total liabilities/total assets
Performance	x5	Net profit margin	(EBIT-taxes-interests)/sales
	x6	Total asset returns	Sales/total assets
Operation ability	x7	Inventory turnover	Cost of goods sold/inventories
	x8	Fixed asset turnover	Sales/net fixed assets
	x9	Total asset turnover	Sales/total assets
	x10	Accounts receivable turnover	Annual credit sales/accounts receivable
Capital structure	x11	Net assets ratio	Equity/total assets
	x12	Fixed assets ratio	Fixed assets/total assets

Research hypothesis

Based on previous studies and the theories, we propose the hypothesis as follows: H1: SMEs' financial risk is positive with debt structure. Debt structure is the ratio between current liabilities and long-term liabilities (non current liabilities) in the total liabilities of the enterprise. Compared with the long-term debt financing, current liabilities financing is short-term, low cost and more debt risk relatively. Financial risk would increase while the ratio increases.H2: SMEs' financial risk is negative with solvency. Solvency refers to the ability that company has to pay the maturing debt (including principal and interest). It can be divided into short-term liquidity and long-term solvency indicators. The stronger corporate solvency is, the more likely debt service is on schedule, and the less likely financial risk appears.H3: SMEs' financial risk is negative with profitability. Profitability refers to the profit level of enterprises. When corporateprofitability increases, the earnings from the production and operation would be much, and the company has more funds to return the due debt and financial risks would be smaller.H4: SMEs' financial risk is negative with operation ability. Operation ability depends on the strength of the turnover rate of assets, asset operation, asset management and other factors. The strong operation ability can contribute to the growth inprofitability, which in turn guarantee enterprises of good solvency and decrease financial risk.H5: SMEs' financial risk is negative with capital structure. The higher net assets ratio in total assets is, the more secure creditors' debt is. Similarly, the higher fixed assets-to-total assets ratio can effectively protect the interests of creditors, so as to reduce financial risk.

Empirical Analysis

The research data of this paper was based on 2010 annual reports of 216 listed enterprises, which were randomly selected from small and medium plate of Shenzhen stock exchange in China. We kicked off 14 enterprises that non-current liabilities is zero. All data are obtained from the CSMAR databases, which are developed by GTA Corporation in China. Statistical software excel2003 and SPSS16.0 were used to process the data.

Descriptive statistical analysis

Table 2 is about descriptive statistics analysis. It shows that the Sample of SMEs, in the study, has a big difference in operating condition, capital formation and so on. The difference of between maximum and minimum of financial risk is more 95%: the maximum of asset-liability ratio is 97.3% while the minimum is 1.83%, and the standard deviation reached 19.22. The average of Current Ratio and quick ratio were both over 1.5. To some extent, it indicates that sample enterprises' liquidation capacity is relatively strong.

Correlation analysis

We make a correlation analysis for the sample, and the result is presented by table 3. It indicates that FR has a significantly positive correlation with current ratio, quick

Table 2: Descriptive statistics for year 2010

variable	N	min	max	mean	stddev
FR	199	.06	37.85	5.3830	5.58819
x1	202	.13	5931517.00	29494.5887	4.17331E5
x2	202	.29	20.11	2.1774	2.14723
x3	202	.19	16.83	1.6466	1.91181
x4	202	1.83	97.30	43.4368	19.21789
x5	190	.59	66.81	11.1185	9.93859
x6	190	.44	30.31	7.3168	5.42075
x7	184	.29	1683.66	15.3014	124.36457
x8	202	.11	94.30	5.4279	10.45860
x9	202	.09	6.61	.8435	.63893
x10	201	1.23	7876.48	76.4729	579.02426
x11	202	2.70	93.40	55.1571	19.13594
x12	202	.35	87.38	27.4230	15.23601

Table 3: Corrections coefficients for year 2010

variable	x1	x2	x3	x4	x5	x6
Pearson	-.005	.899***	.893***	-.702***	.635***	.462***
Sig.	.474	.000	.000	**.000**	.000	.000
variable	x7	x8	x9	x10	x11	x12
Pearson	-.069	-.081	-.141**	-.081	.719***	-.110*
Sig.	.185	.146	.033	.146	.000	.077

*p≤0.1,**p≤0.05,***p≤0.01

ratio, net profit margin, return on assets, net assets ratio. In other words, financial risk has a significantly positive relationship with current ratio, quick ratio, net profit margin, return on assets, net assets ratio. On the contrary, FR is significantly negative with total asset turnover, asset-liability ratio, and fixed asset ratio. Therefore, it has no significant relationship with debt structure, inventory turnover, fixed asset turnover, receivables turnover.

Regression analysis

Taking FR as dependent variable and the measures of x1~x12 as independent variables, we make a multiple linear regression. The first result is not very satisfactory when we put all 12 independent variables into the model. Because there are co linearity problem between the variables, we remove the variables of linear obvious: Quick ratio, debt ratio, return on assets .Then the better results are drawn. The second results are shown in table 4.From the regression results, we find that the sig. of current ratio, net profit rate, net assets ratio, the ratio of fixed assets were 0.000,it indicates that the four variables had a significant linear relation with financial risk, p≤0.01, and they were the main factors of financial risk. The sig. of fixed asset turnover, total asset turnover is less than 0.200, and these factors, to some extent, have impact on financial risk. The sig. of debt structure, inventory turnover, accounts receivable turnover rate are not significant, so the impact on financial risk is not obvious.Next, we make a regression test, just as table 5.The results of test show that F=144.029, P=0.000, R2 of regression model is 0.890, adjusted R2 is 0.884. In the case of large samples (n=169), the fitness (R2)of the model is well.

Table 4: Regression results of financial risk and the factors

Indicator	Non-standardized coefficient		Standard coefficient	t-value	Sig.
	B	standard error			
(constant)	-4.864	.684		-7.114	.000
debt structure(*x1*)	-.00000019	.000	-.016	-.601	.549
Current Ratio(*x2*)	1.869	.092	.722***	20.388	.000
Net profit rate(*x5*)	.116	.022	.193***	5.348	.000
Inventory turnover(*x7*)	.000	.001	-.017	-.608	.544
Fixed asset turnover(*x8*)	.021	.016	.042	1.339	.182
Total asset turnover*(x9*)	.322	.238	.039	1.350	.179
Accounts receivable turnover*(x10*)	.000	.000	-.018	-.676	.500
Net assets ratio(*x11*)	.059	.012	.195***	4.951	.000
Fixed assets ratio(*x12*)	.048	.012	.135***	4.127	.000

a. FR as dependent variable b. *p≤0.1,**p≤0.05,***p≤0.01

Table 5 : Further regression testing

Model	Sum of squares	df	Mean square	F	Sig.	R 2	Adjusted R 2	Standard error of estimate
Regression	4491.259	9	499.029	144.201	.000a	.890	.884	1.86028
Residual	553.703	160	3.461					
Total	5044.962	169						

Finally, we do multicollinearity test for the nine variables to avoid multicollinearity. The test index we used was tolerance (TOL) and variance inflation factor (VIF). The tolerance of variables Xi can be defined as: .When VIF was more than 10, generally, it means that strong collinearity appeared in variables. The results of multicollinearity test show that the nine variables' VIFs are both less than 10, so no significant multicollinearity exist in the nine variables can be considered.

Conclusions

Actually, a number of factors, including outside and inside factors, would influence financial risk of all companies. This study employ some financial measures to investigate the relation between financial and factors with small and medium companies listed in China. The study draws some conclusions as follows. SMEs' financial risk has a significant negative correlation with solvency in China, especially current ratio that reflects short-term payment ability. It is consistent with H1. From the foregoing descriptive statistics analysis, we know that the mean of current liabilities is up to 29494 times of the long term liabilities. It fully explains that SMEs in China mainly choose short-term debt financing, and it means that SMEs need a lot of current assets to pay for interest and principal. So current ratio directly affects SMEs' financing risk whether they could meet a lot of liquidity spending for short-term debt. SMEs' financial risk has a significant negative relation with profitability (net profit rate) in China. This conclusion is also consistent with H3. All the funds of the enterprise need to get complement and expand by earnings. Adequate funds may be used to cover losses, or to expand enterprise production scale or repay the debts. If the enterprise losses during a long-term period, it would face the repayment pressure of maturing debt, which should damage enterprises' reputation, and it also can not continue to raise capital. Eventually, the enterprise will fall into financial crisis inevitably. On the contrary, the higher return on investment is, the better the profitability is, and the less the occurrence of financial risk will be.

SMEs' financial risk has a significant negative relationship with the capital structure in China. In this study, we selected two indicators to measure capital structure: net assets ratio and fixed assets ratio. Both indicators have significant linear correlation with financial risk, which supports H5. This result can be understood easily by the reality. If net assets-to-total assets ratio is low, the size of debt is high and more principal and interest is due to repay, it will increase the pressure for

the enterprises' capital flow, at the same time it might affect other production activities. Especially when the enterprise is under the circumstance of not-good management, it's very easy to make the enterprise sink into financial crisis. Fixed assets is the base of enterprise further development, and it also is the guarantee for debt financing of SMEs, such as mortgage financing, secured financing etc. To some extent, fixed assets ratio of SMES can reflect the ability of continuing financing indirectly, especially when financial situation is worse. So fixed assets ratio of enterprise is much crucial whether the enterprise decide to finance continually or not.

SMEs' financial risk has no obvious linear correlation with debt structure in China. It isn't consistent with the foregoing hypothesis and does not support H1. Seen from the result of descriptive statistics, SMEs' debt structure do exist imbalance status, current liabilities is major in total liabilities, and long-term debt ratio is very low. Seen the foregoing analysis in the study, this indicator doesn't show the significant relation with financial risk. Actually, there are some reasons, such as its scale and other restriction reasons. SMEs mainly depend on short-term debt financing, and at the same time, their current assets are so much that they decrease the payment pressure by short-term debt, thereby reduce the probability of financial risk. Eventually, debt structure does not become the main factor that influences the financial risk in China.

SMEs' financial risk has no significant linear correlation with management ability in China. It is different from many scholars' opinions, also is different with the foregoing hypothesis and does not support H4. The indicators selected affect the results. There are many operational measures to influence financial risk, but the measures of management ability, such as inventory turnover, accounts receivable turnover, mainly reflect operational level and affect operational risk. Those indicators in this study are difficult to comprehensively and accurately reflect the relationship with financial risk.

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