

RESEARCH ARTICLE

Financial Risk Measurement of Small and Medium-sized Companies Listed in

Bombay Stock Exchange

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Abstract

This paper attempts to analyze the financial risk factors of small and medium-sized companies listed in Bombay stock exchanges of India for the period from 2001 to 2011. Financial risk factors are of crucial importance because financial risk factors are uncontrollable from within an organization. Also small and medium sized companies are exposed to financial risk from various aspects of the overall economy. The present study is based on secondary data collected from the annual financial statements of BSE in India. In the course of analysis, descriptive statistics, correlation statistics and regression analysis Alexander Bathory model have been designed. Empirical result shows that financial risk is negatively related with current ratio, net profit margin, net assets ratio, the ratio of fixed assets, positively related with fixed asset turnover, total asset turnover, while no noteworthy relation with debt structure, inventory turnover, accounts receivable turnover.

Keywords: *Bathory model, Bombay stock exchange financial risk, Regression, Small and medium-sized enterprises.*

Introduction

Measuring the performance and risk of holding financial assets is an important aspect of any good financial management plan. The value of each asset in a portfolio depends on a set of economic values called risk factors. These specific risk factors can impact the individual asset value, and they can impact the whole asset group. Two keys to measuring and controlling the risk inherent in financial securities (i) understand the volatility of economic factors on which the value of the portfolio depends and (ii) understanding how changes in those economic factors is related to each other. Small and medium-sized enterprises are playing an increasingly important role in the national economy in India. Today, it accounts for nearly 35% of the gross value of output in the manufacturing sector and over 40% of the total exports from the country. In terms of value added this sector accounts for about 40% of the value added in the manufacturing sector. The sector's

contribution to employment is second highest next to agriculture. Statistics from Ministry of Micro, Small & Medium Enterprises also reflect the growth trajectory of SSI industry in India. The number of SSI units has increased from 6.79 million in 1990-91 to 13.37 million in 2007-08 providing employment to more than 32 million people in India. The Government of India has continuously emphasized the role of MSMEs in order to sustain economic growth. MSMEs provide employment to millions of people, through over 12 mn units. Moreover, MSMEs account for around 45% of the country's manufacturing output and account for well over 90% of the industrial units in the country. MSMEs also play a crucial role in India's exports and account for approximately 40% of India's total exports. It is a well accepted fact that MSMEs provide the foundation for economic growth, especially in developing economies like India [1]. Global business

environment increasingly fills with uncertainty and risk that have already been beyond SMEs' control. In consideration of the rapid changes of the global business environment last year, when inflation attacked in the first three quarters, then suddenly changed to financial crisis, and now turned to recession, grasping the fluctuation of the global economic environment become a difficult job for SMEs, not to mention responding to the fast changes effectively. Currently, SMEs in the APEC region are facing serious challenges from the global financial crisis and are suffering the shrink of both global and domestic markets. A number of difficulties in financing, human resource, and supply chains are emerging from the impacts of the crisis, many of which threaten the very survival of SMEs. Financial risk management has received increased attention over the past few years [2]. The reason for this is that financial risks, though they are not a core competency of non-financial firms also influence their business operations to a large extent [3]. Financial risks can be of different forms. On the one hand there are external financial risks depending on changes on financial markets. On the other hand there are internal financial risks, where the company itself is the source of the risks. Firm financing can become a risk for the company due to different reasons. The choice between fixed rate and floating rate debt, the duration of the debt and the overall amount of debt financing are possible sources of risks such as interest risks. The firm wants to be flexible and at the same time lower the costs for financing. The duration of loans is important in connection with the assets, which are financed with the loan. Here, often a mismatch between the durations can be observed. Long-term assets are then financed with short-term and adjustable rate loans, leading to a shortfall in cash flows in times of rising interest rates. This fact again can lead to a worse ranking of the company and worse conditions to get future loans. Furthermore difficulties regarding follow-up financing over the rest of the lifetime of the asset can occur. Vice versa long-term financing of short-term assets might lead to access financing when the asset is no longer existent. This causes unnecessary interest payments for the company [4]. Finally, a

high amount of debt financing can become a risk to the company. In case the return decreases and is lower than the demanded interest rate, the company is not able to pay the interest without making a loss in that year. This consumes part of the equity and might lead to an even more dramatic situation in the next period. India is facing titanic inflationary and liquidity pressures, after the epidemic of financial crisis in 2008. In 2010-11, the reserve bank of India had to choose to raise interest rates after several fails of being forced to raise the deposit reserve rate. Consequently, the largest group affected is small and medium-size enterprises. In a wide-ranging report into the Chinese financial system, the IMF said that India is facing a "steady build-up of financial sector vulnerabilities". Small and medium-sized enterprise will be more difficult to loan after the bank tighten monetary policy. Severe challenges small and medium-sized enterprises facing now are the rise of production material and labor force, appreciation of the rupee, rise in loan interest rates and increasing of financing costs. Paying attention to the small and medium enterprises financial risk is not only of theoretical meaning, but also a realistic significance. In recently years, many scholars devote themselves to the research of enterprise financial risks from different angles. Zhou Chunsheng and Zhao Duanduan [5] did an empirical research to the financial risks of listed private enterprise with Z value; found that average level of private listed companies' financial risk is significantly higher than that of state-owned holding listed companies. In 2004, Andes Barbro, together with Miguel J Bagajewicz put forward a new two-stage random management pattern to reduce financial risk from enterprise management of view. To the study of small and medium-sized enterprises financial risk [6], Wang Yining and Chen Zhichao [7] found that financial risk of financing constrained Company is higher than that of unconstrained, basing on the unbalanced panel data. And Hu Meihui mainly does the research through questionnaire, analyzing the small and medium-sized enterprises in central Taiwan with multivariable analysis and Logit regression analysis [8]. And its financial prewarning model has four conclusions:

First, the company leader has multiple professional knowledge; Second, significant environmental change will cause poor management of small and medium-sized enterprise (such as the change of government policy). Third, a sound financial system is needed. Forth, the company needs a good monitoring system. The foundation of above 4 items is useful to lower the genesis probability of company financial crisis. In 2006, Liao Weiyan take the small and medium-sized enterprise material, [9] which is offered by a financial institutions, to study the characteristics of these kinds of enterprises, using the Logistic regression and factor analysis, and the variable contains financial variables and the non-financial variables. The research conclusions are as below: first, when model considers the financial and non-financial variables, predictive ability of model will be superior to the model that uses financial variables only. Second, it is more difficult for some young small and medium-sized companies (less than 7 years) to predict about the company financial than the older one. Once in 2005, Cao Defang and Zeng Murong used enterprises' financial leverage coefficient as the dependent variable, did a general empirical research to large enterprises' financial risk. They thought that the financial risks of enterprise are related with enterprise liabilities scale and liability structure, and have a negative correlation with profitability and operation ability, have no obvious linear correlation with enterprise debt interest rates and solvency [10]. Generally speaking, financial risk includes broad and narrow risk. Broad risk refers to the possibility of the actual financial conditions deviation from the expected; it is all risk factors reflected in the enterprise financial, including financing risk and investment risk and profit distribution risk, etc. Narrow risk refers to the possibility of debt that cannot be afforded, which is caused by financing liabilities when it matures [10]. The financial risk in this paper is narrow financial risk. From the studies above, we can find that most scholars' research mainly focus on the concept of financial risk for SMEs, warning models, strategies, management of financial risk. There has been some scholars make empirical research at present, but relatively less. After the

financial crisis, what the financial risk condition of small and medium-sized enterprises will be? How about the influence factors?

Materials and Methods

This study took 513 small and medium-sized listed companies listed under BSE and used the 2010-11 annual financial statements as a sample. At the same time, considering the particularity of the small and medium-sized enterprises, Alexander Bathory model was used to measure the size of the financial risk [11-13].

Definition of Dependent Variable

From the previous research, methods of measuring the financial risks include the asset-liability ratio method, probabilistic analysis, financial leverage coefficient, etc. Asset-liability ratio method measuring financial risk is vague, while need combine return on assets. Probability analysis is greatly subjective during the calculation, and the operation is also difficulty. Financial leverage factor is a common method used many scholars, Because of its simple calculation. But taking into the much specification of the SMEs into account, in this paper, Alexander Bathory model was used to measure the financial risk. This model can be expressed as below:

$$FR_{it} = SZL_{it} + SY_{it} + GL_{it} + YF_{it} + YZ_{it}$$

FR_{it} is the value measuring financial risk of index, We took it as dependent variable in this paper. SZL_{it} = (profit before tax + depreciation + deferred tax) / current liabilities, SY_{it} = Pre-tax profit/operating capital, GL_{it} = Shareholders' interests / current liabilities, YF_{it} = Net tangible assets / total liabilities, YZ_{it} = Working capital / total assets. The characteristics of the model is applicable to all industries, and calculation is simple. It also can be used to predict the possibility of bankruptcy, as well as measure corporate strength. In Alexander

Bathory's view, the smaller the value of FR_{it} is, the weaker the enterprise strength is and the more financial risks of enterprise have.

Selected Independent Variables

This paper summarized in five main factors that affect SME's financial risk, were debt structure, solvency, performance, operation ability, and capital structure, set 12 indexes ($x1 \sim x12$) as independent variables to express the five main factors. The detail was shown in Table 1.

Research Hypothesis

According to the related theory, null and alternative hypothesis can be put forward as following:

Hypothesis 1

Null hypothesis: SMEs' financial risk is not positively related with debt structure; Alternative hypothesis: SMEs' financial risk is positively related with debt structure. Debt structure is the ratio between current liabilities and long-term liabilities (non current liabilities) proportion in the total liabilities of the enterprise; SMEs' financial risk is positively related with debt structure. Compared with the long-term debt financing, current liabilities financing is short-term, low cost, and more debt risk relatively.

Hypothesis 2

Null hypothesis: SMEs' financial risk is not negatively related with solvency; Alternative hypothesis: SMEs' financial risk is negatively related with solvency. Solvency refers to the solvency indicator that company repay 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 risks appear.

Hypothesis 3

Null hypothesis: SMEs' financial risk is not negatively related with profitability; Alternative hypothesis: SMEs' financial risk is negatively related with profitability. Profitability refers to the profitability level of enterprise production

and management. The more corporate profitability is the more profits get from the production and operation, the more able to guarantee of debt due for repayment the less likely financial risks appear.

Hypothesis 4

Null hypothesis: SMEs' financial risk is not negatively related with operation ability; Alternative hypothesis: SMEs' financial risk is negatively related with operational 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 in profitability, which in turn guarantee enterprises of good solvency, reduce financial risk.

Hypothesis 5

Null hypothesis: SMEs' financial risk is not negatively related with capital structure; Alternative hypothesis: SMEs' financial risk is negatively related with Capital structure. The higher net assets ratio in total assets is, the more secure creditors' debt is. In the same way, the ratio of fixed assets can effectively protect the interests of creditors, so as to reduce financial risk.

Empirical Results and Analysis

The research data of this paper was based on 2010-11 annual reports of 513 listed companies out of 5133 Indian companies, which were randomly selected from small and medium of Bombay stock exchange, India. Statistical software excels 2003 and SPSS 17.0 was used to process the data.

Descriptive Statistics

Firstly, descriptive statistics showed that the sample of SMEs, in the research, had a big difference in operating condition, capital formation and so on. The maximum value of financial risk is more than 500 times of the minimum, the maximum of asset-liability ratio was to 94.64%, minimum value was 1.94%, and the standard deviation reached 21.02. The average of current ratio and quick ratio were both above 1.5, to some extent, it indicated that sample enterprises' liquidation capacity is

Table1: Definition of model variables

Variable name	Variable code	Related definition
Financial risk metric values	FR	Bathory's model metrics
debt structure	x1	Current liabilities / non-current liabilities
	x2	Current Ratio
solvency	x3	Quick Ratio
	x4	Asset-liability ratio
performance	x5	Net profit rate
	x6	Total asset returns
	x7	Inventory turnover
operation ability	x8	Fixed asset turnover
	x9	Total asset turnover
	x10	Accounts receivable turnover
capital structure	x11	Net assets ratio
	x12	Fixed assets ratio

Table 2: Descriptive statistics

	N	min	max	mean	S.D.
FR	513	.04	34.89	4.3824	6.0894
x1	513	.16	423897.00	21561.3247	8.1247
x2	513	.30	21.85	1.7845	2.8974
x3	513	.18	18.97	1.5147	2.1257
x4	513	1.94	94.64	40.9846	21.0244
x5	513	.55	64.58	9.3254	10.3247
x6	513	.47	29.97	6.8520	4.2874
x7	513	.25	1457.80	13.2457	101.3254
x8	513	.13	84.30	7.0254	9.2574
x9	513	.12	5.87	.6547	.5478
x10	513	1.33	3125.84	71.2547	455.3264
x11	513	2.47	82.64	49.3256	20.3547
x12	513	.31	90.12	22.3584	18.3652

relatively strong. Insert table 2 here.

Correlation Analysis

Correlation statistics test result for the sample was shown in table 3. The correlation analysis indicated that FR had a significantly positive correlation with current ratio, quick ratio, net profit margin, return on total assets, net assets ratio, in other words, financial risk had a significantly negative correlation with current ratio, quick ratio, net profit margin, return on total assets, net assets ratio. FR was significantly negative with total asset turnover, asset-liability ratio, fixed asset ratio, and no significant correlation with debt structure, inventory turnover, fixed asset turnover, receivables turnover.

Multiple Linear Regressions

Taking FR as dependent variable and the value of $x1 \sim x12$ as independent variables, multiple linear regression has been modeled. First of all, the regression result was not very satisfactory when put all 12 independent variables into the model. Considering there may have collinearity problem between variables, removed the variables of linear obvious: Quick ratio, debt ratio, return on total assets. Then the regression result was better. Regression coefficients were shown below (table 4). From the multiple linear regression, the significance of current ratio, net profit rate, net assets ratio, the ratio of fixed assets were 0.000, it indicated that the four

Table 3: Correlation analysis

	x1	x2	x3	x4	x5	x6
Pearson	-.007	.792	.902	-.686	.841	.614
Sig.	.301	.000	.000	.000	.000	.000
	x7	x8	x9	x10	x11	x12
Pearson	-.084	-.091	-.204	-.074	.847	-.184
Sig.	.221	.167	.041	.224	.000	.083

Table 4: Regression test results ^a

	Non-standardized coefficient		Standard coefficient	t	Sig.
	B	Standard error			
(constant)	-5.879	.771		-5.987	.000
debt structure (x1)	-9.8547	.000	-.021	-.584	.482
Current Ratio(x2)	1.885	.114	.784	19.325	.000
Net profit rate (x3)	.201	.034	.228	4.985	.000
Inventory turnover (x7)	.000	.004	-.025	-.704	.498
Fixed asset turnover (x8)	.024	.018	.037	1.084	.147
Total asset turnover (x9)	.364	.354	.040	1.209	.113
Accounts receivable turnover (x10)	.000	.000	-.025	-.324	.428
Net assets ratio (x11)	.087	.034	.314	4.023	.000
Fixed assets ratio (x12)	.077	.017	.228	3.984	.000

a. dependent variable: FR

Table 5: Regression testing

model	Sum squares	of df	Mean square	F	Sig.	R ²	Adjusted R ²	Standard error of estimate
Regression	5113.651	9	502.365	113.589	.000 ^a	.971	.923	1.81256
residual	611.254	457	3.461					
Total	602.638	466						

variables had a significant linear relation with financial risk metric values-FR and they were the main factors affecting financial risk. The Sig of fixed asset turnover, total asset turnover were less than 0.15, had certain significance, and a certain impact on the financial risk. The sig of debt structure, inventory turnover, and accounts receivable turnover rate were less significant, the impact on financial risk is not obvious. The result of regression test shows $F=113.589$, P (Significance level) was 0.000, R^2 of regression model was 0.971, adjusted R^2 was 0.923. In the case of large samples ($n=466$), the fitness (R^2) of the model was well. Finally, multicollinearity test has been done for the nine variables to avoid multicollinearity. The test index we used was tolerance (TOL) and variance

inflation factor (VIF). The tolerance of variables X_i can be defined as: $Tol_i = 1 - R_i^2$. When VIF was more than 5, in general, it meant that strong collinearity appeared in variables. The result of multicollinearity test showed that the nine variables' VIF were both less than 5, so the nine variables can be considered no significant multicollinearity.

Conclusions

SMEs' financial risk has a significant negative correlation with solvency in India, especially flow ratio that reflects short-term debt paying ability; this is consistent with the obverse assumption. Descriptive statistics shows that the mean value of current liabilities is up to 21561 times of the

long term liabilities. It indicates that SMEs in India mainly choose short-term debt financing; it certainly will 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 correlation with profit ability (net profit rate) in India. This conclusion is also consistent with what get obverse. All the funds of the enterprise need to get complement and expand through earnings, no matter it are used to cover losses, or expand enterprise production scale or repay the debts. If an enterprise has no profit for long term, it will face the repayment pressure of maturing debt, damage enterprises' reputation, and also can not continue financing. Eventually, the enterprises will fall into financial risk inevitably. The higher return on investment and the better profitability of the enterprise are the less occurrence of the financial risk will be. SMEs' financial risk has a significant negative correlation with the capital structure in India. Two capital structure indexes of net assets ratio and fixed assets ratio have good linear correlation with financial risk. Also it can be understood easily from the reality that net assets is low in the total assets, and then the size of debt is high. As a result, more principal and interest is due to repay. It will cause certain pressure for the enterprises' capital flow, at the same time it might affect other production activities. Especially when enterprises were under the circumstance of not-good management,

it's very easy to make enterprises sink into financial risk, even insolvent. Fixed assets is the foundation of enterprise deeper development, at the same time, it's also the guarantee for debt financing of SMEs, such as mortgage financing, secured financing etc. In some extend, the size of fixed assets ratio of SMEs indirectly react the size of continuing financing, especially when financial situation is not good. So fixed assets ratio of enterprise are crucial whether the enterprise can continue to finance or not. SMEs' financial risk has no obvious linear correlation with debt structure in India. This isn't consistent with our obverse hypothesis. From the result of descriptive statistics it is clear that SMEs' debt structure do exist imbalance status, current liabilities is major in total liabilities, and long-term debt ratio is very low. As what is analysed in this paper, this indicator didn't show a good significant. The reason may be due to its scale and other restriction reasons. SMEs mainly depend short-term debt financing, at the same time, its current asset is good fluidity that can well ease payment pressure brought by short-term debt, thereby reducing the incidence of financial risk. As interaction, debt structure does not become the main factor that influence the financial risk in the sample regression analysis. SMEs' financial risk has no significant linear correlation with management ability in India. It is different from many other scholars' opinion, also different with the foregoing hypothesis.

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