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The Risk Comparison Between Large Enterprises and SMEs on Chinese Pharmaceutical Industry

Based on the Solvency Indicators

COMPARAISON DES RISQUES ENTRE GRANDES ENTREPRISES ET PME DE L'INDUSTRIE PHARMACEUTIQUE CHINOISE

BASÉE SUR LES INDICATEURS DE SOLVABILITÉ

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Abstract: The development of Medium and small enterprises (SMEs) in China are facing many difficulties to overcome its economic contradictions and problems. Financing will bear the brunt. As the SME's own characteristics, which is small and the controllable resources are scarcer, often are growing rapidly, and require large capital investments. The current situation of SME financing is not good. The paper contributes using the basic method of statistical analysis of variance according to the research on financing difficulties of SMEs in relation to their business risks. Firstly the solvency indexes reflect the businesses are illustrated. Secondly, the paper introduces the basic principles of variance analysis and homogeneity of variance test and variance analysis of multiple comparisons. Finally the use of SPASS on the pharmaceutical industries' solvency targets is analysed through the financial indicators related to SMEs' finance difficult situation verified whether the risk of their operations has a significant impact.
Keywords: SMEs; finance difficulty; operation risk; variance analysis; solvency ability.

Résumé: Le développement des petites et moyennes entreprises (PME) en Chine est en train de faire face à de nombreuses difficultés pour surmonter les contradictions et les problèmes économiques. Le financement fera les frais. Comme les caractéristiques propres des PME, elles sont petites, leurs ressources contrôlables sont plus rares, elles ont une croissance de plus en plus rapide et ont besoin de gros investissements. La situation actuelle du financement des PME n'est pas très bonne. Le présent article utilise une méthode de base de l'analyse statistique de la variance en fonction de la recherche sur les difficultés de financement des PME par rapport à leurs risques d'affaires. Tout

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d'abord, les indices de solvabilité reflétant les affaires sont illustrés. Ensuite, l'article présente les principes de base de l'analyse de la variance, l'homogénéité du test de variance et l'analyse de la variance des comparaisons multiples. Enfin le SPASS a été utilisé pour analyser les objectifs de solvabilité des industries pharmaceutiques à travers les indicateurs financiers liés à des difficultés de financement des PME afin de vérifier si le risque de leurs activités a un impact significatif.

Mots-clés: PME; difficulté de financement; risque de fonctionnement; analyse de la variance; capacité de solvabilité

1. INTRODUCTION

According to the end of November 2009 data, there are 9,718,900 domestic-funded enterprises (including private enterprises), and 4,341,000 forgeign-invested enterprises, and 3,184,020 individual businesses in china. SMEs in China weighted more than 99%, more than 40 million. The industrial output value, profits and taxes, exports have accounted for the country's 60%, 50% and 68% respectively. SMEs provided 75% job opportunities. The financing difficulties of SMEs has become the hotspot, has restricted the further development of SMEs in China. Financing difficulties of SMEs whether increases their operation risk is very important. The paper will explore the links between financing difficulties and operational risk of SMEs. Financial indicators refer to the collection of financial informations and illustration of financial activities which reflect production and operation process and outcome of economic indicators.

Financial indicators is the datas in the calculation indexs through company's financial report. Solvency ability is the capacity to repay corporate debt (including principal and interest) within maturity. Repayment of debts in due date is an important indicator reflects the financial situation good or bad. Common indicators include: current ratio, quick ratio, asset-liability ratio, equity ratio.

Current Ratio = current assets / current liabilities. The indicators reflect the company's capacity to repay short- term debt. The more liquid assets, the less short-term debt. The larger the current ratio is, the stronger corporate short-term solvency. If the solvency was less than the normal, short-term corporate debt is in a higher risk situation. In general, business cycle, the amount of receivable accounts of current assets and inventory turnover rate are major factors that affect the current ratio.

2. MATHEMATICAL MODEL

R. A. Fisher invented analysis of variance (ANOVA), also known as “analysis of variance”, or “F test”. It is a significance test for more than two and two sample mean difference. It tests the significant difference between variables and the dependent variables whether is caused by the random sampling. It decomposes the changes process of each variables as the value of dependent variable with different values. Comparison of the contributions of each variables and random errors (F test) determines whether the type of dependent variables have significant effects on numerical variables.

2.1 Analysis of variance

2.1.1 The original hypothesis

Ho: $\mu 1 = \mu 2 = \bullet \bullet \bullet = \mu i = \bullet \bullet \bullet = \mu k$. H1: μi ($i = 1,2 \bullet \bullet \bullet, k$) does not equal wholely. μi is the ith mean, if rejected the original hypothesis, it means that significantly affected the dependent variable. It was significantly related between independent variables and dependent variables. If do not reject the null hypothesis, there is no evidence that shows it has a significant effect on the independent variable with the dependent variable, which is no significant difference between the independent variable and dependent variables.

2.1.2 Established statistic tests

If test Ho is set up, need to determine statistic test.

Firstly, calculate the sample mean of k-factors. assume that select a simple random sample with the extract of sample size ni from population i so that xi is the i-population sample mean, there are (i = 1,2, • • • k)

$$\bar{x}_i = \frac{\sum_{j=1}^{n_i} x_{ij}}{n_i}$$

Where, ni is population sample size i, xij population observation i.

Secondly, calculat the total mean of all observations. It is the sum of all observations divided by the total number of observations, bring the total mean $\bar{\bar{x}}$, and

$$\bar{\bar{x}} = \frac{\sum_{i=1}^{k}\sum_{i=1}^{k} x_{ij}}{n} = \frac{\sum_{i=1}^{k} n_i \bar{x}_i}{n}$$

Where,$n=n_1+n_2+\cdots+n_k$

Thirdly calculat the error sum of squares. To constructtest statistics, It is required in the calculation of the three error sum of squares during analysis of variance, which are the total error sum of squares, standard error mean and, on average of error term., the total error sum of squares. They are the error sum of squares of the observations X_{ij} and the total mean $\bar{\bar{x}}$.

$$SST = \sum_{i=1}^{k}\sum_{j=1}^{n_i}(x_{ij} - \bar{\bar{x}})$$

The horizontal sum error is the sum error of mean of each group $\bar{x}_i(i = 1,2,\cdots k)$ and total mean $\bar{\bar{x}}$, SSA is known as the effect of independent variables or factors. The formula is:

$$SSA = \sum_{i=1}^{k}\sum_{j=1}^{n}(\bar{x} - \bar{\bar{x}})^2 = \sum_{i=1}^{k} n(\bar{x} - \bar{\bar{x}})^2$$

Finally, the calculation of statistics. As a result of the size of the error square and the number of observations related to the number of observations in order to eliminate the errors and the size of the square, the average is needed, using the square and divided by the corresponding degrees of freedom equal to the variance, the three variances and corresponding degrees of freedom were: SST's degrees of freedom n-1, where n is the number of all observations; SSA have degrees of freedom k-1, where k is the number of factor levels; SSE of degrees of freedom n-k.

Calculate the mean square SSA and SSE. SSA is also known as the mean square between groups, denoted by MSA, its formula is:

MSA = SSA / K-1

MSE = SSE/ n-k

Compared with MSA with MSE, which are needed to test statistic F, when H0 is true, then F distributes:

$$F = \frac{MSA}{MSE} \sim F(k-1, n-k)$$

2.1.3 Statistical decision

Calculate the test statistic, compare the value of F statistics with given level α of significance threshold F_α, which can make a decision on the original hypothesis H0. If F> F_α, then reject the hypothesis H0,

thatμ1=μ2=···=μk not hold, that there are significant differences, the test factors on the observed values have a significant impact. If not reject the null hypothesis H0, there is no evidence of significant differences, that is, when the test can not believe that the factors on the observed values have a significant impact.

2.2 Homogeneity of variance test

Statistical test of homogeneity of variance is the sigificance test to the differences for two independent samples taken as the overall variance. First of all, there is no difference between population variances with two original hypothesis that $H_0:\sigma_1^2=\sigma_2^2$ and the alternative hypothesis $H_1:\sigma_1^2\neq\sigma_2^2$. By comparing the difference between two sample variances, S_1^2 and S_2^2, to infer the differences of the overall variances, σ_1^2 andσ_2^2. Because statisticians have proven $F = S_1^2/S_2^2$ ratio of the sampling distribution follows the F distribution, denoted as:

$$F = \frac{S_1^2}{S_2^2} \sim F(N_1 - 1, N_2 - 1)$$

F distribution has two degrees of freedom, $df_1=n_1-1$ as molecular degrees of freedom, $df_2=n_2-1$ as the denominator degrees of freedom, the $F=S_1^2/S_2^2$ known as the F statistic. F distribution patterns with the F ratio in the numerator and denominator degrees of freedom changes in the formation of a cluster of positively skewed distribution curve.

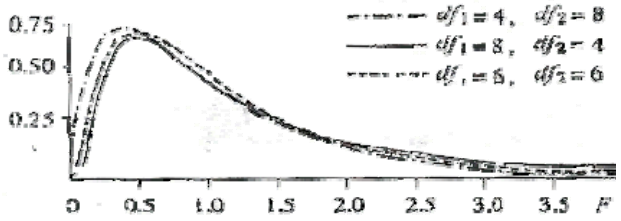

Figure 1: F distribution curve

Combination of various degrees of freedom formed the theoretical F value, you can check the value of F table, the table top in the F rampant that the ratio of the molecular degrees of freedom (df_1), the far left column that the denominator degrees of freedom (df_2). F value lists only the critical value of the right side of the table, so in the calculation of the value of F statistics, it must be one of the larger sample variance as elements, the small one for the denominator, making $F \geqq 1$, so that you can make decisions and compare the critical values of the F form: if the result obtained by calculating the F value is greater than the critical value, then object the original hypothesis; if the result obtained by calculating the F value is less than the critical value, will accept the original hypothesis.

3. ANALYSIS

3.1 sample selection

Sample selection unified selects the pharmaceutical industrys. Six companis are selected based on company sizes which avoids the different factors of different industries. They are divided into large companies and SMEs, large companies include: Dongbei Pharmacyl, 3 Jing pharmacyl, Yunnan Bai Yao. SMEs include: Huabond pharmacy, Hualan Biological, Jingxin Pharmacy.

3.2 Index Selection

Corporate solvency indicators select the current ratio, ability of business operations to select the receivable accounts and total assets turnover turnover indicators. The indicators of corporate profitability select return on total assets, reflect cash flow targets and operations of the companies.

3.3 Enterprise solvency analysis

Table 1: Test of homogeneity of variance on current ratio

Test of Homogeneity of Variances			
Current ratio			
Levene Statistic	df1	df2	Sig.
36.973	5	114	.000

Table 1 shows homogeneity of variance test results in significant probabilities p = 0.00 <0.05, indicates that the data does not have homogeneous variances.

Table 2: ANOVA on Current ratio

ANOVA					
Current ratio					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	122.571	5	24.514	16.311	.000
Within Groups	171.329	114	1.503		
Total	293.900	119			

Table 2 is ANOVA table. Column 2 represents bias squared and Sum of Squares, which groups square deviation is 122.571, squared deviations within groups is 171.329, total deviation squared is 293.900. Column 3 states the degrees of freedom is 5 that the test statistic (df) degrees between groups. squared deviations within groups is 114, total degrees of freedom (Total df) is 119. Column 4 shows the mean square is the quotient of deviation sum of squares and degrees of freedoml, are 24.514 and 1.503 respectively, whihci is the ratio for the F distribution of observations. Column 5 is the statistic F value, calculated 16.311.

4. CONCLUSION

In summary, solvency indicators can be drawn through business discussions: There are no clear boundaries based on the solvency indicators between large enterprises and SMEs. Therefore, comparing with the relatively large enterprises, it can not simply consider that the financing difficulty of the SMEs is a significant factor causing the high business risk of the company, namely SME financing difficulty is not the direct reason caused high operational risk.

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