An empirical study on factors influencing capital structure of pharmaceutical listed corporations

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ABSTRACT

Based on the theory of capital structure, the paper combines specification analysis with empirical analysis to discuss the factors which affecting the capital structure of the pharmaceutical industry and its influence. The essay constructs a panel data model to study the selected financial data of 119pharmaceuticallisted companies from 2010 to 2013. The results show that the size of enterprises and collateral value are positively related to capital structure; profitability, debt paying ability and ownership concentration are negatively correlated to the capital structure; development ability, tax shield effect of debt and operational ability are not significantly related to the capital structure. Finally, according to the current situation of the pharmaceutical regulation and the characteristics of pharmaceutical, this paper proposes some suggestions on how to optimize the enterprise's capital structure.

Keywords: capital structure; influencing factors; pharmaceutical
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INTRODUCTION

As the core theory of western financial management theory, the theory of capital structure plays an important role in managing the company. The so-called capital structure or the financing structure refers to a variety of capital value composition and ratio. [1] For example, the optimal capital structure will maximum the welfare of shareholders or the share price. The capital structure reflects the enterprise asset-liability ratio, it significantly influence the enterprise debt and refinancing capacity, thus affecting the future profitability.

From different angles, domestic and foreign scholars have researched on this topic. Among them, Lu Zhengfei believes that significant difference do exist in different sectors. [2] So far, the scholars haven't come to an agreement on the conclusion of the study. Based on the current articles about the research, this paper takes the pharmaceutical listed companies as samples to discuss the factors influencing capital structure and its influence. By using pharmaceutical listed companies' annual financial data, this paper choose the fixed effects model to reach the following conclusions: firm size, profitability, solvency, asset guarantee ability, ownership concentration will exert an influence on the pharmaceutical capital structure; however, the development capacity, tax shield effect, operation ability and the capital structure is not significant correlation. Among them, the enterprise scale, asset guarantee ability are positively correlatedwith capital structure. And profitability, solvency and ownership concentration are negatively related to capital structure.

EXPERIMENTAL SECTION

1.1 Research hypothesis
Through the analysis of the related theory of capital structure, this paper takes asset-liability ratio as dependent variable and set the enterprise scale, development ability, profitability, debt paying ability, operation ability, capital

guarantee ability, tax shield effect and the ownership concentration as independent variable to conduct multiple linear regression. [3] This paper puts forward the following hypothesis:

H1: Enterprise scale and enterprise capital structure are positively related.
H2: Development ability and the capital structure are positively related.
H3: Profitability is negatively related to the enterprise capital structure.
H4: Solvency is negatively related to the capital structure.
H5: Operation ability has a positive correlation with the capital structure.
H6: Capital guarantee ability is positively related to the capital structure.
H7: Tax shields and capital structure are positively related.
H8: Ownership concentration is positively associated with the capital structure.

1.2 Data source

This paper collects annual financial statement data of 119 listed pharmaceutical companies from 2010 to 2013, which are selected from 149 pharmaceutical listed companies in CSMAR by following selection principles:

(1) It gets rid of 3 companies in the B share market in order to eliminate the differences in different public sector.

(2) Considering the bigger difference of financial data from ST listed pharmaceutical companies, it also eliminated 4 corporations which are now or for ST and * ST shares to guarantee the validity of the results.

(3) Considering comparability of various data form selected samples within a certain time span, it also eliminated 23 samples with incomplete data in the observation period.

1.3 Selection and measurement of variables

Based on the above analysis, we get about the specific measure of each variable used in empirical research method, which are shown in the table below:

Table 1 The choice and measure of variables

Aspect	code	name	definition
Capital structure	Y	Asset-liability ratio	Total debt/total assets
Company size	X_1	LN(total assets)	LN (total assets)
Development capacity	X_2	Growth rate of total assets	(Final total assets - initial total assets)/initial total assets
Profitability	X_3	Net profit margin of total assets	Retained profits/total assets
Solvency	X_4	Quick ratio	(Currentassets -inventory)/current liabilities
Operation ability	X_5	Turnover rate of total assets	Operating income/ final total assets
Capitalguarantee ability	X_6	Capitalguarantee ability	Inventory+ fixed assets+ projects under construction+ investment property/total assets
Tax shield effect	X_7	Actual income tax rate	Income tax expenses/total profit
Ownership concentration	X_8	The ratio of the first three big shareholder holds	Sum of ratio that top three shareholders holds

1.4 Selection of empirical model

According to the above analysis, this article takes empirical model as shown below:

$$y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7i} + \beta_8 X_{8it}$$

Among them, i means individual companies from the selected samples, t sample time distribution, y_{it} shows asset-liability ratio, the following different independent variable expresses the firm size, growth rate of total assets, net interest rate of total assets, quick ratio, turnover rate of total asset, assets guarantee ability, actual income tax rate and equity concentration. In addition, α、β_{1-8} expresses parameter for each variable.

RESULTS AND DISCUSSION

2.1 F test

First of all, we use the F test to choose individual fixed effect model or the mixed regression panel data model. The null hypothesis and alternative hypothesis:

H_0: contrast mixed regression model
H_1: contrast individual fixed effect model
F statistics are defined as follows: F= [(SSEr-SSEf)/N-1]/ [SSEf/ (NT-N-K)]

Among them, SSEr means the sum squared resied of mixed effect model, SSEf means the sum squared reised of fixed effect model, N means the number of sample, T means the number of year of samples, K means the number of independent variable.

If the F statistic value is larger than critical value of the significant level, we will reject the null hypothesis and choose the individual fixed effect model. Otherwise, we will choose the mixed regression model.

$F= [(45.63553-6.433187)/ 119-1]/ [6.433187/(119*4-119-8)]=18.02309;$

Critical value at the significant level of 5%: F.INV(0.05,118,349)=0.773096;

Therefore, the individual fixed effect model will be preferable.

2.2 Hausman test

Then we use the Hausman test to further choose individual fixed effect model or the random effect model. The null hypothesis and alternative hypothesis:

H_0: contrast random effect model
H_1: contrast individual fixed effect model

According to the result, Chi-Sq.Statistic=41.117801, Prob.=.0000<0.05.

Therefore, we reject the null hypothesis and choose the individual fixed effect model.

2.3 Regression result

This paper conducts panel data model to estimate the samples. After the F test and Hausman test, we finally choose the individual fixed effect model. Under Cross-section weights, we use generalized least square method to eliminate the influence of interfacial heteroscedasticity.

Table 3 Regression result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1?	0.018406	0.009690	1.899443	0.0483
X2?	0.017744	0.002208	8.035240	0.8596
X3?	-0.592761	0.094998	-6.239719	0.0000
X4?	-0.002412	0.000396	-0.173882	0.0021
X5?	0.091393	0.028509	-3.205714	0.0515
X6?	0.797007	0.043119	18.48388	0.0000
X7?	0.017480	0.021411	-0.816419	0.4184
X8?	-0.000480	0.000554	0.867218	0.0364
C	-0.278477	0.002096	-1.331988	0.0083
R-squared	0.973737			
Adjusted R^2	0.964256			
F-statistic	102.6967			
DW	1.863185			
Prob.	0.000000			

Using the panel data model to analysis the influence factors of asset-liability ratio, then the regression equation is as follow:

$Y_{it}= 0.018406X_{1it}-0.592761X_{3it}-0.002412X_{4it}+0.797007X_{6it}-0.00048X_{8it}-0.278477$

2.4 Analysis of result

According to the regression result, the enterprise scale, profitability, solvency and capital guarantee ability are consistent with the null hypothesis. Among them, the enterprise scale is positively related to the company's capital structure under 5% significance level. Although, diversified business strategy cannot guarantee higher profitability, to some extent, it can effectively reduce the management risk of the enterprise, thus confirming stability of management in big firms. [4] Larger companies are able to bear the higher asset-liability ratio. Profitability is negatively correlated to enterprise capital structure under the significance level of 5%. It suggests that a company with stronger profitability has more opportunities to use the company's retained earnings for financing, [5]thus the proportion of exogenous financing will be reduced. Debt paying ability and the enterprise capital structure are also negatively correlated under the significance level of 5%. Enterprises with greater quick ratio are able to meet its liabilities in shorter time so that the ability of capital turnover will be improved, thus reducing the dependence on

external financing. Asset-backed ability has positive relationship with enterprise capital structure under the significance level of 5%. Pharmaceutical companies take the objects such as inventory and fixed assets to guarantee the ability to pay down debt. [6] With higher value of these objects, it will be easier to receive a better credit rating and get loans from the bank.

In this paper, the empirical results show that, contrary to the null hypothesis, ownership concentration is negatively related to corporate capital structure under the significance level of 5%.In the pharmaceutical listed companies, management may prefer to choose those which may not have a significant impact on control power and the right to ask for residual interest when making financing decision. Due to the strong economic constraints, external debt financing may be abandoned.

The empirical results also show that the development ability, operating ability and debt tax shield effect was not significantly correlated to asset-liability ratio, which are also not consistent with the original hypothesis. Among them, the development ability doesn't has a direct relation with the asset-liability ratio. Greater development ability shows a better prospect, profitability and debt paying ability will also be improved. But considering the nature of pharmaceutical industry, it belongs to technology intensive enterprises with high risk. Given the huge uncertainty of pharmaceutical industry, ability of enterprise's development cannot be the single indicator to decide the limit of loans. Therefore, the development ability and the asset-liability ratio don't have significant link. Operation ability and the asset-liability ratio of listed companies of pharmaceutical has no significant positive correlation. Because the market economy of our country starts relatively late, relevant system should be improved. When deciding the limit of loans, in addition to financial indicators such as operating ability, the interest of local governments and other institutions will also be considered, thus gradually weakening the indicators like operation ability. Besides, debt tax shield effect and the rate of assets and liabilities of the pharmaceutical listed companies also show no significant positive correlation. It suggests managers' ignorance of the tax effect. They didn't make full use of the tax shield effect of debt, thus causing indistinctive relation between tax shield effect and enterprise's capital structure.

CONCLUSION

3.1 Research conclusions
The results show that the size of enterprises and capital guarantee ability are positively related to capital structure; profitability, debt paying ability and ownership concentration are negatively correlated to the capital structure; development ability, tax shield effect of debt and operational ability are not significantly related to the capital structure.

3.2 Suggestions
(1)Transformation of development mode
By implementing the diversified business strategy, it also helps to achieve large-scale development, scatter business risk, establish brand effect and get higher credit ratings to raise a loan at relatively low cost.

(2) Broaden the financing channels
The single channel of financing has been the main problems in thepharmaceuticalindustry. All the fund for research and development, achievement transformation and industrialization come from their own retained earnings and government support. Meanwhile, credit funds from bank find it hard to enter the stage. Market financing behavior leads to the high requirement, which also restrict the industrial development.

In orderto alleviate the increasingly tense situation, pharmaceutical companies should develop diversified financing channels and innovate ways of financing. It may try to bound with financial institutions and introduce the trust fund, which can concentrate idle capital of society. Through the professional management, it can share the risk of pharmaceuticalindustry as well as meet the capital needs, thus enrichingthe external financing channels and increasing the flexibility of financing forms. At the same time, the pharmaceutical enterprises should also vigorously develop the bond market. [7] By improving the bond financing ratio, it can achieve the purpose of optimize the capital structure of enterprises.

(3) Optimize equity structure
Pharmaceutical industry should actively promote equity reform to standardize corporate governance structure, thus avoidingthe phenomenon of the single-large shareholder, which weaken the independence of management. By reducing the concentration of enterprise's equity, mangers should make full useofsupervision to realize the effective management andoptimize allocation of resources. It also helps to optimize the companies' capital structure and achieve the goal of enterprise value maximization.

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