Research on the Relationship between Debt Financing and Operating Performance Based on Mediation of Diversification

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Abstract

Debt financing and diversification are two important characteristics of agricultural listed companies in China. This paper uses multiple linear regression model with financial data of 52 agricultural listed companies from 2009 to 2014 in Chinese Stock Exchanges to study the mediating effect of diversification on debt financing and operating performance. Results show that debt financing has a significantly negative impact on operating performance, and diversification plays a partial intermediary role between debt financing and operating performance.

Keywords

Debt Financing, Diversification, Operating Performance, Mediating Effect

1. Introduction

Agriculture plays an important role in the development of the national economy and the stability of society in China. Agricultural listed companies are outstanding representatives of agricultural industry, and have a leading role in optimizing the structure of agricultural industry, solving the problem of agricultural investment and improving the international competitiveness of agriculture. Because of the public welfare of agricultural industry, Chinese government offers strong support to agricultural listed companies in credit policies, especially in debt financing. Being burdened with important task, however, agricultural listed companies' operating performance is relatively low in China. Due to the weakness of the agriculture and profit-driven characters of the capital, it's very common for agricultural listed companies to implement the strategy of pluralistic management [1].

Trade-off theory considers that the nature of debt financing in repayment of interest regularly will result in greater pressure on corporate funds. The poor management of enterprise will lead to financial crisis, and even

the risk of bankruptcy [2]. Since creditors are more risk aversion than equity holders, creditors may force operators to give up some high risk investment opportunities, and this will bring about under-investment to enterprises. Though the relationship between diversification and operating performance was unable to reach a consensus, considering this issue from two aspects of added value and coordination cost is reasonable [3]. Diversified operation will expand the size of enterprise, and internal relations will become increasingly complex. Owning to the limited resources inputted in new areas, the coordination costs among different businesses of enterprise are increased and even affecting the competitiveness of the main business. Based on perspectives of financing and investment, this paper attempts to explore the impact of debt financing and diversification on operating performance of agricultural listed companies.

Diversification of agricultural listed companies has captured a wide attention in academic circle. Peng *et al.* noted that agricultural listed companies invested non-agricultural area mainly resulting from the weakness of agricultural industry [4]. Researches on diversification are mainly based on the macro background of the agricultural industry, and rather than the micro environment of the enterprise. Furthermore, researches on the financing constraint problem mainly focus on how internal cash flow affects investment behavior of enterprises [5] [6]. Few studies involve the impact of financing method on investment strategy of agricultural listed firms. In this paper, we introduce diversification as a mediating variable into the study and research the relationship between debt financing and operating performance. We try to answer the following two questions: 1) Whether debt financing has a direct impact on operating performance of agricultural listed companies? 2) Whether diversification plays an intermediary role between debt financing and operating performance of agricultural listed companies?

2. Literature Review and Research Hypotheses

2.1. Debt Financing and Operating Performance

Modern capital structure theory can be traced back to the MM theory proposed by Modigliani and Miller, this theory infer that capital structure has nothing to do with enterprise value in a series of strict assumptions, namely there does not exist an optimal capital structure [7]. Because there is no near perfect capital market in reality, the MM theory has not been widely accepted. However, researches on capital structure, especially debt financing has been one of the hot researches in the field of financial problems ever since.

Through analyzing theories, we summarize the advantages of debt financing: firstly, liabilities tax shields role. The element of tax was introduced into financing structure analysis in the modified MM theory. Debt financing can reduce corporate financing costs because of liabilities tax shields role and promoting firm value [8] [9]. Secondly, signal transfer function. The pecking-order financing theory believes that the issue of bonds is considered to be a good business reputation and operating performance [10]. Last but not least, reducing agency costs. According to the Jensen's hypothesis of free cash flow, debt could be to curb over investment. Debt financing will reduce free cash flow, and the risk of bankruptcy can motivate managers to work hard and achieve the maximum of firm value [11].

Based on the reality of agricultural listed companies in China, the incentive effect of debt can not work effectively because of incomplete corporation government mechanism. Besides, operating performance of agricultural listed companies is relatively low and Chinese government provides many preferential tax policies for agricultural listed companies. So, liability tax shield effect is not very obvious. Due to the existence of credit rationing, agricultural listed companies' debt financing has a single source in China. Short-term bank loans is a main financing channel in agricultural listed companies. Although the short-term debt financing cost is relatively low, a large number of capital outflow increases enterprise financial risk in a short time [12]. Agricultural industry has a long payback period feature. The inhibition of debt financing on investment will also affect operating performance of agricultural listed companies. Based on the above analysis, this paper puts forward the following hypothesis:

H1: Debt financing is negatively associated with operating performance.

2.2. Debt Financing and Diversification

Financing and investment are two basic financial activities in financial management, and the financing environment of enterprise has a significant impact on investment activities. The existence of financing constraints has to

give up some investment opportunities, thereby reducing the degree of diversification of the enterprise [13] [14]. Furthermore, the impact of different sources of debt financing on the scale of investment is not different. Commercial credit and bonds are stronger than bank loans on the constraint effect of investment [15].

The state offered strong support to agricultural listed companies in the credit policies, and the problem of financing constraints in agricultural listed firm is not very serious. Since the development of bonds is relatively lagged behind in China, bank loan is currently the main source of debt financing. Bank loan is weaker than Commercial credit and bonds on the constraint effect of investment. It is very common to change the investment direction of bank loans [16]. Besides, the increase in the proportion of debt financing to total assets will strengthen the power of managers. Professional managers have motivation to enlarge enterprise scale by diversification strategy so that they can earn a higher salary. Meanwhile, limited channels of debt financing mean that enterprises need large amounts of funds to refinance maturing debt in a short term. Agricultural listed companies tend to invest non-agricultural areas to make short-term profit and reduce the financial risk. Therefore, this paper puts forward the following hypothesis:

H2: Debt financing is positively associated with diversification.

2.3. The Mediation of Diversification

There is a close relationship among financing method, investment strategy and corporate performance. The method of financing is the basis of investment strategy, and corporate performance depends on its investment strategy. The thesis attempted to introduce investment strategy as an intermediate variable to explore the relationship between financing method and corporate performance.

Diversification strategy is one of the most important business ways in operation. Along with increasingly drastic competition, more and more agricultural listed companies in China tend to chose diversified strategy. In order to put the limited resources into the highest income project at the lowest cost and ensure the enterprise fast development, the enterprise should make comparison and choice to each project. However, diversification will expand the size of enterprise, which increases the cost of cooperation and coordination, and reduces the decision-making efficiency. Companies which carry out diversification strategy will reduce the value of the enterprise, and resulting in the phenomenon of corporate diversification discount [17]. Without the integration of internal and external resources, agricultural listed companies ignored the development of the staple while managing in diversification blindly. The use of limited resources ineffectively will weaken the core business competitiveness, and affect the enterprise's overall operating capacity [1] [4]. Liu *et al.* found that the degree of overall diversification and unrelated diversification of agricultural listed companies have a negative impact on operating performance [18].

Hypothesis 2 points out that debt financing has a positive impact on diversification, while diversification is not conducive to improving the performance of agricultural listed companies. This shows that debt financing indirectly affects operating performance of agricultural listed companies through diversified operation. Namely, the impact of debt financing on operating performance partly depends on diversification in agricultural listed companies. Therefore, the following hypothesis is put forward in this paper:

H3: Diversification plays an intermediary role between debt financing and operating performance.

Above all, **Figure 1** shows the relational model assumed in this paper.

## 3. Measures of Variables and Research Method

3.1. Measures of Variables

3.1.1. Independent Variable

In this paper, debt financing is seen as the independent variable. In the research of capital structure, debt financing mainly includes creditor's rights financing in direct financing and indirect financing through banks, which is usually measured by asset-liability ratio. So this paper uses LEV as the indicator of debt financing, and calculated by the following formula:

$$LEV = \frac{TL}{TA} * 100\%$$

where LEV represents asset-liability ratio; TL represents total liabilities; TA represents total assets. Compared to other indicators, LEV has two major advantages: firstly, all calculations are available from financial statements
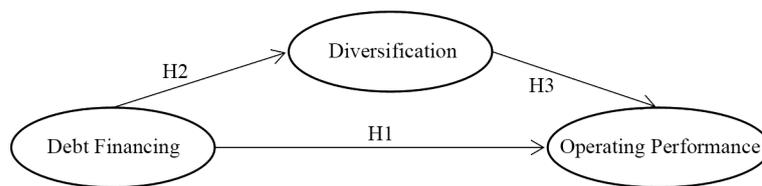
Figure 1. Conceptual model figure.

with higher objectivity; secondly, this indicator reflects the degree of debt financing based on the percentage of the total assets raised by borrowing, so it is a comprehensive index to evaluate the company's debt level.

3.1.2. Dependent Variable
In this paper, operating performance is the dependent variable. Usually, Tobin's Q, shareholder value added (SVA), economic value added (EVA), return on equity (ROE), return on assets (ROA) can be used as indicators of operating performance. In this paper, operating performance is appropriate to be represented by return on assets (ROA) for these reasons: firstly, the realization of operating performance ultimately reflected in the improvement of economic benefits; secondly, financial performance indicator shows higher reliability and objectivity, and it is easy to obtain from financial statements.

3.1.3. Mediator Variable
In this paper, we take the degree of diversification as the moderator variable. Most of the present literature defines diversification mainly from two angles, that is, the number of industries involved in the main business and the degree of diversified operation including Herfindahl index (HI) and Entropy index (EI). This paper uses the degree of diversified operation represent diversification, with Herfindahl index (HI) as the indicator, and calculated by the following formula:

$$\text{HI} = \sum_{i=1}^{n} P_i^2$$

where P_i represents each department of revenue to total revenue ratio. The value of HI is 0 to 1, and the larger value of HI, the lower diversification level.

3.1.4. Control Variables
The ownership of enterprise will not only affect the financing environment, but also affect investment strategy, thus affects the enterprise performance. So in this paper, we introduce the virtual variable Owner, when the enterprise belongs to State-owned, Owner = 1, when the enterprise belongs to non-state, Owner = 0.

A large number of empirical studies show that enterprise size, government subsidy and corporate growth have a great influence on performance [1] [19] [20]. So in this paper, these factors are introduced as control variables to study the relationship, and characterized by the total assets (TA), government subsidy (GS) and revenue growth rate (RGR) respectively. To sum up, there are four control variables, namely the ownership, enterprise size, government subsidy and corporate growth in this paper.

3.2. Models
In this paper, we use the method of multiple linear regressions to verify the relationship among the variables. In order to eliminate the variance of the models, the logarithm of the models is processed. The established models are as follows:

$$\text{M1: ROA}_{it} = \beta_0 + \beta_1 \text{LnTA}_{it} + \beta_2 \text{LnGS}_{it} + \beta_3 \text{RGR}_{it} + \beta_4 \text{Owner}_{it} + \varepsilon$$

$$\text{M2: ROA}_{it} = \beta_0 + \beta_1 \text{LEV}_{it} + \beta_2 \text{LnTA}_{it} + \beta_3 \text{LnGS}_{it} + \beta_4 \text{RGR}_{it} + \beta_5 \text{Owner}_{it} + \varepsilon$$

$$\text{M3: HI}_{it} = \beta_0 + \beta_1 \text{LEV}_{it} + \beta_2 \text{LnTA}_{it} + \beta_3 \text{LnGS}_{it} + \beta_4 \text{RGR}_{it} + \beta_5 \text{Owner}_{it} + \varepsilon$$

$$\text{M4: ROA}_{it} = \beta_0 + \beta_1 \text{LEV}_{it} + \beta_2 \text{HI}_{it} + \beta_3 \text{LnTA}_{it} + \beta_4 \text{LnGS}_{it} + \beta_5 \text{RGR}_{it} + \beta_6 \text{Owner}_{it} + \varepsilon$$

In the test of the intermediary effect of diversified operation, according to Baron and Kenny (1986) defined the intermediary process, mediating effect of diversification requires the following relationships to be established.

Model 1 checks the relationship between control variables and operating performance. The independent variable is added to Model 2 to verify the hypothesis 1. If the β_1 in model 2 is significant, the mediating effect will be allowed to test. Model 3 checks the relationship between independent variable and mediator variable, and verifies the hypothesis 2. Then the mediator variable is added to Model 4 to check the moderation of diversification and verify the hypothesis 3. The condition for the existence of the mediation effect is that the β_1 in model 3 and the β_2 in model 4 are significant at the same time. If the β_1 in model 4 is not significant, diversification will play a completely intermediary role between debt financing and operating performance, or diversification will play a partial mediating effect.

3.3. Research Sample

In this paper, A-share of agricultural listed companies in Shanghai and Shenzhen stock market are chosen as samples, and the study period is from 2009 to 2014. We also follow the following principles to select samples: 1) Only enterprises listed before 2009 and persistently operating until 2014 are selected. In order to eliminate the impact of accidental factors and the volatility of the enterprise's special circumstances, the equalization of the annual data is processed; 2) ST or *ST listed enterprises will be eliminated because of the abnormal financial situation (ST means Special treatment when the company's operating losses for the two consecutive year; *ST means delisting warning when the company's operating losses for the three consecutive year); 3) Listing enterprises with incomplete information disclosure, incomplete basic financial data or the abnormal value of financial indicators will be excluded. Finally 52 listed enterprises meeting the above conditions form the research sample in this sample. Data are obtained mainly through Wind database and financial statements of list enterprises.

4. Empirical Results

First step, a correlation analysis with the STATA13.0 software is processed, and the Pearson correlation coefficient between the main variables is shown in **Table 1**. As shown in the table, there is no significant correlation between the independent variables (<0.4), indicating that the independent variable index is relatively independent, which means further regression model test is feasible. There is a significant negative correlation between independent variable and dependent variable. That is to say, debt financing is vital to operating performance. There is a significant positive correlation between HI and ROA which means that the mediator variable of diversification can also affect operating performance negatively.

Second step, we use the method of multiple linear regression to analyze the sample data. **Table 2** shows the regression results.

From the regression results in **Table 2**, we can see that:

1) After adding the independent variables and adjustment variables to model 2, R^2 value increases from 0.08 to 0.109, which shows that the fitting degree of equations is fair. In model 4, R^2 value increases from 0.109 to 0.121, which means the fitting degree of equations is further increased.

2) The empirical results of model 2 show that the value of β_1 between the LEV and dependent variable is −0.0226, the value reach a significant level of 0.01. It shows that the increase of debt financing can significantly reduce the performance. Therefore, the hypothesis 1 is confirmed.

Table 1. The Pearson correlation coefficient matrix between the main variables.

	ROA	LEV	HI	LnTA	LnGS	RGR	Owner
ROA	1						
LEV	−0.1837[**]	1					
HI	0.1859[***]	−0.3019[***]	1				
LnTA	−0.0458	0.2825[***]	−0.1236[**]	1			
LnGS	−0.1506[**]	0.0341	−0.0164	0.3752[***]	1		
RGR	0.2110[***]	−0.1068[*]	0.0749	−0.0587	−0.0289	1	
Owner	−0.1406[**]	0.0086	−0.1847[**]	−0.0175	0.0396	−0.0707	1

Note: Significance level [*]$p < 0.1$, [**]$p < 0.05$, [***]$p < 0.01$.

Table 2. The regression analysis of debt financing, diversification and operating performance.

	M1 (ROA)	M2 (ROA)	M3 (HI)	M4 (ROA)
Constant (β_0)	0.0468 (0.0536)	0.0798 (0.0539)	1.361 (0.192)***	0.0353 (0.0578)
LEV		−0.0226 (0.0072)***	−0.129 (0.0256)***	−0.0184 (0.0074)**
HI				0.0327 (0.0159)**
Lnsize	0.0015 (0.0046)	0.0057 (0.0047)	−0.0147 (0.0167)	0.0062 (0.0047)
Lnsubsidy	−0.0033 (0.0013)**	−0.0037 (0.0013)***	0.0017 (0.0047)	−0.0037 (0.0013)***
Growth	0.0427 (0.0118)***	0.0392 (0.0117)***	0.0227 (0.0416)	0.0385 (0.0116)***
Owner	−0.0169 (0.0077)**	−0.0166 (0.0076)**	−0.092 (0.0271)***	−0.0136 (0.0077)*
Observations	312	312	312	312
R-squared	0.080	0.109	0.127	0.121

Note: Significance level *p < 0.1, **p < 0.05, ***p < 0.01, values in parentheses are standard deviation.

3) The empirical results of model 3 show that the value of β_1 between the LEV and the moderator variable of diversification is −0.129, the value reach a significant level of 0.01. It shows that the increase of debt financing can significantly improve the degree of diversification. Therefore, the hypothesis 2 is confirmed.

4) The empirical results of model 4 show that the value of β_2 between the moderator variable of diversification and the operating performance is 0.0327, and the significant level is 0.05. It shows that the indirect effect of diversification on dependent variable is significant. Furthermore, the value of β_1 between the LEV and dependent variable is −0.0184, the value reach a significant level of 0.05. It shows that the direct effect of the debt financing on the operating performance is also significant. Hence, diversification plays an intermediary role between debt financing and operating performance. The proportion of the mediating effect to the total effect was 18.76% (−0.129*0.0327/−0.0226). Therefore, the hypothesis 3 is confirmed.

5. Conclusions & Implications

This paper sets out to investigate the impact of debt financing on operating performance of agricultural listed companies. Using sample firms listed on Ashare in Shanghai and Shenzhen stock market, we find empirical support for propositions drawn from Trade-off theory and diversification discount on agricultural listed companies. There is a research gap on the integration of financing method and investment strategy in agricultural listed companies, making it necessary to clarify how debt financing affects operating performance. Our empirical results support the given propositions. Debt financing is negatively associated with operating performance and diversification plays partial intermediary role between debt financing and operating performance in agricultural listed companies.

In this paper, the research has the following theoretical significances: firstly, we choose diversification as a mediating variable to study its mediating effect. It is a new perspective of researches on operating performance in agricultural listed companies; secondly, this paper confirms that diversification plays an intermediary role between debt financing and operating performance. Financing methods and investment strategies have been considered to be an effective model of performance, and the influence mechanism of the operating performance in agricultural listed companies is analyzed.

The practical significance of this paper is that agricultural listed companies should choose appropriate financing channels and investment strategies based on their own situation and features. Under the environment of financing constraints, debt financing can raise the hard budget constraint effectively, optimize capital structure and promote the rise of management efficiency. The major resources in debt financing include bank debt, commercial credit and corporate bonds and the short-term bank debt is currently the main resource of debt financing in agricultural listed companies. Agriculture has lower comparatively benefit and more investment risks compare with other industries. Excessive debt increase financial risk of enterprises and high debt financing decision are not conducive to improving the operating performance of agricultural listed companies. Diversification is one of the important operation modes of agricultural listed companies, reducing the operating risk from a single

business. Nevertheless, diversification disperses the firm resources, enlarges the hardness of firm management and improves the cost of inner coordination and communication. Diversified operation may damage the operating performance of agricultural listed companies. Agricultural enterprises should be more prudent to implement diversified strategy. The refocusing strategy is a wise choice for agricultural listed companies at the present stage.

Funding

References

[1] Fan, L.B., Ma, C.C. and Ma, X.J. (2012) Diversification, Government Subsidy and Agricultural Firms' Performance: An Empirical Research on Chinese Agricultural Listed Companies. *Issues in Agricultural Economy*, **11**, 83-90.

[2] Smith, C. and Warner, J.B. (1979) On Financial Contracting: An Analysis of Bond Covenants. *Journal of Financial Economics*, **7**, 117-161. http://dx.doi.org/10.1016/0304-405X(79)90011-4

[3] Chen, S-S. and Ho, K.W. (2000) Corporate Diversification, Ownership Structure and Firm Value: The Singapore Evidence. *International Review of Financial Analysis*, **9**, 315-326. http://dx.doi.org/10.1016/S1057-5219(00)00032-6

[4] Pen, Y., Huang, Z.H. and Shao, G.R. (2007) Non-Agricultural Operations and the Operation Performance of the Listed Agricultural Companies: Theoretical Analysis and Positive Test. *Journal of Finance and Economics*, No. 10, 117-130.

[5] Luo, Q., Xiao W.C. and Xia, X.P. (2007) Financing Constraints or Overinvestment—Evidence on Investment-Cash Flow Sensitivities of Chinese Listed Companies. *China Industrial Economy*, No. 9, 103-110.

[6] Wang, Y.C. (2009) Financing Constraints, Cash Holdings and Over-Investment. *Journal of Financial Research*, No. 7, 121-133.

[7] Modigliani, F. and Miller, M.H. (1958) The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review*, No. 3, 261-297.

[8] Mreton, H. and Miller, M.H. (1977) Debt and Taxes. *The Journal of Finance*, No. 2, 261-275.

[9] Brick, L. and Ravid, S.A. (1985) On the Relevance of Debt Maturity Structure. *The Journal of Finance*, **40**, 1423-1437. http://dx.doi.org/10.1111/j.1540-6261.1985.tb02392.x

[10] Myers, S.C. (1984) The Capital Structure Puzzle. *Journal of Finance*, **39**, 575-592. http://dx.doi.org/10.2307/2327916

[11] Jensen, M.C. and Meckling, W.H. (1976) Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, **3**, 305-360. http://dx.doi.org/10.1016/0304-405X(76)90026-X

[12] Yao, W.Y. (2011) Research on the Relationship between Financing Sources and Investment Scale of Agricultural Listed Companies in China. *Issues in Agricultural Economy*, No. 8, 70-74.

[13] Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (1988) Financing Constraints and Corporate Investment. *Brooking Papers on Economic Activity*, **1988**, 141-195. http://dx.doi.org/10.2307/2534426

[14] Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (2000) Investment-Cash Flow Sensitivities Are Useful: A Comment on Kaplan and Zingales. *Quarterly Journal of Economics*, **115**, 695-705. http://dx.doi.org/10.1162/003355300554773

[15] Huang, F.Q. and Shen, H.B. (2009) The Sources of Debt, Debt Maturity Structure and Over-Investment of Cash Flow: Evidence from Manufacturing Listed Companies in China. *Journal of Financial Research*, No. 9, 143-155.

[16] Tong, P. and Lu, Z.F. (2005) Debt Financing, the Sources of Debt, and the Firms' Investment Behavior: Evidence from Listed Companies in China. *Economic Research Journal*, No. 5, 75-84.

[17] Lang, L.R. and Stulz, R.M. (1994) Tobin's q, Corporate Diversification and Firm Performance. *Journal of Political Economy*, No. 6, 1248-1280.

[18] Liu, Y.F. and Chen, L. (2015) Diversification, Government Support and Firm Performance. *Journal of Agrotechnical Economics*, No. 2, 118-128.

[19] Raghuram, R. and Luigi, Z. (2004) Making Capitalism Work for Everyone. *Journal of Applied Corporate Finance*, **16**, 101-108. http://dx.doi.org/10.1111/j.1745-6622.2004.tb00677.x

[20] La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (2002) Investor Protection and Corporate Valuation. *Journal of Finance*, **57**, 1147-1170. http://dx.doi.org/10.1111/1540-6261.00457

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