Impact of financing structure on operating performance: Evidence from Chinese listed agricultural firms

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Abstract

Based on the financial data of 50 Chinese listed agricultural firms in 2013-2017, this paper makes an in-depth analysis of how the financing structure of the agricultural industry affects their operating performance, and concludes that there is a significant positive correlation between the proportion of internal financing and the operating performance of the firms, a significant negative correlation between the proportion of equity financing and the operating performance of the firms, and no significant relationship between the proportion of debt financing and the operating performance of the firms. Positive correlation or negative correlation. According to the results of this study, reasonable suggestions are put forward to promote the healthy development of Chinese agricultural listed firms and improve the viability and competitiveness of Chinese agricultural firms.

Keywords

Internal financing, Equity financing, Agricultural listed firms, financing structure, operating performance.

1. Introduction

Agriculture is the cornerstone of Chinese economic and social development. As the representative of Chinese advanced agricultural productivity, agricultural listed firms play an essential role in accelerating the adjustment of Chinese agricultural industrial structure, promoting agricultural production management, improving the quality and efficiency of agricultural products, enhancing Chinese international competitiveness in agriculture, realizing the progress of agricultural science and technology, and accelerating Chinese agricultural modernization. By studying the financing structure and operating performance of agricultural listed firms, we can provide useful references for the healthy development of agricultural listed firms, so it has definite practical significance.

Financing structure refers to the organic composition and proportion of funds obtained from different channels when firms raise funds, reflecting the combination of various sources of funds.

1.1 The impact of internal financing structure on operating performance

The theory of financing priority pointed out that internal financing mainly comes from the natural cash flow generated within the firms, which is equal to net profit plus depreciation minus dividends. Since internal financing does not need to sign contracts with investors, and does not need to pay various fees, and is easy to obtain, with limited restrictions and low risks, it will not bring about the dispersion of management rights, so it is the preferred financing method. However, Chinese agriculture has its natural attributes, externalities, and basics, which makes the sources of internal funds for agricultural listed firms very limited. Furthermore, less cash flow generated within the firms will affect the ability of the firms to repay the debt and distribute dividends, thereby limiting the source of external funds, forming external financing constraints, and thus less investment opportunities for firms. Therefore, the higher proportion of internal financing of agricultural listed firms, not only indicates that the firm has accumulated surplus value from the operation process but also indicates that the less financing constraints the firm receives, the higher the investment level, so the firm has better operating performance.

1.2 The impact of equity financing structure on operating performance

The financing priority theory proposes that debt financing is preferred in the external financing structure and, finally, equity financing. Because in the case of information asymmetry, the financing structure of firms is the means for internal managers to transfer project quality information. Due to adverse selection, investors will think that firms are only willing to issue stocks when stock prices are overvalued, resulting in lower market value of firms. The traditional theory of capital structure also believes that the cost of equity financing is relatively high relative to debt financing because, for firms, dividends are paid from after-tax profits and do not have a tax-deductible effect. Besides, firms will issue dilution control and have insufficient control over the company.

However, from the actual situation in China, the cost of issuing stock financing is not high. Because Chinese capital market is still not perfect, shareholder supervision is relatively weak, there are fewer constraints on corporate formation, and enterprises have no fixed dividend burden, which significantly reduces the cost of equity financing. Besides, Chinese policy of appropriate tilting of agricultural firms' listing and share placement qualifications has changed the cost and availability of equity financing, enabling agricultural firms to pass equity when making financing decisions. Financing to reduce capital costs has a positive impact on economic performance.

1.3 The impact of debt financing structure affects on operating performance

The positive impact of debt financing on operating performance is mainly reflected in the following three points: firstly, the tax shield effect of debt. According to the modified model of MM theory, debt financing has a tax shield effect, which can reduce the cost of corporate capital; secondly, the signal effect of debt. In the theory of financing priority, because of information asymmetry, corporate bond issuance will be considered as an excellent performance by external investors; thirdly, the incentive effect of debt. In the agency cost, because the debt will force the operator to repay the principal and interest of the debt on a regular basis, thus reducing the cash flow at the operator's disposal, it can motivate the manager to work hard and improve the company's performance.

According to the trade-off theory, there are three main adverse effects of debt financing on operating performance: the first is to increase the risk of bankruptcy. The regular repayment of principal and interest brought by the enterprise's debt will lead to an enormous pressure on the firms capital. Once the enterprise is in a state of operation, it will quickly fall into financial difficulties, even lead to bankruptcy; Secondly, the insufficient investment caused by high debt. Compared with the equity owners, the creditors are more risk-averse, which will cause the creditors to force the managers to give up some investment opportunities with higher risks when the debt level is higher, and less capital outflow, resulting in the insufficient investment of the firms; thirdly, increase the credit risk of the firms. Once the enterprise is difficult to repay the debt, it will affect the reputation level of the enterprise and increase the financing difficulty in the future.

However, from the perspective of the actual situation of China's agricultural industry, the domestic capital market has not established a strict bankruptcy mechanism, which may make the bond incentive unable to play its due effect. Moreover, due to the low profitability of firms themselves, China has a lot of preferential tax policies for agricultural listed firms, making the actual income tax of agricultural firms. At the same time, the state has implemented many credit financing preferential policies for agricultural firms, which, to some extent, increases the sources of funds for agricultural firms, but these accessible funds may bring "soft budget constraints" for agricultural listed firms, thereby reducing the operating efficiency of agricultural listed firms and hurting operating performance.

2. Financing structure and operating performance of sample agricultural listed firms

2.1 Sample selection and data source

This paper takes 50 agricultural listed firms on the main-board, growth enterprise board, and small and medium-sized board of Shenzhen Stock Exchange and Shanghai Stock Exchange as samples. The agricultural firms here are listed firms in the "agriculture, forestry, animal husbandry, and

fishery" in the industry classification determined by the China Securities Regulatory Commission (CSRC). The research period is 2013-2017. The data of listed firms are from wind database and IfinD database of Straight flush company. In order to maintain the accuracy and objectivity of the data, the research samples were processed as follows:

a) it has eliminated the enterprises with poor continuous performance, such as the agricultural listed firms that are going to delist under the labels of ST and ST *, these firms generally have significant problems in their business conditions and suffer losses year after year, resulting in the inaccuracy and objectivity of the data;

b) Firms with incomplete annual report data and significant changes in main business are excluded, such as those with immense wealth suddenly obtained except for main business and those with severe losses caused by investing in other fields besides main business operation losses. The addition of these sample data is easy to cause the abnormal value of statistical data, which leads to the lack of authenticity of the analysis data;

c) Firms listed for less than five years by 2019 are excluded.

The total number of firms studied in this paper is 50, among which there are 24 agricultural listed firms in the main-board, accounting for 48% of the sample size; there are 17 agricultural listed firms in the SME, accounting for 34% of the sample size; there are only 9 agricultural listed firms in the GEM, accounting for 18% of the sample size. Although compared with the Main-board, the GEM(Growth enterprise market) and SME(Small and Medium Enterprise Board)listed firms are all companies with low market value and small scale, according to the listing regulations of the CSRC, the Listing Rules of SME board are the same as those of the main-board, which are higher than those of the gem. It can be seen that among the listed agricultural firms, their main business is relatively stable, their assets are in good condition, and their profitability is strong. The financial statements of these agricultural listed firms are audited, which can ensure that the data is accurate and stable, and can carry out practical regression statistical analysis.

After removing some firms, the agricultural listed firms and data in the sample,see Appendix.

2.2 Analysis of the current situation of financing structure

2.2.1Analysis of the overall financing structure of agricultural listed firms

Financing structure refers to the composition and proportion of funds obtained from different channels when firms raise funds. It reflects the financing mode of firms, which can be divided into internal financing and external financing according to the relationship between financing parties.Internal financing refers to the internal financing of enterprises, mainly composed of depreciation and retained earnings; external financing refers to the external financing of firms, including equity financing and bond financing. According to the theory of priority financing, the financing of firms should follow the sequence of internal financing, debt financing, and equity financing. However, contrary to the priority financing theory, the current financing order of agricultural listed firms in China is equity financing, debt financing, and internal financing, which generally exists the phenomenon that external financing occupies an absolute position and excessive dependence on equity financing. The unreasonable financing structure has become a significant problem affecting the sustainable development of agricultural listed firms. In order to further explore the impact of various financing models on operating performance, this paper is based on three perspectives: debt financing, equity financing, internal financing, and in-depth segmentation of indicators to determine the corporate financing structure.

Table 1 Financing structure variant

Type	Index	abbreviation	Formula
Debt financing	Commercial credit financing rate	CFR	（notes payable +accounts payable+deposit received）/total assets

	Short-term loan financing rate	SDFR	Short-term borrowing / total assets
	Long-term loan financing rate	LDFR	Long-term borrowings/total assets.
	Bond financing rate	RBF	（Payable short-term bonds payable）/total assets
	Other debt financing ratio	OFR	（Other accounts payable+Other non-current liabilities+Payroll payable+Taxes payable）/total assets
equity financing	equity financing rate	EFR	（paid-in capital+Capital reserve fund）/total assets
Internal financing	Internal financing rate	IFR	（Surplus reserves+undistributed profit +accumulated depreciation）/total assets

The internal financing amount of Chinese agricultural listed firms has maintained a stable growth since 2013-2017, but there is still a large gap between the external financing amount and the internal financing amount, which means that the overall retained earnings financing and depreciation financing performance of these firms in recent years is stable, but still at a relatively low level. At the same time, it can be seen from the table that external financing finance is increasing, from about 3.11 billion per company in 2013 to about 4.62 billion in 2017. Affected by the increasing amount of external financing year by year, the scale of financing amount of agricultural listed firms in China has been expanding, from about 3.67 billion per firm in 2013 to about 5.57 billion per company in 2017, see Table 2.

Table 2 List of financing amount of listed firms

Year	Average endogenous financing	Average external financing	Total average financing
2013	557,622,377.34	3,110,723,242.84	3,668,345,620.18
2014	620,358,768.50	3,387,027,120.62	4,007,385,889.12
2015	675,988,950.46	3,628,835,600.16	4,304,824,550.62
2016	843,147,208.40	4,048,493,559.86	4,891,640,768.26
2017	943,773,499.32	4,623,880,964.58	5,567,654,463.90
5-year average	728,178,160.80	3,759,792,097.61	4,487,970,258.42

According to the calculation of the average proportion of internal and external financing of each agricultural listed firm from 2013-2017, the proportion of internal and external financing in China is quite different. The proportion of internal financing is only 16%, while the proportion of external financing is 84%. This shows that the first way of financing for agricultural listed firms in China is external financing. This may be related to firms' easy access to external financing and low ability of internal wealth accumulation.

Besides, the average internal financing proportion of 50 sample agricultural listed firms in 2013-2017 is 16%. In the external financing structure, the average equity financing proportion is about 39%, while the debt financing proportion is about 45%, six percentage points more than the equity financing. Therefore, China's agricultural listed firms prefer external financing. The order of financing decisions is debt financing, equity financing, and internal financing, which is different from the conclusion of internal financing, debt financing, and equity financing in the modern financing priority theory.

2.2.2 Analysis of the external financing structure of Agricultural Listed firms

From 2013 to 2017, although the scale of equity financing and debt financing in China decreased a bit in 2015, it showed an overall upward trend. The rising trend of debt financing is higher than that of equity financing, which shows that agricultural listed firms in China prefer debt financing since

2013. As the amount of bond financing and equity financing has increased, the scale of external financing is also increasing year by year, which shows that China's agricultural listed firms pay more and more attention to external financing,see Fig.1.
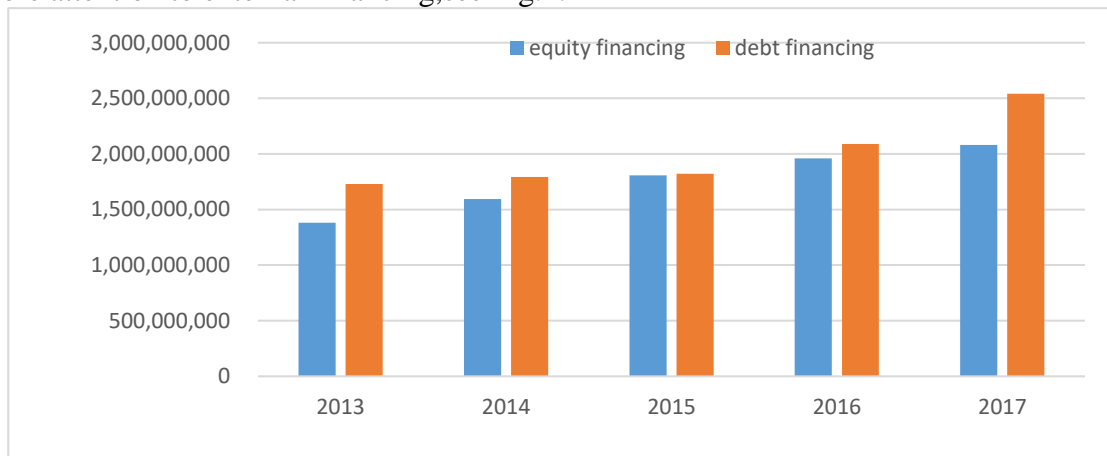

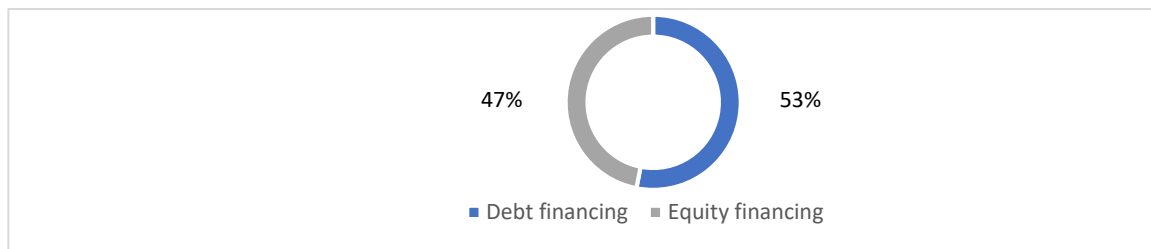Fig.1 Change chart of debt financing and equity financing amount over the years

Fig.2 Proportion chart of debt financing and equity financing

From 2013 to 2017, the debt financing and equity financing of each agricultural listed firm accounted for the average of the proportion of external financing. In the case of external financing, debt financing has a large share. Generally speaking, China's agricultural listed firms prefer debt financing, but the ratio of equity financing to debt financing is not much different,see Fig.2.
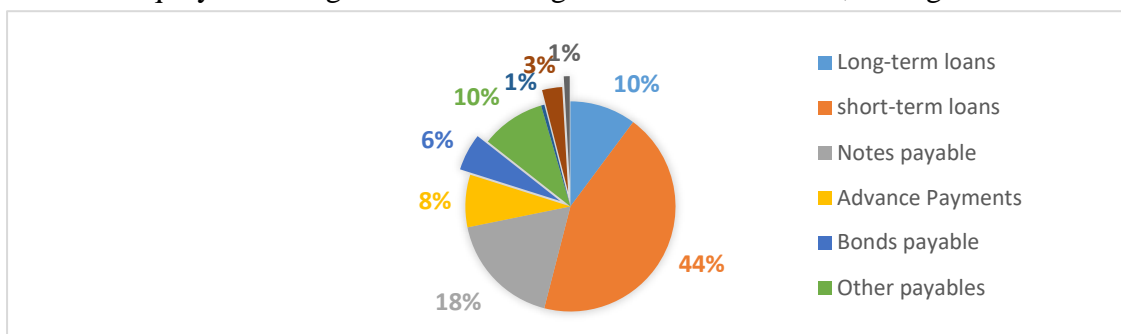

Fig.3 Proportional of debt financing

The top three in debt financing are short-term loans (44%), notes payable and accounts (18%), and long-term loans (10%). Short-term loans account for the most significant proportion of debt financing, so we can get it is concluded that China's agricultural listed firms prefer short-term loans in debt financing, but long-term loans and commercial credit financing are also the second-best choice for debt financing of agricultural listed firms,see Fig.3 .

The data is the proportion of equity and capital reserve financing in the equity financing structure of 50 agricultural listed firms from 2013 to 2017. From the table, the capital reserve financing and equity financing from 2013 to 2017 The proportion of the increase is increased every year, and the increase in equity financing is more significant than the increase in capital reserve.,see Table 3.

Table 3 Proportion of each part of equity financing structure

equity financing	2013	2014	2015	2016	2017
capital stock	15%	16%	19%	25%	25%
capital reserve	17%	20%	22%	20%	22%

In the process of equity financing, the ratio of capital reserve to total assets can be effectively measured. Capital reserve refers explicitly to the transfer in of appropriations and capital premiums that firms receive when they are operating. Capital reserve can also realize capital increase, so the capital reserve is also an essential part of equity financing, which will also affect the operating performance of enterprises. When Chinese listed firms go public, their P / E ratio and share premium are usually higher, even higher than their registered capital, and agricultural listed firms generally have state funding, so the proportion of capital reserve is higher than that of share capital.

2.2.3Analysis of the internal financing structure of Agricultural Listed firms

From the perspective of its internal financing sources, the proportion of surplus reserve and undistributed profit financing in the internal financing structure of each of the 50 listed agricultural firms from 2013 to 2017 was analyzed. From 2013 to 2017, the proportion of surplus reserve financing and undistributed profit financing increased every year, and the increase of undistributed profit financing was more significant than that of capital reserve,see Table 4.

Table 4 Proportion of each part of internal financing structure

Internal financing	2013	2014	2015	2016	2017
Surplus reserves	16%	17%	19%	23%	25%
undistributed profit	15%	17%	18%	23%	26%

In the process of internal financing, the proportion of undistributed profits in internal financing is as high as 81%, which shows that for most of China's agricultural listed firms, they tend to choose undistributed profits for internal financing. However, the proportion of surplus reserve is relatively low, accounting for 19%, which may be due to the small base of surplus reserve of agricultural listed firms in China. Furthermore, when the company withdraws the surplus reserve, it will not withdraw it when the withdrawal amount reaches 50% of the registered amount according to the law. The function of the surplus reserve is to make up for the loss, increase the capital, or distribute the dividend. Because the operation of China's agricultural listed firms is getting better year by year, the proportion of the surplus reserve in the internal financing structure is relatively small and stable.

2.3 Analysis of current situation of operating performance

2.3.1Analysis of profitability of Chinese agricultural listed firms

Average profitability index of agricultural listed firms in China,see Table 5:

Table 5 Index of profitability indicators over the years

Year	Return on total assets	Return on equity	Net sales interest rate	Earnings per share
2013	3.41%	3.45%	7.98%	0.11
2014	2.84%	-8.5%	-3.10%	0.11
2015	1.46%	-0.45%	-30.90%	0.06
2016	5.23%	5.60	5.05%	0.20
2017	3.98%	2.78	3.30%	0.13
5-year average	3.39%	0.57%	-3.53%	0.12

Normally, there is no upper limit for the indicators of return on total assets and return on net assets, but the lower limit is the fixed deposit rate of the central bank. After selecting the enterprises with

negative net profit and negative net return on operating activities, it is found that the loss-making enterprises of agricultural listed firms in the past five years have also shown a trend of decline first and then rise. Among the 50 listed agricultural firms in China, there is a severe polarization of the level of net profit. However, on the whole, the development trend in 2017 is excellent.

2.3.2Analysis of solvency of Agricultural listed firms

China's agricultural listed firms' average Solvency Index.

Table 6 Index of solvency indicators over the years

Year	Asset-liability ratio	Current ratio	Quick ratio
2013	44%	240%	130%
2014	44%	244%	118%
2015	45%	186%	83%
2016	42%	256%	109%
2017	44%	215%	101%
5-year average	44%	228%	108%

The average asset-liability ratio of China's agricultural listed firms from 2013 to 2017 is 44%, which means that about 40% of the assets of China's Agricultural Listed firms in the past five years are obtained by borrowing. In general, it is reasonable for a company's asset-liability ratio to be in the range of 40% - 60%, but there are different standards for different industries. For example, the asset-liability ratio of high-risk industries (such as agricultural listed companies) should not be too high. The average asset-liability ratio of China's agricultural listed firms is relatively reasonable, and the range of change is not significant. The current ratio and quick ratio are indicators to measure the ability of current assets to repay current liabilities. Besides, the current ratio is 2:1, and quick ratio 1:1 is appropriate, which shows that half of current assets can not be realized immediately, but can also bear current liabilities and current assets can repay current liabilities immediately. The average current ratio of agricultural listed firms in China is 2.3:1, the quick ratio is 1.1:1, and the changes are basically above 1.5:1 and 1:1, which shows that the liquidity of agricultural listed firms in China is relatively stable,see Table 6 .

2.3.3Analysis of operating ability of Agricultural listed firms in China

Chinese agricultural listed firms by average turnover capacity index,see Table 7.

Table 7 Index of Operating capacity over the years

Year	Inventory turnover ratio	Turnover of current assets	Turnover of total capital
2013	406%	172%	84%
2014	372%	173%	78%
2015	401%	161%	72%
2016	379%	167%	72%
2017	379%	172%	78%
5-year average	388%	169%	77%

Inventory turnover rate is the ratio of sales cost and average inventory, reflecting the efficiency of sales and inventory use. In general, the larger the value is, the faster the weekly turnover rate of inventory is, the faster the inventory can become money or accounts receivable [e.g.MJ. Baker, 1998]. The inventory turnover rate of Chinese agricultural listed firms are relatively high, around 390%, and remains at 400% up and down. The turnover rate of movable assets reflects the turnover speed of a firm's current assets. The higher the index is, the faster the turnover speed of the firm's current assets is, and the higher the utilization rate is. The average turnover rate of current assets of Chinese agricultural listed firms is 169%. There is little change from 2013 to 2017, which indicates that the

utilization efficiency of current assets of Chinese agricultural listed firms has remained stable in the past five years. The turnover rate of total assets is the ratio of primary business income to average total assets, reflecting the turnover rate of total assets of firms. The higher the index, the faster the turnover speed of the firm's total assets. The turnover rate of total assets of Chinese Agricultural Listed firms in recent five years is 77%, showing a trend of decreasing year by year from 2013 to 2016, and the turnover rate of total assets in 2015 and 2016 is lower than the average value of five years, which shows that the turnover rate of total assets of Chinese Agricultural Listed firms in these two years is at a low level.

2.3.4Analysis of the growth ability of agricultural listed firms in China

Table 8 Index of Growth capacity indicators over the years

Year	Growth rate of operating revenue	Net asset growth rate	Total asset growth rate
2013	7%	10%	10%
2014	2%	18%	17%
2015	15%	-10%	17%
2016	30%	39%	18%
2017	171%	129%	29%
5-year average	45%	37%	19%

Overall, Chinese agricultural listed firms have maintained high-speed growth in terms of assets and revenue, while the growth rate of net assets and sales profit margin slightly slowed down in 2015. The rapid growth from 2016 to 2017 shows that the asset scale of China's agricultural listed firms is expanding rapidly. However, from the perspective of profit performance, although the operating revenue and total assets of Chinese agricultural listed firms have increased year by year, the development of income quality has been ignored, and the overall increase of scale and volume has not brought a stable increase of profit margin year by year., see Table 8.

3. An empirical Analysis of financing structure and operating performance of listed Agricultural firms in China

3.1 Variables Setting

3.1.1Select explanatory variables

The connotation of financing structure is very rich, so the selected variables can not contain all the content. Based on the definition and division of financing structure in the previous paper, the following four indicators are selected as the variables of financing structure for research:

$$IFR=Internal\ financing/(Internal\ financing+external\ financing) \qquad (1)$$

$$EFR=equity\ financing\ /(Internal\ financing+external\ financing) \qquad (2)$$

$$DFR=debt\ financing\ /(Internal\ financing+external\ financing) \qquad (3)$$

Among them, internal financing includes surplus reserve and undistributed profit, external financing includes equity financing and debt financing, equity financing includes equity and capital reserve, and debt financing includes long-term loan, short-term loan, accounts payable and receivables in advance and notes and other payables.

3.1.2Select the explained variable

Operational performance refers to the results of the business activities. Nevertheless, the selection of evaluation indexes is also very different. There are two kinds of evaluation indexes for a firm's performance: a single index and a comprehensive index. Although the performance measurement method of a single indicator is simple, because the firm pursues not a single goal but multiple goals in the process of operation, a single indicator cannot comprehensively measure the firm's performance. In the financial indicators studied in this paper, the profitability, solvency, operation ability, and

growth ability are considered, and 12 indicators are selected to establish the evaluation system. These 12 indicators are earnings per share, return on net assets, return on total assets, the net interest rate on sales; asset-liability ratio, current ratio, quick ratio; inventory turnover rate, accounts receivable turnover rate, total assets turnover rate; operating revenue growth rate and total assets growth rate.

3.2 Comprehensive evaluation of the operating performance of Chinese agricultural listed firms based on factor analysis

3.2.1Calculate the original performance index value

Using the annual reports of the selected 50 agricultural listed firms from 2013 to 2017, searching the original index value, and then calculate the return on net assets, earnings per share, net sales interest rate, return on total assets, asset liability ratio, current ratio, quick ratio, inventory turnover rate, turnover rate of accounts receivable, turnover rate of total assets, growth rate of operating revenue, growth rate of total assets, etc.12 Index, then take the average value of 5 years (keep three decimal places).It needs to be noted that since the asset-liability ratio is the reverse indicator of operating performance, in order to evaluate accurately, it needs to be turned into a positive indicator. The method adopted in this paper is to replace the original indicator value with its reciprocal.

3.2.2Handle operational performance index values.

The correlation coefficient matrix of each performance index is obtained through the correlation treatment of the calculated performance index value. From the correlation matrix, we can see that the 12 operating performance indicators selected in this paper have a strong correlation with each other, which means that the information reflected by these 12 indicators has a significant overlap and needs further processing. Continue to process the indicators and get the eigenvalues of the correlation matrix, the variance contribution rate of the corresponding factors, and the cumulative variance contribution rate,see Table 9。

Table 9 Main components information

Ingredient	Initial eigenvalue			Extract the sum of load squares			Sum of squares of rotating loads		
	Amount to	Variance percentage	Accumulative %	Amount to	Variance percentage	Accumulative %	Amount to	Variance percentage	Accumulative %
1	3.483	29.025	29.025	3.483	29.025	29.025	2.902	24.179	24.179
2	2.862	23.851	52.875	2.862	23.851	52.875	2.759	22.995	47.174
3	2.11	17.587	70.463	2.11	17.587	70.463	2.269	18.91	66.084
4	1.354	11.284	81.747	1.354	11.284	81.747	1.88	15.663	81.747
5	1.098	9.148	90.895						
6	0.484	4.032	94.927						
7	0.338	2.815	97.742						
8	0.134	1.12	98.862						
9	0.067	0.556	99.418						
10	0.046	0.385	99.804						
11	0.014	0.114	99.918						
12	0.01	0.082	100						

According to the principle that the eigenvalue is greater than 1, four public factors are selected, and the cumulative variance contribution rate is 81.747%, which shows that these four public factors can replace 12 fundamental indicators to describe the operating performance of agricultural listed firms, see Table 9.In order to make each common factor have a clear explanation of meaning, the factor load matrix is obtained by using the maximum variance method to rotate the factor five times,see Table 10. From the rotated factor load matrix, we can see that the load of current ratio and quick ratio on factor F1 are 0.993 and 0.966 respectively, which represent the company's operating capacity, so factor F1 can be used as an indicator of operating capacity to describe the comprehensive performance; the load of EPS and total asset return on factor F2 are 0.95 and 0.929 respectively, which represent

the firm's profitability. Therefore, factor F2 can be used as a profitability indicator to describe the comprehensive performance; the load of inventory turnover rate and total asset turnover rate on factor F3 is 0.917 and 0.876 respectively, which represent the firm's solvency, so F3 can be used as a solvency indicator to describe the comprehensive performance; the load of operating income growth rate and total asset growth rate on factor F4 is 0.942 and 0 respectively. 461, they represent the growth ability of the firm, so F4 can be used as the growth ability index to describe the overall performance.

Table 10 Rotated Component Matrix

	index			
	F_1	F_2	F_3	F_4
current ratio	.993	-.005	-.016	.037
quick ratio	.966	-.050	.014	.144
asset-liability ratio	.916	.028	-.041	-.033
earnings per share	-.028	.950	.123	-.076
rate of return on total assets	-.112	.929	.038	-.152
Return on net assets	.102	.804	.061	-.095
inventory turnover ratio	-.069	.124	.917	.015
turnover of total capital	-.170	.238	.876	-.018
average accounts receivable turnover ratio	.176	-.107	.786	-.006
increase rate of business revenue	-.025	-.221	-.095	.942
net interest rate	.079	.435	.038	-.847
Total asset growth rate	.223	.144	.099	.461

3.2.3 Calculate comprehensive performance value

First, the score coefficient matrix of each factor is obtained by regression,see Table 10.Among them, F_1, F_2, F_3, F_4 are calculated according to the score matrix and the original performance index value, and the calculation formula is:

$$F_i = \beta_{1j}X_1 + \beta_{2j}X_2 + \beta_{ij}X_i (i = 1,2...; j = 1,2,3,4) \quad (4)$$

$$F_1 = -0.008X_1 + 0.037X_2 - 0.036X_3 + 0.054X_4 + 0.318X_5 + 0.343X_6 + 0.331X_7 - 0.013X_8 + 0.071X_9 - 0.048X_{10} - 0.039X_{11} + 0.064X_{12} \quad (5)$$

$$F_2 = 0.385X_1 + 0.324X_2 + 0.370X_3 + 0.030X_4 + 0.007X_5 + 0.004X_6 + 0.001X_7 - 0.022X_8 - 0.114X_9 + 0.026X_{10} + 0.084X_{11} + 0.137X_{12} \quad (6)$$

$$F_3 = -0.024X_1 - 0.038X_2 - 0.061X_3 - 0.007X_4 - 0.009X_5 + 0.005X_6 + 0.021X_7 + 0.409X_8 + 0.372X_9 + 0.380X_{10} - 0.037X_{11} + 0.030X_{12} \quad (7)$$

$$F_4 = 0.125X_1 + 0.083X_2 + 0.079X_3 - 0.443X_4 - 0.043X_5 - 0.009X_6 + 0.048X_7 + 0.022X_8 - 0.039X_9 + 0.026X_{10} + 0.539X_{11} + 0.300X_{12} \quad (8)$$

Table 11 Component Score Coefficient Matrix

	β_1	β_2	β_3	β_4
earnings per share	-0.008	0.385	-0.024	0.125
Return on net assets	0.037	0.324	-0.038	0.083
rate of return on total assets	-0.036	0.370	-0.061	0.079
net interest rate	0.054	0.030	-0.007	-0.443
asset-liability ratio	0.318	0.007	-0.009	-0.043
current ratio	0.343	0.004	0.005	-0.009
quick ratio	0.331	0.001	0.021	0.048
inventory turnover ratio	-0.013	-0.022	0.409	0.022

Turnover rate of accounts receivable	0.071	-0.114	0.372	-0.039
Turnover rate of total assets	-0.048	0.026	0.380	0.026
increase rate of business revenue	-0.039	0.084	-0.037	0.539
Total asset growth rate	0.064	0.137	0.030	0.300

The weight of the comprehensive factor is the proportion of the variance contribution rate of each factor to the total variance contribution rate of the four factors,see Table 10.Then F_1, F_2, F_3, F_4 are weighted and summed up to obtain:

$$F= （24.179\,F_1+22.995\,F_2+18.91\,F_3+15.663\,F_4） /81.747 \qquad (9)$$

According to the above calculation, the full score of the operating performance factors of the agricultural listed firms in China is obtained. The score here is only a relative concept. Positive and negative represent the position relationship between the operating performance of the firm and the average performance level of the listed firms, that is mean the average level of operating performance is taken as the zero point, which is the result of data standardization in the whole process. Therefore, negative numbers do not represent the firm. The performance is negative.

3.3 The correlation analysis of financing structure and operating performance

3.3.1Proposal of research hypothesis

As the connotation of financing structure and performance is very rich, the variables selected by predecessors in the study of financing structure and performance are not the same, and the conclusions will be different. This paper summarizes the research results of financing structure and operating performance, and puts forward the following assumptions based on the differences in the selection of indicators:

Hypothesis 1:Based on the theory of financing priority, the internal financing is the first choice among all kinds of financing methods, because this way will not produce any side effects of stock price fluctuations, so this paper assumes that the proportion of internal financing is positively related to operating performance.

Hypothesis 2:Based on the theory of signal transmission, enterprises adopt debt financing, which shows that they are optimistic about future operating prospects, to transmit a positive profit signal to the market. Therefore, this paper assumes that the proportion of debt financing is positively related to operating performance, and the proportion of equity financing is negatively related to operating performance.

3.3.2Establish research methods and models

Table 12 Variable interpretation of regression model

type of variable	Variable name	Abbreviation	definition
explained variable	Operating performance	F	Aggregate performance values
explanatory variable	Internal financing ratio	IFR	IFR=Internal financing/(Internal financing+external financing)
	Equity financing ratio	EFR	EFR=equity financing /(Internal financing+external financing)
	Debt financing ratio	DFR	DFR=debt financing /(Internal financing+external financing)

The following analysis will use the method of regression analysis, through the design of three regression analysis models, to analyze the relationship between the proportion of internal financing,

external financing, debt financing, equity financing and operating performance of agricultural listed firms,see Table 12.

The explained variable is the comprehensive performance score F of agricultural listed firms calculated by factor analysis in the previous chapter. It reflects the operating performance level of agricultural listed firms from four aspects: profitability, operating ability, growth ability, and solvency. The explanatory variables are the internal financing proportion, external financing proportion, debt financing proportion, and equity financing proportion of listed firms, to establish a model for analysis. The three regression formulas are as follows.

$$F = \alpha_1 + \beta_1 \times \text{IFR} + \varepsilon_1 \tag{10}$$

$$F = \alpha_2 + \beta_2 \times \text{EFR} + \varepsilon_2 \tag{11}$$

$$F = \alpha_3 + \beta_3 \times \text{DFR} + \varepsilon_3 \tag{12}$$

α_1, α_2, α_3 are constant terms, β_1, β_2, β_3 are independent variable coefficients, ε_1, ε_2, ε_3 are error terms.

4. Results and analysis of empirical research

4.1 Empirical research results

4.1.1 Relationship between internal financing ratio and operation performance

Table 13 Correlations

		F	IFR
Pearson correlation	F	1.000	.501
	IFR	.501	1.000
conspicuousness(one-tailed)	F		.000
	IFR	.000	
Number of cases	F	50	50
	IFR	50	50

Pearson correlation coefficient between internal financing ratio and operating performance F is 0.501, and the probability of one-tailed significance test is 0.000, less than 0.05, so there is a significant positive correlation between internal financing ratio and operating performance F, see Table 13.

Table 14 Model summary

Model	R	R-square	R-square after adjustment	Error of standard estimation
1	.501	.251	.236	24.386890

The correlation R of the two variables is 0.501, and the R-square is 0.251, indicating that the proportion of internal financing can explain the change of overall performance of 25.1%, but other factors are affecting the overall performance, see Table 14.

Table 15 ANOVA

Model		quadratic sum	Freedom	mean square	F	conspicuousness
1	recurrence	9574.358	1	9574.358	16.099	.000
	residual	28546.580	48	594.720		
	amount to	38120.937	49			

The recurrence is 9574.358, and the residual is 28546.480, the observed value of F-test statistics is 16.099, the corresponding significance level(conspicuousness) is 0.000, less than 0.05, which further shows that there is a robust linear relationship between the two variables, see Table 15.

Table 16 Coefficients

Model		Unstandardized coefficient		Standardization coefficient	t	conspicuousness	95.0% confidence interval of B	
		B	standard error	Beta			inferior limit	superior limit
1	(constant)	-21.348	9.033		-2.363	.022	-39.509	-3.1
	IFR	70.253	17.509	.051	4.012	.000	35.048	105.458

The coefficient of the constant is -21.348, the coefficient of regression is 70.253, the observed value of t statistic of regression coefficient T-test is 4.012, the significance level is 0.000, less than 0.05, it is considered that the regression coefficient has significant significance, see Table 16.

The preceding results show that there is a significant positive correlation between the proportion of internal financing and overall performance.

4.1.2 Relationship between equity financing ratio and operating performance

Table 17 Correlations

		F	EFR
Pearson correlation	F	1.000	-.495
	EFR	-.495	1.000
conspicuousness(one-tailed)	F		.000
	EFR	.000	
Number of cases	F	50	50
	EFR	50	50

Pearson correlation coefficient between equity financing ratio and operating performance f is -0.495, and the probability of one-tailed significance test is 0.000, less than 0.05, so there is a significant negative correlation between equity financing ratio and operating performance F, see table 17.

Table 18 Model summary

Model	R	R-square	R-square after adjustment	Error of standard estimation
1	.495	.245	.229	24.489999

The correlation coefficient R of the two variables is 0.495, and the R-square is 0.245, which means that the equity financing ratio can explain the R-square after adjustment of 22.9%, but other factors affect the overall performance, see Table 18.

Table 19 ANOVA

Model		quadratic sum	Freedom	mean square	F	conspicuousness
1	recurrence	9332.455	1	9332.455	15.560	.000
	residual	28788.482	48	599.760		
	amount to	38120.937	49			

The mean square of regression is 9332.455, and the remaining mean square is 28788.482, the observed value of F-test is 15.560, the corresponding significance level is 0.000, less than 0.05, which further shows that there is a robust linear relationship between the two variables, see Table 19.

Table 20 Coefficients

Model		Unstandardized coefficient		Standardization coefficient	t	conspicuousness	95.0% confidence interval of B

		B	standard error	Beta			inferior limit	superior limit
1	(constant)	18.374	3.806		4.828	.000	10.721	26.026
	EFR	-69.284	17.564	-.495	-3.945	.000	-104.599	-33.969

The coefficient of the constant is 18.374, the coefficient of regression is -69.284, the observed value of the t-test of the regression coefficient t-test is 4.828, the significance level is 0.000, less than 0.05, it is considered that the regression coefficient has significant significance, see Table 20.

The preceding analysis results show that there is a significant negative correlation between equity financing ratio and overall performance.

4.1.3 Relationship between debt financing ratio and operating performance

Table 21 Correlations

		F	DFR
Pearson correlation	F	1.000	-.008
	DFR	-.008	1.000
conspicuousness(one-tailed)	F		.477
	DFR	.477	
Number of cases	F	50	50
	DFR	50	50

The Pearson correlation coefficient between debt financing ratio and operating performance F is -0.008, and the probability of a one-tailed significance test is 0.477, far higher than 0.05, so there is no significant correlation between debt financing ratio and operating performance F, see Table 21.

Table 22 Model summary

model	R	R-square	R-square after adjustment	Error of standard estimation
1	.008	.000	-.021	28.180346

It shows that the correlation coefficient R of the two variables is 0.008, and the R-square is 0.000, indicating that the debt financing ratio can hardly explain the R-square after adjustment,see Table 22.

Table 23 ANOVA

model		quadratic sum	Freedom	Mean square	F	conspicuousness
1	recurrence	2.605	1	2.605	.003	.955
	residual	38118.332	48	794.132		
	amount to	38120.937	49			

It shows that the mean square of regression is 2.605, the remaining mean square is 38118.332, the observed value of F-test is 0.003, and the corresponding significance level is 0.955, which is far greater than 0.05, further indicating that there is no linear relationship between the two variables,see Table 23.

Table 24 Coefficients

model		Unstandardized coefficient		Standardization coefficient	t	conspicuousness	95.0% confidence interval of B	
		B	standard error	Beta			inferior limit	superior limit

| 1 | constant | 12.862 | 13.056 | | .985 | .329 | -13.388 | 39.112 |
| | DFR | -1.643 | 28.689 | -.008 | -.057 | .955 | -59.326 | 56.039 |

The coefficient of constant is 12.862, the coefficient of regression is - 1.643, the observed value of t-statistic of regression coefficient t-test is - 0.057, and the significance level is 0.955, which is far greater than 0.05, so the coefficient of regression is not significant,see Table 24.

The preceding analysis results show that there is no significant positive or negative correlation between bond financing ratio and comprehensive performance.

5. Summary and policy suggestion

This chapter summarized the conclusions and advanced suggestions on the basis of the preceding study.

5.1 Summary

5.1.1 Conclusion

Through the empirical research on the financing structure and operating performance of China's agricultural listed firms, this paper draws the following conclusions: (a) a significant positive correlation between the internal financing proportion and operating performance; (b) a significant negative correlation between the equity financing structure and operating performance; (c) no significant positive or negative correlation between the debt financing proportion and operating performance.

The proportion of debt financing and operating performance did not pass the hypothesis test. The empirical results show that there is no significant correlation between debt financing structure and operating performance of Chinese agricultural listed firms. The reasons may be as follows: first of all, Chinese agricultural listed firms mainly focus on short-term debt in debt financing. In order to maintain solvency, enterprises have to maintain a certain current ratio, thus retaining a large number of current assets with weak profitability; second, the debt financing of agricultural listed firms mainly comes from commercial banks, but because of the market of Chinese commercial banks The low degree of commercialization indirectly leads to the failure of the effect of "hard constraint" of debt financing; thirdly, the self-owned funds of agricultural listed firms are too small, when there are problems in project development or business activities, the operators do not have enough ability to save the firm, which plays a little role in reducing the agency cost between shareholders and managers.

There is a significant negative correlation between equity financing structure and operating performance. If the proportion of equity financing is too high, it will form a single financing structure of the firm, produce problems such as imperfect constraint mechanism and governance function defects, and can't enjoy the advantages of bond financing, such as incentive and positive signal transmission to the management, and the negative impact on the company's performance can't be avoided.

5.1.2Limitations of research

Firstly, in terms of sample selection, 50 Chinese agricultural listed firms are selected, but due to limited time and energy, only the annual report data of 50 agricultural listed firms in 2013-2017 are selected so that the explanatory power may be lacking.

Secondly, Chinese agricultural industry has own characteristics and does not represent other industries. This paper only studies the relationship between the financing structure and operating performance of agricultural listed firms. Therefore, there is a lack of explanatory power on the relationship between the financing structure and operating performance of other industries.

Thirdly, in the selection of the financing structure variables of agricultural listed firms, the paper selects the internal financing proportion, external financing proportion, equity financing proportion,

and debt financing proportion for research and the specific indicators include surplus reserve, undistributed profit, paid-in capital, capital reserve, long-term loan, short-term loan, notes payable, accounts payable, advance receipts and other payables. The financing structure is a vibrant concept. This paper can not cover all the indicators.

Fourthly, debt financing has not passed the test, and its role in the operating performance of agricultural listed firms needs further study.

5.2 Policy suggestion

5.2.1Suggestions on external policies of agricultural listed firms in China

Firstly, gradually improve the bond financing market and actively explore diversified financing services to solve the capital problems of listed agricultural firms. Bond interest, as a financial expense, has a prominent advantage. It can be used as the deduction base of corporate income tax to promote the increase of corporate after-tax profits. Compared with a bank loan, the interest rate of a bond is still low. Compared with bank loan support, listed firms are more likely to obtain a bond guarantee. However, China has not yet perfected the bond listing mechanism, so many listed firms can not pass the high requirements of the bond listing threshold. Therefore, the government should give full play to its functions, build a scientific and sound enterprise credit evaluation system, give full play to the role of relevant rating agencies, and help enterprises with an excellent reputation to obtain the support of bond financing.

Secondly, strengthen the supervision of the stock market. Once an firm is listed successfully, the threshold for carrying out related business will be lowered, which provides conditions for some firms to operate in the dark, and the final result is that the capital utilization rate of the enterprise will be reduced rapidly. Therefore, the relevant departments must assume their responsibilities, actively carry out the corresponding review work, strengthen external supervision, to solve such problems, and comprehensively improve the investment efficiency of firms.

Thirdly, to create a healthy environment for agricultural development. Due to the overall poor agricultural production environment in China, not only the profitability of the agricultural industry is limited, but also faces the dilemma of land shortage. Under multiple pressures, Chinese agricultural listed firms generally have a low level of performance and are facing operating difficulties. In order to solve this problem, the national government and relevant departments must actively carry out the operation and gradually build a healthy agricultural development environment, to promote the rapid upgrading of Chinese agricultural industry.

5.2.2Internal countermeasures and suggestions of agricultural listed firms in China

Firstly, improve the decision-making ability of firms managers. Only by using the funds raised reasonably can enterprises have more internal funds to expand and develop their business. It is not a simple thing to use the raised funds reasonably and efficiently, which requires the firm's managers to have strong decision-making ability and judgment ability.

Secondly, determine a reasonable debt financing ratio and use financial leverage to improve the performance of the firm. At present, the current debt ratio of most agricultural listed firms in China is too high, and the long-term debt ratio is relatively low. This kind of unreasonable debt capital structure is not conducive to the exertion of financial leverage, and the balance between the short-term and long-term debt ratio should be maintained.

References

[1] Jarrad Harford,Sandy Klasa,Nathan Walcott:Do firms have leverage targets?Evidence from acquisitions,Journal of Financial Economics,Vol. 93 (2009)No.1, p.1-14.

[2] Sheridan Titman,Roberto Wessels:The Determinants of Capital Structure Choice,The Journal of Finance,Vol.43 (1988)No.1, p.1-19.

[3] Murillo Campello:Debt financing:Does it boost or hurt firm performance in product markets,Journal of Financial Economics,Vol.82 (2006)No.1, p.135-172.

[4] Bart M.Lambrecht,Stewart C.Myers:Debt and managerial rents in areal-options model of the firm,Journal of Financial Economics,Vol.89 (2008)No.2, p.209-231.

[5] Dimitris Margaritis,Maria Psillaki:Capital structure,equity ownership and firm performance, Journal of Banking&Finance,Vol. 34 (2010)No.3, p.621-632.

[6] DeAnge-lo H,DeAngelo L,Whited T. M:Capital structure Dynamics and Transitory Debt,Journal of Financial Economics,Vol. 99 (2011)No. 2, p.235-261.

[7] Rongli Yuan,Jason Zezhong Xiao,Nikolaos Milonas,Joe Hong Zou:The Role of Financial Institutions in the Corporate Governance of Listed Chinese Companies,British Journal of Management,Vol. 20 (2009) No.4, p.562-580.

[8]Information on http://www.csrc.gov.cn

[9]Lazarus Angbazo:Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking,Journal of Banking&Finance,Vol. 21 (1997)No.1, p.55-87.

[10]Author Frank,Vidhan K Goyal:Testing the pecking order theory of capital structure,Journal of Financial Economics,Vol.67 (2003)No.2, p.217-248.

[11]Jean Helwegea,Nellie Liang:Is there a pecking order? Evidence from a panel of IPO firms,Journal of Financial Economics,Vol.40 (1996)No.3, p.429-458.

[12]Frederik P.Schlingemann:Financing decisions and bidder gains,Journal of Corporate Finance,Vol.10 (2004)No.5, p.683-701.

[13]Malcolm Baker,Jeffrey Wurgler:Market Timing and Capital Structure,The journal of finance,Vol.57 (2002)No.1, p.1-32.

[14]Nigel Driffiel,Sarmistha Pal:The East Asian crisis and financing corporate investment: is there a cause for concern?,Journal of Asian Economics,Vol.12 (2001)No.4, p.507-527.

[15]Christopher A. Hennessy,Toni M. Whited:How Costly Is External Financing? Evidence from a Structural Estimation,The journal of finance,Vol.62 (2007)No.4, p.1705-1745.

[16]Qiao Liu,Zhou (Joe)Lu:Corporate governance and earnings management in the Chinese listed companies: A tunneling perspective,Journal of Corporate Finance,Vol.13 (2007)No.5, p.881-906.

[17]Hong Zou,Jason Zezhong Xiao:The financing behaviour of listed Chinese firms,The British Accounting Review,Vol.38 (2006)No.3, p.239-258.

[18]Ang, James S:Small Business Uniqueness and the Theory of Financial Management,Journal of Small Business Finance,Vol.1 (1991)No.1, p.1-13.

[19]Allen N. Berger,Gregory F. Udell:The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle,Journal of Financial Economics,Vol.22 (1998)No.6-8, p.613-673.

[20]Johan F.M Swinnen,Hamish R Gow:Agricultural credit problems and policies during the transition to a market economy in Central and Eastern Europe,Food Policy,Vol.24 (1999)No.1, p.21-47.

[21]Enrico C Perotti,Laixiang Sun,Liang Zou:State-Owned versus Township and Village Enterprises in China,Vol.41 (1999)No.2-3, p.151-179.

[22]Huafang X,Jianguo Y:Ownership structure, board composition and corporate voluntary disclosure, Managerial Auditing Journal,Vol.22 (2007)No.6, p.604-619.

[23]Anthony G.Hopwood:An Empirical Study of the Role of Accounting Data in Performance Evaluation,Journal of Accounting Research,Vol.10 (1972), p.156-182.

[24]Obstfeld, Maurice, and Kenneth Rogoff:The Mirage of Fixed Exchange Rates,Journal of Economic Perspectives,Vol.9 (1995)No.4, p.73-96.

[25]MeiYu:State ownership and firm performance: Empirical evidence from Chinese listed companies,China Journal of Accounting Research,Vol.6 (2013)No.2, p.75-87.

Appendix

Sample agricultural listed firms

Number	Stock code	Stock abbreviation	Listing year	Listing board	Province
1	600540	XSGF	2004	Main	Xinjiang
2	600506	XLGF	2001	Main	Xinjiang
3	600076	KXXC	1997	Main	Shandong
4	600298	AQJM	2000	Main	Hubei
5	600975	XWF	2004	Main	Hunan
6	600371	WXDN	2002	Main	Heilongjiang
7	600354	DHZY	2004	Main	Gansu
8	600313	NFZY	2001	Main	Beijing
9	600359	XNKF	1999	Main	Xinjiang
10	601118	HNXJ	2011	Main	Hainan
11	600097	KCGJ	1997	Main	Shanghai
12	600598	BDH	2002	Main	Heilongjiang
13	600257	DHGF	2000	Main	Hunan
14	600467	HDJ	2004	Main	Shandong
15	600737	ZLTY	1996	Main	Xinjiang
16	600873	MHSW	1995	Main	Tibet
17	000798	ZSYY	1998	Main	Beijing
18	000702	ZHKJ	1997	Main	Hunan
19	000876	XXW	1998	Main	Sichuan
20	000505	JLKG	1992	Main	Hainan
21	600127	JJMY	1998	Main	Hunan
22	600251	GNGF	2003	Main	Xinjiang
23	000713	FLZY	1997	Main	Anhui
24	000735	LNS	1997	Main	Hainan
25	300119	RPSW	2010	GEM	Tianjin
26	300138	CGSW	2010	GEM	Hebei
27	300268	JWGF	2011	GEM	Hunan
28	300175	LYGF	2011	GEM	Shandong
29	300021	DYJS	2009	GEM	Gansu
30	300087	QYGK	2010	GEM	Anhui
31	300189	SNJY	2011	GEM	Hainan

32	300313	TSSW	2012	GEM	Xinjiang
33	300094	GLSC	2010	GEM	Guangdong
34	002385	DBN	2010	SME	Beijing
35	002548	JXN	2011	SME	Guangdong
36	002567	TRS	2011	SME	Hunan
37	002220	TBSP	2008	SME	Liaoning
38	002124	TBGF	2007	SME	Zhejiang
39	002157	ZBKJ	2007	SME	Jiangxi
40	002311	HDJT	2009	SME	Guangdong
41	002688	JHSW	2012	SME	Inner Mongolia
42	002100	TKSW	2006	SME	Xinjiang
43	002069	ZZD	2006	SME	Liaoning
44	002321	HYNY	2009	SME	Henan
45	002458	YSGF	2010	SME	Shandong
46	002505	DKNY	2010	SME	Hunan
47	002041	DHZY	2005	SME	Shandong
48	002679	FJJS	2012	SME	Fujian
49	002234	MHGF	2008	SME	Shandong
50	002299	SNFZ	2009	SME	Fujian