Pstructure, Market Volatility and Market Income

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Abstract

This paper analyzed the relationship between pyramid structure and market income and market volatility of private enterprises by using the data of listed private companies in China from 2007 to 2013, and we revealed the internal causes of this relationship through the alternative role of the internal capital market of pyramid structure. The empirical results showed that the pyramid structure level, complexity and degree of deviation of the pyramid structure of private enterprises in China are negatively correlated with market income and market volatility. These conclusions revealed that under the condition of weak institutional environment and imperfect market system, the private controlling shareholder chose to reduce the risk of enterprise market volatility through the pyramid structure and to share the enterprise income within the group. This article provided suggestions for promoting the healthy development of private enterprises.

Keywords

Pyramid structure, Market volatility, Market income.

1. Introduction

The widespread existence of the pyramid structure has aroused the attention of scholars at home and abroad. Such as La Porta [1] found that 26% of the ultimate shareholder adopt the pyramid structure in world's 27 developed countries; Claessens, Djankov and Lang [2] have studied 2980 companies in East Asia, and 38.7% of large enterprises adopt pyramid-holding structure. As in the case of other countries in the world, the controlling shareholders of private listed companies in China also use the pyramid structure to control the various companies within the enterprise. For example, Fan, Wong and Zhang [3] in the study of 750 IPO companies in China found that 75% of the enterprises are controlled by the pyramid structure.

The initial study on the pyramid structure focused on the phenomenon of controlling shareholder exploited the small shareholders through the pyramid structure. The controlling shareholder of pyramid structure achieves deviation of the right to control and cash flow through constructing levels and chains. With a smaller cash flow rights to obtain greater control, and then through the sale of assets, transfer pricing, cash and other internal transactions, they achieve the transfer of resources, seek control of private income, and occupy small and medium shareholders' interests. With the deepening of the research, scholars began to study the advantages of the pyramid structure. Member companies can form an internal capital market, the controlling shareholder through internal funds and other ways help member companies to solve the financing difficulties. Especially in the case of strong external financing constraints, the effect of pyramid structure of the internal capital market is more obvious.

The two theories of the pyramid structure both have the points, and two diametrically opposed conclusions are drawn. However neither of these theories can conduct a comprehensive study of the pyramid structure, and there is little study on the relationship between pyramid structure and corporate market income and market volatility. This paper takes the private listed companies from 2007 to 2013 in China as a sample, which reveals the relationship between pyramid structure and market income and market volatility. The study found that the pyramid structure not only reduced the market income but also inhibited the market volatility. This article taking a comprehensive view of

the pyramid structure, provides a reasonable explanation and recommendations for the private listed companies in China.

2. Theories and Hypotheses

2.1 Related theories of Pyramid structure

The initial research on the pyramid structure focused on the controlling shareholder who exploited the small and medium shareholders through the pyramid structure. The main theory is interests grab. The theory holds that in the area where the investor protection is poor, the controlling shareholder of the pyramid structure achieves the deviation of control rights and cash flow rights by constructing levels, and obtains the bigger control rights with the smaller cash flow. They obtain control of private income, occupation of small and medium shareholders' interests through the asset pricing, cash exploitation and other internal transactions. La Porta[1] and others have shown that family-controlled pyramid structures are more prevalent in countries and regions where investor protection is inadequate. Because the law cannot protect these investors adequately. The controlling shareholders have the incentive to exploit the scattered minority shareholders. Claessens [2] studied the 1301 listed companies in eight East Asian countries and regions, and found that the firm's value was positively related to the ownership of the controlling shareholder, but was negatively related to the degree of separation of ownership and control. In the domestic research, Wang Lijun [4] takes 329 private listed companies as a sample and found that the controlling shareholder of private listed companies exploited small shareholders' interests by the relevant guarantees, funds and activities. Liu Qiliang [5] and others' studies have shown that in the case of weak protection for investors, the controlling shareholder will hollow out and seek rent to obtain control of private interests.

However, the theory of interest grab cannot explain, despite   small and medium shareholders know exploitation, why they are still invest them by pyramid structure. With the deepening of the research, scholars began to study the inherent advantages of the pyramid structure. It is found that the pyramid structure itself has the effect of debt financing amplification, especially the deviation of control right and cash flow right can bring the improvement of external debt financing, effectively improve the external debt financing capacity of enterprises. Pyramid structure enterprises established huge internal capital market, and can obtain high internal financing scale and effect through internal transactions, mutual loans, short-term financing. Almeida and Wolfenzon [6] established theoretical models to explain the formation of the pyramid structure. They believed that the internal capital market   of the pyramid structure is an alternative to external capital markets. This alternative feature is more obvious especially in the area where there are little protection for investors and weakness of external capital markets. Masulis [7] found that the controlling shareholder constructing the pyramid structure enterprise is to alleviate the financing constraints faced by the company in two levels in the country and the company.

2.2 Hypotheses.

 (1) Pyramid structure and market volatility

Property rights theory holds that the system is the logical starting point to explain the organizational structure. China is facing economic restructuring, the corresponding market system is not perfect, the system environment is unsatisfactory, and private enterprises are subject to many unfair treatment and system discrimination in policy preferences, taxes and financial subsidies. Among these threats, the biggest threat to private enterprises is financing constraints. Government behavior seriously affects the allocation of resources. With the help of local governments, state-owned enterprises can generally easier access the bank loans, financing constraints are relatively light [8]. Although private enterprises played an important role in promoting economic growth, because of the differences in property rights, they are still facing significant external financing constraints [9]. In order to avoid the risks of external markets, private enterprises seek joint through different forms of cooperation to enhance the ability to resist risks. Therefore, the widespread existence of the pyramid structure of private enterprises in China will eventually play a role of avoiding risks. In the study of the

relationship between pyramid structure and institutional environment in China, Han Zhongxue, Cheng Lei [10] found that the private enterprises tend to construct complex pyramid structure in the poor protection for investors areas. Enterprises can adapt to the external market environment. You Jiaxing, Luo Shengqiang [11] found that the pyramid structure as a special capital structure arrangement, its advantage is to ensure the actual controller with less capital investment to achieve the control of large-scale resources, to avoid the investment risks.

Pyramid holding group can build the internal financing market, expand the source of funds, so that the group's risks have been shared. For example, the domestic scholar Han Liangliang [12] from the "internal capital market financing substitution effect" point of view, found that the more complex pyramid structure is, the more listed companies tend to use the internal capital market to provide non-bank loans. Li Zengquan [13] found that the pyramid structure of the controlling shareholder could use a small amount of self-owned funds to control a large number of external funds.

In summary, we found that the pyramid structure could avoid business risks, reduce market volatility, so we come to the following assumptions:

Hypothesis 1: The characteristic variables of pyramid structure have a significant negative correlation with the market fluctuation of the listed company.

(2) Pyramid structure and market income

The pyramid structure of the enterprise not only is a way of ownership structure, but also has a far-reaching relationship with the organizational structure of the enterprise, has a deep influence on management, investment and financing decision and profit distribution. Under the constraints of the institutional environment, private entrepreneurs are more focused on the development of strategic decision-making and business plans from a stable and sustainable development perspective, safeguarding the interests of the entire enterprise rather than the interests of individual enterprises. In addition, there are a small number of listed companies because of the strict control of financial. Private listed companies of the pyramid structure played a leading role, which could create a better income. When the listed company created a good income, the controlling shareholder will distribute the income based on the overall interests. The financing advantage model of Almeida and Wolfenzon [6] divides the income generated by the company into two parts: the right of control and the non-transferable income. The non-transferable income is shared by all investors. Reasonable external investors are only responsible for the non-transferable income generated by the new company. When the deviation of cash flow and control is not obvious, the controlling shareholders use the non-transferable income of the enterprise within the pyramid structure to establish a new company and share this part of income with other shareholders. The companies that belong to the pyramid-holding group are not just "diverted" resources and wealth, but also share the benefits, share the costs and risks. Khanna and Rivkin [14] have evidences that the variance of the return on assets in the pyramid is small, and it is concluded that the pyramid members share the benefits while creating revenue. Based on the above view, listed companies have created a good income, however, due to the role of allocation of resources of pyramid structure, this part of the income will be shared by the other enterprise. China's securities market financing control is strictly limited, the stock supply is limited, small and medium investors have a strong investment demand for the securities market. Small and medium-sized shareholders may sacrifice some of their revenue in order to avoid risks. Riyanto and Toolsema [15] studied that the pyramid structure of the interests of transport is an insurance on interests of minority shareholders. In summary, because the pyramid structure has the role of resource allocation, while generating revenue, the controlling shareholders will also share the benefits of listed companies, which will lead to lower returns of listed companies, so we have the following assumptions:

Hypothesis 2: The characteristic variables of pyramid structure have a significant negative correlation with the market income of the listed company.Literature References

3. Data selection and variables definition

3.1 Data selection

This paper chooses all private listed companies other than state-owned and foreign-funded enterprises in Shanghai and Shenzhen from 2007 to 2013 as research samples. In order to ensure the effective use and accuracy of the data, we have two following strict principles: (1) Taking into account the requirements of the previous year's data calculation, we select the company listed before 2007. (2) In order to ensure the accuracy of financial data, we exclude companies that were ST, ST in 2007 – 2013. (3) We exclude companies with significant asset restructuring and significant financial data losing in seven years. At the same time, in order to eliminate the impact of extreme values, this paper also removed the upper and lower 1% of extreme values. Finally, we get 1885 companies annual non-balanced panel data. The data of the pyramid structure level, complexity, control and cash flow are calculated manually by the ownership structure chart. Other financial data come from the CCW and Guotai CSMAR databases.

3.2 Variables definition

(1) Proxy variables of market income and market volatility

This paper chooses two variables: the annual excess return rate of whole market and the annual excess return rate of the market, to measure the market income of listed companies. The market volatility of the listed companies is measured by the variance of the monthly excess return rate of whole market and the monthly excess return rate of the market.

(2) Characteristic variables of pyramid structure

This paper takes three indicators to measure the complexity of pyramid structure, namely, pyramid structure level (LEVE), pyramid structure complexity (COMP) and control and cash flow right degree of deviation (DIFF). In order to reflect effectively the actual control of the controlling shareholder, the pyramid structure level is defined in accordance with the maximum control chain level of the ultimate controller, and the listed company as the lowest level of the control chains, rather than the longest control chain [16]. In order to measure the size of the internal capital market of the pyramid structure, we use an index: complexity, which is represented by the product of the pyramid structure level and the control chains. The control chains are calculated by the number of chains that the final controller can control. There are three basic principles for calculating the number of chains: it must be a chain that the ultimate controller or holding company can control; there must be a new holding company in the middle of the chain of control chains, otherwise it can only be counted as one chain of control; the holding company shows that it is not possible to determine whether the holdings are holding more than 10% as the holding standard. The degree of deviation between the controlling shareholder's control right and the cash flow right are expressed by the ratio of control and cash flow rights.

(3) Controlled variables

In order to study the relationship between pyramid structure and market volatility and market income, this paper chooses the control variables by referring to the relevant literature at home and abroad, see Table 1.

Table 1. Variables selection and definition

	Variables		Definitions
Explained variables	Market income	REVE1	the annual excess return rate of whole market
		REVE2	the annual excess return rate of the market
	Market volatility	REVEVAR1	the monthly excess return rate of whole market
		REVEVAR2	the monthly excess return rate of the market.
Explanatory variables	Structure level	LEVE	ln (the maximum control chain level)
	Complexity	COMP	ln (the product of the pyramid hierarchy and the control chains)
	Differential	DIFF	Control rights/ cash flow rights

Control variables	Size	SIZE	ln (Total assets)
	Assets and liabilities	DEBT	Total liabilities/ Total assets
	Flow	FLOW	Net cash flow / Total assets
	Capital	CAPI	Cash paid for fixed assets, intangible assets and other long-term assets/ Total assets
	The proportion of the largest shareholder	FIRS	The proportion of the largest shareholder / Total number of shares
	Annual dummy variable	YEAR	Belonging to the year for 1, no for zero
	Industry dummy variable	INDU	Belonging to the industry for 1, no for zero

4. Data analysis and model results

4.1 Analysis of Sample Data of Private Listed Companies in China

(1) Descriptive statistics of the main variables

According to the data of the sample of private listed companies in our country, we make preliminary descriptive statistics on the main variables, and can see the general situation of pyramid structure, market income and market volatility variables.

Table 2. Descriptive statistics of the main variables

	MEAN	MAX	MIN	MEDIA	STD.DEV
REVE1	0.000	0.104	-0.090	-0.002	0.020
REVE2	-0.001	0.104	-0.088	-0.002	0.020
REVEVAR 1	6.31810-4	3.62810-3	2.09710-5	4.78110-4	5.15210-4
REVEVAR 2	6.33610-4	3.63410-3	2.36310-5	4.75810-4	5.17810-4
LEVE	2.350	6.000	1.000	2.000	0.918
COMP	2.945	12.000	1.000	2.000	1.975
DIFF	2.061	12.500	0.500	1.337	1.780
DEBT	0.472	1.028	0.007	0.482	0.180
FLOW	0.049	0.553	-0.415	0.048	0.087
CAPI	0.052	0.431	-0.027	0.038	0.049
SIZE	21.666		17.902	21.611	1.028
BETA	1.120	1.991	0.121	1.141	0.225
FIRS	0.295	0.852	0.045	0.266	0.134
OBS	1885	1885	1885	1885	1885

Table 2 showed the results of descriptive statistical analysis of the sample of private listed companies in China. Due to the small number of first-class pyramid structure enterprises, considering our main purpose is to obtain the trend of pyramid structure change. Therefore, this paper puts first-class pyramid structure into consideration. We can see that private listed companies market income level is not high, and the average level is even negative relative to the market excess return rate. Corresponding to this is that the market volatility is still good. This is due to economic restructuring in China, and government behavior still has a serious impact on the allocation of resources. Private listed companies have relatively less competitiveness. Table 2 also showed that pyramid structure level is 2.350; the average level of complexity is 2.945. This showed that China's private enterprise pyramid structure level and complexity is not very high, the level is mainly concentrated in the 2-3

layer. This may be due to the situation that China's private enterprises are facing many difficulties, and the size is subject to certain restrictions. The deviation level are relatively low for 2.061, and we can speculate that motives for the establishment of complex pyramid structures by private controlling shareholders may not be a simple interest grab.

(2) Descriptive statistical comparison of sample variables of single structure and pyramid structure in China

Table 3 Descriptive statistical comparison of sample variables of single structure and pyramid structure in China

	MEAN		MEDIA		STD.DEV	
REVE1	0.001	-0.001	0.000	-0.002	0.022	0.020
REVE2	0.000	-0.001	-0.001	-0.003	0.022	0.020
REVEVAR1	6.73710-4	6.27410-4	5.55210-4	4.68910-4	4.71610-4	5.19510-4
REVEVAR2	6.80010-4	6.28710-4	5.44610-4	4.67310-4	4.83510-4	5.21210-4
LEVE	1.000	2.494	1.000	2.000	0.000	0.847
COMP	1.000	3.152	1.000	2.000	0.000	1.968
DIFF	1.000	2.174	1.000	1.432	0.000	1.837
DEBT	0.484	0.471	0.495	0.480	0.189	0.179
FLOW	0.042	0.050	0.043	0.049	0.072	0.089
CAPI	0.064	0.050	0.052	0.037	0.054	0.049
SIZE	21.589	21.674	21.443	21.616	0.929	1.037
BETA	1.122	1.119	1.147	1.140	0.222	0.225
FIRS	0.208	0.305	0.185	0.280	0.102	0.133
OBS	181	1704	181	1704	181	1704

From Table 3 we can see that the pyramid structure of the company's market income situation is lower than single structure company, indicating that the pyramid structure of enterprise may exist the situation of sharing interests. The pyramid structure of the company's market volatility is lower than single structure company, indicating that the joint enterprises have the ability to resist risks.

4.2 Analysis of Regression Results between Pyramid Structure and Market volatility and Market income

In the following paper, we analyzed the relationship between pyramid structure and market volatility and market income through the multiple regression model. Due to space constraints, the correlation coefficients between the variables are not listed. Based on the Hausman test, the panel data is applied to the stochastic effect model. The generalized least squares method is used to estimate the panel data. The specific econometric model is as follows:

$$REVEVAR_{it} = \alpha_0 + \alpha_1 LEVE_{it}(COMP_{it}/DIFF_{it}) + \alpha_2 DEBT_{it} + \alpha_3 FLOW_{it} + \alpha_4 CAPI_{it}$$
$$+ \alpha_5 SIZE_{it} + \alpha_6 BETA_{it} + \alpha_7 FIRS_{it} + \alpha_8 YEAR_{it} + \alpha_9 INDU_{it} + \varepsilon_{it} \tag{1}$$

$$REVE_{it} = \beta_0 + \beta_1 LEVE_{it}(COMP_{it}/DIFF_{it}) + \beta_2 DEBT_{it} + \beta_3 FLOW_{it} + \beta_4 CAPI_{it}$$
$$+ \beta_5 SIZE_{it} + \beta_6 BETA_{it} + \beta_7 FIRS_{it} + \beta\alpha_8 YEAR_{it} + \beta_9 INDU_{it} + \varepsilon_{it} \tag{2}$$

(1) Regression Analysis of Pyramid Structure and Market volatility

Under the constraints of China's new market institutional environment, the company will form joint enterprises to solve the problem of financing constraints, so that the financing risks faced by listed companies will be weakened, and the complexity of the pyramid structure will affect the enterprise market volatility. The regression results are shown in Table 4.

Table 4. The regression results between pyramid structure and market volatility

	REVEVAR1	REVEVAR2	REVEVAR1	REVEVAR2	REVEVAR1	REVEVAR2
C	1.791	1.734	1.832	1.774	1.794	1.736
	(6.52)	(6.11)	(6.65)	(6.24)	(6.44)	(6.02)
COMP	-0.012	-0.011				

	(-2.32)	(-2.00)				
LEVE			-0.077 (-2.85)	-0.073 (-2.62)		
DIFF					-0.013 (-2.22)	-0.011 (-1.80)
DEBT	0.264 (4.31)	0.253 (4.01)	0.263 (4.28)	0.253 (3.99)	0.260 (4.20)	0.251 (3.91)
FLOW	-0.217 (-1.92)	-0.217 (-1.88)	-0.202 (-1.78)	-0.202 (-1.74)	-0.208 (-1.78)	-0.199 (-1.68)
CAPI	0.198 (0.98)	0.227 (1.10)	0.171 (0.84)	0.201 (0.97)	0.240 (1.17)	0.261 (1.24)
SIZE	-0.084 (-7.47)	-0.080 (-6.81)	-0.086 (-7.54)	-0.081 (-6.89)	-0.085 (-7.42)	-0.081 (-6.76)
BETA	0.142 (3.13)	0.134 (2.91)	0.144 (3.15)	0.138 (2.31)	0.140 (3.02)	0.133 (2.81)
FIRS	0.162 (2.04)	0.169 (2.05)	0.188 (2.33)	0.193 (2.31)	0.174 (2.16)	0.180 (2.15)
YEAR	YES	YES	YES	YES	YES	YES
INDU	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.348	0.339	0.350	0.340	0.347	0.338
Wald chi2(36)	985.97	930.77	984.21	929.95	951.60	898.95
OBS	1885	1885	1885	1885	1885	1885

 $p<0.1$, $p<0.05$, $p<0.01$, the following as the same

It can be seen from Table 4 that the three characteristic variables of the pyramid structure: the pyramid level, the pyramid structure complexity and the two rights deviations are negatively correlated with the market volatility. Moreover pyramid structure level, complexity and market volatility at 5% and 1% of the confidence level was significantly negatively correlated, which is greater than significant degree between the degree of deviation and market volatility. This shows that the pyramid structure forms a complex internal financing market through the construction level and complex control chain to constrain the market volatility. In addition, private companies can avoid risks.

(2) Regression Analysis of Pyramid Structure and Market income

Table 5. The regression results between pyramid structure and market income

	REVE1	REVE2	REVE1	REVE2	REVE1	REVE2
C	-1.450 (-1.13)	-1.450 (-1.12)	1.450 (-1.12)	1.045 (-0.82)	-1.165 (-0.95)	0.959 (-0.79)
COMP	-0.055 (-2.46)	-0.054 (-2.38)				
LEVE			-0.249 (-2.23)	-0.245 (-2.18)		
DIFF					-0.041 (-1.75)	-0.046 (-1.91)
DEBT	-0.504 (-1.89)	-0.547 (-2.04)	-0.586 (-2.22)	-0.634 (-2.39)	-0.554 (-2.16)	-0.437 (-1.86)
FLOW	-0.893 (-1.74)	-1.072 (-2.06)	-0.587 (-1.67)	-1.024 (-2.00)	-0.971 (-1.95)	-1.078 (-2.19)
CAPI	0.729 (0.82)	0.738 (0.82)	0.950 (1.08)	0.979 (1.11)	1.454 (1.67)	1.396 (1.62)
SIZE	0.098 (2.00)	0.106 (2.14)	0.088 (1.82)	0.095 (1.96)	0.085 (1.81)	0.074 (1.59)

BETA	-0.410 (-2.04)	-0.403 (-1.98)	-0.442 (-2.20)	0.434 (-2.14)	-0.405 (-2.06)	-0.421 (-2.15)
FIRS	0.589 (1.77)	0.616 (1.84)	0.579 (1.73)	0.604 (1.80)	0.420 (1.32)	0.474 (1.49)
YEAR	YES	YES	YES	YES	YES	YES
INDU	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.107	0.088	0.104	0.086	0.108	0.110
Wald chi2(34)	164.84	136.20	162.47	136.20	162.97	163.58
OBS	1572	1572	1572	1572	1572	1572

Domestic and foreign scholars generally believed that the pyramid structure will transfer the interests of companies from its bottom to the upper controlling shareholders, and occupy the interests of the listed companies. This paper argues that the purpose of transfer is more inclined to the allocation of resources rather than interests occupation. Taking into account the influence between characteristic variables and market income will not be shown in the year, this paper uses a lagging way to carry out research. Table 5 shows the regression results of the characteristic variables of the pyramid structure and the market income.

According to the regression results in Table 5, we find that the characteristic variables of pyramid structure have a significant negative correlation with the market income. However, the pyramid structure level, the pyramid structure complexity and market income are negatively correlated at the 5% confidence interval, while the significant level between two rights and market income is only 10%. This shows that the source of behavior and overall interests of the group made by listed companies will share the benefits within the group, rather than occupy the interests of listed companies.

5. Conclusion

In this paper, the private listed companies were sampled for the study, and we have studied the relationship between pyramid structure and market income, market volatility, as well as generated sources. In general, the pyramid structure level, complexity and the deviation degree of the private listed companies have a significant negative correlation with the market volatility and the market income. In the case of the game between the double characteristics of interests grab and advantages of financing, which can avoid market risks of enterprises, reduce market volatility, as well as inevitably lower market income.

The motive that the private shareholders select the pyramid structure reflects the lack of investor protection in China, the weak institutional environment and the imperfect market system. In light of this situation, we put forward the following policy recommendations: First, the relevant departments should further improve the financial market, including a variety of market mechanisms and public governance level, which is for the development of private enterprises to create a good political and ecological environment to deepen the financial system reform. Second, the relevant departments should guide the rational allocation of resources, create a fair and just market environment, and truly solve the structural contradictions between the state-owned financial and private economy, as well as promote the healthy development of private economy. Third, for the regulatory authorities, they should focus on the supervision of listed companies, which have large family characteristics and complex structures, strengthen such companies on related party transactions, internal and external audits, major events and other important information disclosure, and ensure its scientific nature, authenticity and timeliness.

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