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The Impact of Debt Financing on Startup Profitability

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Abstract

If a start-up company is unable to grow due to a lack of capital, it is prudent to investigate the possibility of using debt as a source of funding. This study examines the impact of debt financing on the profitability of start-ups using trade-off theory and pecking order theory and uses regression analysis to select factors that are correlated with debt financing structure and profitability for listed companies on the National Equities Exchange and Quotation System (NEEQ) from 2012 to 2021. At the end of the theoretical and empirical analyses, the impact of debt financing on the profitability of start-ups is analyzed and corresponding countermeasures are proposed. Finally, the findings of the study are summarized and the shortcomings of the study and the prospects for future research are outlined. The findings of this study are that debt level structure is negatively related to profitability, indicating that gearing has a negative impact on the profitability of start-ups. In terms of debt type structure, mercantile credit has a positive effect on the profitability of start-ups and bank financing have a detrimental effect on profitability. Overall, debt financing has a negative impact on the profitability of start-ups, but business credit has a positive impact on profitability.

Keywords: debt financing, startup, profitability, trade-off theory, pecking order theory, fixed effects model

1. Introduction

Financing is always one of the most difficult challenges for start-ups in their development phase. Financing options must be matched to the appropriate stage of growth or level of development to determine financing needs. According to Fama and French (2005), low growth and high profit companies do not retire or issue large amounts of equity, and start-ups are particularly vulnerable because they lack a track record of success. Financial institutions are generally conservative and only lend to companies that have been in business for at least five years and have a track record of financial statements. In many countries, lending decisions are made by the state rather than on a commercial basis, which complicates debt financing. Changes in the characteristics, activities, structure and environment of a business

have an impact on the determinants of its financial resources. As a start-up prepares to bring a product to market, it will increase its expenditure, build relationships with partners, customers and suppliers, and hire people, resulting in small or no revenue. At this point, a start-up can assist the company in maximizing the benefits of financing costs by adjusting the appropriate debt-to-equity ratio, which is essential to give the company an edge in continued growth.

China put forward the slogan "Mass Entrepreneurship, Mass Innovation" in 2015. Policies to encourage and promote innovation and entrepreneurship should also be encouraged and promoted. As a result, a large number of start-ups emerged in China during this period. It has not only boosted regional economic development, but also increased the number of patented achievements and technological innovations. It has made an increasing contribution to economic growth and has become a major channel for job creation. However, Chinese start-ups are usually short-lived, small in size and have a small number of employees. According to the latest 2018 China Economic Census statistics, the number of businesses in mainland China has been statistically categorized into two statistical categories: number of employees and time of establishment.

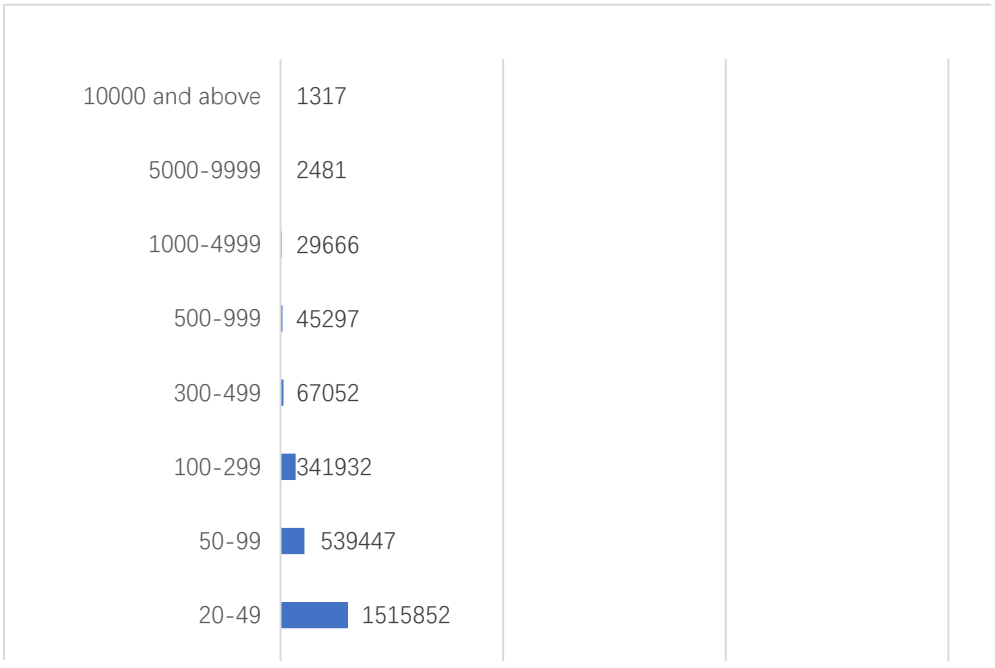


Figure 1. Number of companies-by number of employees

*Source: China Statistical Yearbook databases (2018)

Figure 1 shows that the majority of businesses have fewer than seven employees. 21,641,460 businesses, or 99.33% of the total, have fewer than 300 employees. The total number of medium and large enterprises with more than 300 employees was 145,813, accounting for only 0.67% of the total. This result indicates that the majority of businesses in China are small and that start-ups make a significant contribution to job creation.

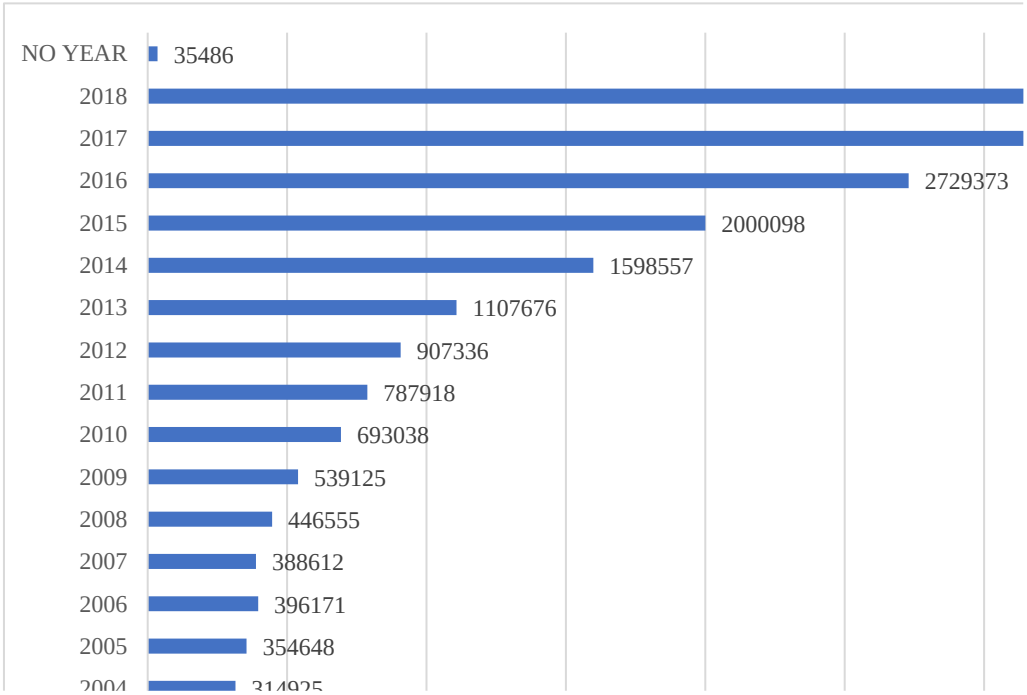


Figure 2. Number by companies-classified by time of incorporation

*Source: China Statistical Yearbook databases (2018)

Figure 2 shows that the number of businesses in China has increased rapidly over time as the country has grown. A large number of entrepreneurship start-ups have been formed each year, with growth accelerating especially since 2014, which is associated with China's policy of "entrepreneurship for all". Although the census year of the data source is 2018 and does not reflect the current actual situation, the data is still informative by extending the timeline. Evidence of the growth of Chinese start-ups can be found in this timeframe, and the current state of the Chinese economy shows that the establishment and rapid growth of start-ups has a positive impact on the economy.

1.1 Research Objectives

In order to accomplish the objectives from various debt financing viewpoints, this study's research goals are, in particular:

1. To identify the impact of size of a startup's debt financing on the profitability of start-ups.

2. To explore the impact of different types of debt financing on the profitability of start-ups.

2. Literature Review

The theory and literature on capital structure helps us to understand the impact of debt financing on start-ups. This section is divided into subsections here, as described below.

2.1 Trade-off Theory

Trade-off theory evolved from Modigliani-Miller's MM theory in 1958 and refers to how

much debt financing and how much equity financing a company prefers to use, taking into account costs and benefits. There are two types of MM theory, the MM theory without tax and the MM theory with tax. The former asserts that a firm's capital structure has no effect on firm value when the firm's debt financing rate is kept at the risk-free rate and there are no transaction costs in capital market transactions. This means that when there is income tax, interest expenses must be deducted. The higher the interest rate, the lower the income tax and therefore the higher the profit and enterprise value. According to trade-off theory, although interest expenses can be deducted from income tax, the higher the debt ratio, the greater the leverage and therefore the heightened the risk to the firm. Debt exposes a company to the risk of insolvency. Due to the presence of interest, business managers need to exercise caution when selecting projects. According to trade-off theory, the optimal capital structure for a firm is when the tax savings from the use of debt financing and the risk of insolvency from debt financing are equal. The relationship between debt financing and corporate performance is a crucial and often discussed issue in management finance. Debt financing is related to the trade-off between costs and benefits (Harris et al., 1991). If firms are highly profitable, they will prefer debt financing to increase shareholder wealth and further debt in the capital structure of the firm provides more tax benefits. If a firm is highly profitable, the likelihood of insolvency is increased if it uses more debt.

2.2 Pecking Order Theory

In the pecking order of financing in pecking order theory, endogenous financing is used first, followed by debt financing and finally equity financing. When it comes to pecking order theory, a start-up's desire to raise capital should be a key factor in determining a firm's capital structure. Because priority financing theory puts this desire first, due to priority financing theory, small firms are less likely to use bank financing and more likely to use internal financing (Fulghieri et al., 2020). According to Cole and Sokolek (2018), most people in start-ups start with low-risk debt and take equity once the situation changes. According to pecking order theory, organizations do not have an optimal capital structure. The theory advocates a financing hierarchy that includes earnings, debt and equity to maximize the adverse cost options for securities issuance caused by the available asymmetric information. The inverse relationship between profitability and leverage leads one to believe that debt will be issued when revenues are insufficient. When it comes to debt financing, it is also worth discussing what types of debt financing methods are used by start-ups. There are various forms of debt financing, including bond issues, bank loans, mercantile credit and finance leases. How you choose and decide on the order of use can help your business achieve the lowest cost while maximizing the benefits. This should be studied by researchers. A financing method contains many types of financing, and the cost of financing varies between different types of financing. The order of the different types of financing for the same type of financing is also worth deciding and considering by managers based on the principle of maximizing the company's benefits. Because financing is expensive, how to leverage limited resources can help a company find the most appropriate capital structure and maximize utilization, which is very relevant for start-ups with limited resources.

2.3 Debt Financing

Debt financing is a type of external financing where the borrower receives financial assistance through a credit or mortgage loan, which they then repay with principal and interest when the loan matures. Unlike equity financing, it does not require the sale of shares in the company and maintains concentration of management in the company. In comparison to equity investments, creditor income is limited and business risk is high. If the company's operations falter, it may choose not to pay dividends to shareholders but must still repay its creditors' debts. This study will first go over three components of debt financing: debt levels, debt maturity structure, and debt sources. The level of debt financing is defined as the ratio of a company's total debt to total assets. The term "debt maturity structure" refers to the different categories of debt arranged according to the time until maturity, including the long-term debt ratio and the short-term debt ratio, with debt typically classified as short-term debt if it matures in less than a year and long-term debt if it does so. The source of debt finance for start-ups is referred to as the debt source structure. According to Hou (2009), the two most common sources of startup capital are bank financing and commercial credit. A bank loan is a business transaction in which the bank loans money to someone in need at a certain interest rate in accordance with national regulation and then receives the money back within a predetermined time frame. Mercantile credit is a loan relationship between enterprises formed in a commodity transaction as a result of deferred payment or advance receipt of payment.

2.4 Profitability

Profitability is the process by which a company uses various economic resources to conduct business activities in order to make money. It can help start-ups obtain funding quickly, as it is not only used as a criterion for investors, but also a key indicator when seeking debt financing. As long as the company can demonstrate viability, it may be eligible for funding assistance. However, investors are often wary of investing in start-ups due to information asymmetries, and the mere notion of a profitability model can be difficult to test. Financial statements are usually used to examine whether a firm has the potential to continue growing in the future and to assess whether a corporation can sustainably grow. Profitability is a monetary indicator of performance that measures how effectively a company is utilizing its assets to generate income. SMEs' economic performance can be measured in a variety of ways, including profitability metrics, cash flow, and revenue growth (Singh & Kumar, 2017).

2.5 Empirical Review

An extensive discussion of existing theories on capital structure forms an integral part of this work. The discussion of theories will therefore cover the benefits and drawbacks experienced by firms using debt financing. These characteristics determine the reasons for the success or failure of firms.

Most of the studies have focused on large firms. For example, according to Aziz and Abbas (2019) who surveyed 360 firms in 14 industries in Pakistan, the findings suggest that debt has a negative impact on the performance of firms in the non-banking sector in Pakistan because

debt is an expensive source of funding and therefore firms should rely on internal sources of funding which are the most reliable and cheapest, a view that is consistent with pecking order theory. However, there are also slightly different findings. Javed et al. (2014) selected 63 public companies in Pakistan and used a fixed effects model to conclude that capital structure exhibits a positive effect on firm performance and debt to asset ratio exhibits a positive effect on ROE.

Most empirical and theoretical studies have focused heavily on the impact of large companies. Firms consider using debt financing when structuring their capital because of the many advantages it offers over using equity as a source of funding. More importantly, big firms consider debt financing because it allows them to save taxes (Miglo, 2016). This in turn allows companies to increase their profits while increasing their debt, which has an impact on cash flow in the long run. However, the results of these studies may not apply to SMEs, as they have more limited access to finance and less access to formal finance than larger companies. Debt financing is more accessible to start-ups as they do not have access to a wide range of funding sources, such as business research or equity. As debt policy significantly affects firm performance and thus firm value and survival, owners and managers of start-ups should focus on finding a satisfactory level of debt. Existing empirical research therefore focuses on whether there is an impact on the financial performance of start-ups when they use debt financing.

Some findings suggest that debt can have a negative impact on the financial performance of start-ups. For example, the findings of another study by Badi and Ishengoma (2021) looked at the differences between start-ups that do not use credit and those that do, with one in five not needing any form of credit at all. This study was conducted to examine the differences between start-ups that do not rely on credit and those that do. Firms using equity financing were found to be more profitable, have an acceptable level of earnings liquidity and have improved credit quality compared to those using debt financing. Firms with debt financing were found to be less creditworthy. The results of this study confirm this. Both studies came to the same conclusion which is in line with the pecking order theory. Singh and Kumar (2017) selected financial data of 254 manufacturing SMEs in India from 2010-2014 and used an OLS model to conclude that sales growth has a positive impact on financial performance. Operating cash flow and financial leverage were negatively related to financial performance. There are also studies that reach the exact opposite conclusion. Yazdanfar and Öhman (2015) This study uses OLS models and fixed effects models to analyses 15,897 Swedish SMEs between 2009 and 2012, and this study confirms that debt ratios have a negative impact on firm profitability in terms of trade credit, short-term debt and long-term debt. The study confirms that debt ratios have a negative impact on firm profitability in terms of trade credit, short-term debt and long-term debt. As high debt ratios appear to increase agency costs and the risk of losing control of the firm, SME owners and managers tend to finance their businesses to a considerable extent with equity capital. This study also shows that firm performance and short-term debt are positively correlated, and that increasing short-term debt ratios will, to some extent, reduce firms' borrowing costs and improve their profitability.

2.6 Hypotheses Development

The discussion of hypotheses is an instrumental part of determining the basic results of the expected understanding and perception of the impact of debt financing on the profitability of entrepreneurial companies.

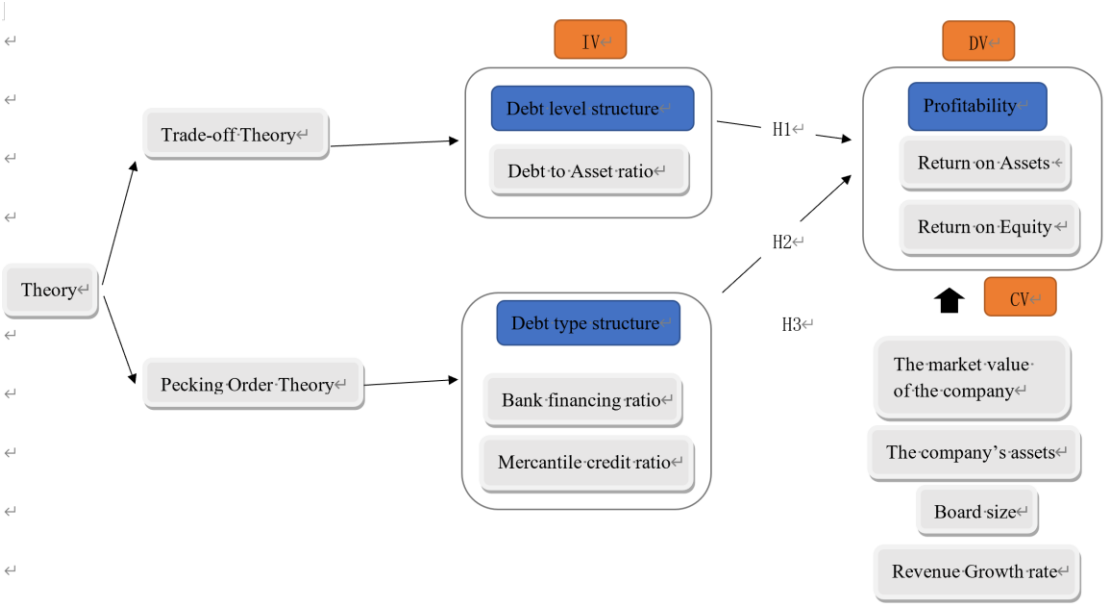
Generally, startups use debt financing has two reasons: to expand their production operations and to obtain the tax benefit of debt. Debt financing will contribute to the profitability of the startup. However, in the actual course of business, the production and operation of the enterprise will also be influenced by other variables. This will result in a gearing ratio that does not necessarily have a positive impact on the profitability of the enterprise. Based on the vicious circle hypothesis in Figure 3.1, this argument advances the view that debt financing has a negative impact on the profitability of start-ups, which contradicts the reality of start-ups financing their business objectives. An empirical analysis of the relationship between debt and profitability indicators for start-ups is a fundamental basis for assessing whether the impact of debt level structure on start-ups is negative. The asset level structure is a reflection of a company's total debt level and is used to measure the level of debt of a company. The extent of the return on assets ratio is a testament to a company's competitiveness and capability. The level of return on assets directly indicates the competitiveness and development ability of a company and is a key indicator in determining the profitability of a company. Sun and Ouyang (2019) conducted a study with electronic equipment manufacturing companies and found that an increase in total gearing leads to a decrease in corporate financial performance. Based on the theoretical analysis and the results of scholars' studies, the following hypotheses were made.

Hypotheses 1: The level of debt financing has a negative impact on profitability.

There is a link between the type of debt a business is expected to incur and the nature of its business. The argument for this hypothesis focuses on whether the use of bank financing versus mercantile credit as a source of resources for start-ups has a different impact on the profitability of start-ups. Bank financing are more formal and safer than mercantile credit. Bank financing look at the potential of the business, i.e., the ability to continue to grow in the future, future profitability, etc. Banks assess startups at a slightly lower value in this respect compared to larger companies. Mercantile credit is mainly money borrowed by start-ups from companies with which they have financial dealings in the course of their business. This form of financing has limited access to funds and needs to be measured. Too much mercantile credit can also damage the economic interests of other companies, and excessive use of this type of debt financing can leave a bad impression on the other party and damage the goodwill of the start-up, which can have a negative impact on the start-up. Therefore, the focus is on whether different types of debt financing have the same impact on startups. The types of debt can be classified according to various financial indicators. According to Sun and Ouyang (2019), both the business credit rate and bank financing rate are significantly and negatively related to financial performance. The study by Yin and Pi (2017) found that bank financing, mercantile credit, or bonds payable, which have a negative effect on performance, are not

conducive to improving performance. Based on the above analysis, the following hypotheses were made.

Hypotheses 2: The debt type structure has a negative impact on profitability.



3. Research Methodology

This study draws on the wind database and the China Statistical Yearbook, and the startups selected are those listed on the National SME Stock Transfer System (NEEQ), 850 in total (except for ST companies, finance-related companies and companies with missing data). The NEEQ was chosen because it is a national unlisted equity trading platform for Micro, Small and Medium Enterprises, which is characterized by relatively low barriers to entry, a relatively short time to listing and a concentration of healthy growing but illiquid start-ups in the market. This is because the National Stock Exchange and the Quotation System have listing criteria set by law, have been in operation for two years and have the capacity to continue as a commercial institution, which is consistent with the objectives of the study of start-ups in this study.

The model in this study was built using panel data. Panel data is a type of sample data which is formed by selecting a sample of observations from numerous components of a time series simultaneously. Due to the research characteristics of this work, it is necessary to collect financial data from each organization each year and panel data meets the requirements. Ordinary Least Square (OLS), Random effects model (REM) and Fixed effects model (FEM) are the three panel data measures, Fixed effects model (FEM) was selected for this study. The dependent variables for this study will be return on total assets and return on equity. Gearing ratio, bank financing ratio and mercantile credit ratio will be studied as independent variables. Market value of the company, revenue growth rate and board size will be studied as control variables. The model was developed to test the effect of debt financing on the profitability of

start-ups.

$$A_{it} = a_0 + a_1 AR_{it} + a_2 F_{it} + a_3 T_{it} + x_4 M_{it} + x_5 B_{it} + x_6 G_{it} + d \quad (1)$$

Where

In the formula, A_{it} represents the dependent variable, which is the rate of return on total assets. On the right-hand side of the formula, a_0 is a constant term, $AR_{it}$is the debt to asset ratio, F_{it} is the bank financing rate and T_{it} is the mercantile credit financing rate. And $x_4 M_{it}$, $x_5 B_{it}$ and$x_6 G_{it}$are control variables, where M is the market value of the company, G is the revenue growth rate, B is the Board size and d represents a random disturbance term.

Table 1. Description of Variables

Type	Name	Symbol	Description
DV	Return on assets (%)	A	Net income / Total assets
	Return on equity (%)	E	Net income/Total equity
IV	Debt to assets ratio (%)	AR	Total liabilities / Total assets
	Bank financing ratio (%)	F	(Short-term liabilities + long-term liabilities) / Total liabilities
	Mercantile credit ratio (%)	T	(Bills payable + Accounts payable + Accounts received in advance) / Total assets
CV	The market value of the company (million)	M	The total market value of the company at the end of a period
	The company's assets (million)	C	The stock of assets owned by the company
	Board size	B	number of board members
	Revenue growth rate (%)	G	the increase in operating income this year / total operating income last year

*Source: wind database (2021)

4. Results

Descriptive Statistics

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
A	6,507	1.891	11.771	-49.116	29.068
AR	6,507	38.428	20.113	2.388	93.511
L	6,507	4.413	7.490	0.000	38.180
S	6,507	33.880	18.642	1.942	86.954
F	6,507	1.592	6.655	0.000	41.372
T	6,507	14.198	11.813	0.001	54.704
M	6,502	963000000	2380000000	7950000	16300000000
G	6,507	15.844	58.421	-85.670	345.936
B	6,507	6.103	1.475	5.000	10.000

Note: this table provides descriptive statistics for all continuous variables of the present study. A denotes return on assets. AR denotes debt to asset ratio. L denotes long-term debt ratio. S denotes short-term debt ratio. F denotes bank financing ratio. T denotes mercantile credit ratio. M denotes the market value of the company. G denotes revenue growth rate. B denotes board size. Obs denotes the number of observations. Std. Dev denotes standard deviation. Min denotes minimum values. Max denotes maximum values.

Table 2 presents the descriptive statistics for the variable of the study. It shows that on average return on assets of the China's startups is 1.891 percent of net income by total assets. Return on assets has a standard deviation of 11.771 with a maximum value of 29.068 and a minimum value of -49.116, indicating a wide range of returns on assets across start-ups. The mean and standard deviation values for the debt to assets ratio are 38.428 and 20.113 respectively, with maximum and minimum values of 93.511 and 2.388 respectively. The Debt to asset ratio indicates that the total liabilities by total assets that mean the lower the debt to asset ratio suggests stronger the solvency of companies.

The mean and standard deviation for long-term debt ratio is 4.413 and 7.490, respectively. The mean value suggests that on average, long-term debt ratio is at a low level in China's startups. The mean and standard deviation for short-term debt ratio is 33.880 and 18.640, respectively. The average value shows that the short-term debt ratio is at a high level. The maximum value reaches 86.954% and is higher than the long-term debt ratio.

The structure of debt types, as measured by the bank financing ratio and the mercantile credit ratio, has a mean value of 1.590 and 14.198 and a standard deviation of 6.655 and 11.813. According to Table 4.1, it shows that, on average, the mercantile credit ratio is higher than the bank financing ratio. Also, in terms of standard deviation values, the mercantile credit ratio is higher than the bank financing ratio, which indicates that the difference in the use of mercantile credit by Chinese start-ups is more pronounced than the difference in the use of bank financing.

The control variables used in this study are the market value of the company, revenue growth rate and board size. On average, the market value of the company is 963,000,000 with a standard deviation of 238,000,000. The minimum value is 7,950,000. This indicates that the size of the companies listed on the NEEQ varies greatly. The revenue growth rate is 15.844 with a standard deviation of 58.4206. The high standard deviation implies that the revenue growth rate varies significantly between companies. In addition, on average, board size is 6.103 with a standard deviation of 1.475. The lowest value of sample board size is 5 and the highest value of sample board size is 10. This clearly shows that board size varies considerably from firm to firm.

Correlation Matrix

Table 3. Correlation Matrix

Variables	A	AR	F	C	M	G	B
A	1						
AR	-0.236***	1					
F	-0.144***	0.275***	1				
C	-0.039***	0.545***	-0.061***	1			
M	-0.0150	0.152***	0.585***	-0.060***	1		
G	0.280***	-0.002	-0.015	0.0200	0.061***	1	
B	-0.028**	0.083***	0.313***	-0.036***	0.363***	-0.026**	1

Note: this table provides the correlation among the independent variables. A denotes return on assets. AR denotes debt to asset ratio. F denotes bank financing ratio. C denotes mercantile credit ratio. M denotes mercantile credit ratio. G denotes revenue growth rate. B denotes board size.

Table 3 shows the pairwise correlations between the variables. This was done to check for multicollinearity between the variables, as the variables may be strongly correlated with each other and may lead to multicollinearity problems. According to Javed et al. (2014) if the correlation value is less than or equal to 0.2 then the correlation is weak, if the correlation value is less than or equal to 0.4 but greater than 0.2 then the correlation is poor, if the correlation value is between 0.4 and 0.6 then the correlation is acceptable, if the correlation value is between 0.6 and 0.8 then the correlation is acceptable, and if the correlation value is higher than 0.8 then the correlation is strong. However, in the coefficient correlation table, the correlations between the variables were relatively low, not exceeding 0.6, and the variables all had an autocorrelation coefficient of 1. Therefore, the results suggest that multicollinearity

was not an issue in this study.

Regression Analysis

Table 4. Impact of debt financing on return on assets

VARIABLES	A
AR	-0.218***
	(-19.56)
F	-0.159***
	(-4.28)
T	0.055***
	(2.92)
M	0.000***
	(7.13)
G	0.057***
	(28.44)
B	-0.109
	(-0.71)
Constant	8.864***
	(8.55)
Observations	6,502
Number of companies	865
R-squared	0.200

Note: This table determines the results of impact of debt type structure on return on assets (Eq.3) using fixed effects model. A denotes return on assets. F denotes banking financing ratio. T denotes mercantile credit ratio. M denotes the market value of the company. G denotes revenue growth rate. B denotes board size. t-statistics in parentheses. Which is the p-values. *** p<0.01, ** p<0.05, * p<0.1.

Table 4 presents the results of the impact of debt financing on return on assets (Eq.1) using a fixed effects model. The study discusses the results to determine whether debt has an impact on startup profitability. Table 4.4 examines the impact of debt level structure and debt type structure on the profitability of start-ups. The results show that the impact of gearing on the return on total assets of start-ups is negatively related, in line with hypothesis 1 of this study, and the results are extremely significant. It would seem that the more debt a firm uses, the more its profitability declines.

The table 4 also shows that the bank financing ratio and the mercantile credit ratio have different effects on the return on total assets, with the bank financing ratio having a negative effect on the return on total assets and the mercantile credit ratio having a positive effect on the return on total assets, and the results are extremely significant. This also implies that there is an inverse relationship between the profitability of a start-up and the bank financing ratio, but a positive relationship with the mercantile credit ratio. This means that the higher the

bank financing ratio of a start-up, the lower the profitability and the higher the mercantile credit ratio, the higher the profitability. This indicates that the impact of the various types of debt financing on the profitability of start-ups is different and does not fully comply with Hypothesis 3 of this study.

Robustness Test

The robustness test in this study was conducted by swapping variables. This was done by swapping the dependent variable from ROA to ROE and by reversing the control variable from company market value to company assets. This was done to ensure that the results were reliable.

Table 5. Impact of debt financing on return on equity

VARIABLES	E
AR	-0.632***
	(-26.57)
F	-0.512***
	(-6.47)
T	0.227***
	(5.60)
M	0.000***
	(10.45)
G	0.104***
	(24.17)
B	-0.033
	(-0.10)
Constant	20.128***
	(9.08)
Observations	6,502
Number of companies	865
R-squared	0.230

Note: This table determines the results of impact of debt type structure on return on equity (Eq.3) using fixed effects model. A denotes return on equity. F denotes banking financing ratio. T denotes mercantile credit ratio. M denotes the market value of the company. G denotes revenue growth rate. B denotes board size. t-statistics in parentheses. Which is the p-values. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5 presents the results of the impact of debt level structure on return on equity (Eq.1) using a fixed effects model. By swapping the dependent variable from ROA-ROE, the study can examine the impact of debt financing on the profitability of start-ups. The impact of debt financing on the profitability of startups was examined by reversing the dependent variable

from ROA-ROE. The results show that after swapping the dependent variables, the effect of gearing on return on equity is negative. The results are extremely significant, in line with the results of the regression analysis. This further establishes that there is an inverse relationship between the profitability of a start-up and the gearing ratio, with the more debt a start-up uses, the less profitable it is. Hypothesis 1 was further confirmed.

It is also evident from the results that the impact of the bank financing ratio and the mercantile credit ratio on the return on net assets continues to be different, with a negative correlation between the bank financing ratio and the return on net assets and a positive correlation between the mercantile credit ratio and the return on net assets, and the results are extremely significant and consistent with the results of the regression analysis. This also implies that the higher the bank financing ratio used by a start-up, the lower the profitability, while the higher the mercantile credit financing ratio used, the higher the profitability.

Table 6. Impact of debt financing on return on assets (company's assets)

VARIABLES	A
AR	-0.227***
	(-20.36)
F	-0.129***
	(-3.39)
T	0.059***
	(3.10)
C	0.000***
	(0.28)
G	0.059***
	(29.23)
B	-0.043
	(-0.28)
Constant	9.268***
	(8.19)
Observations	6,507
Number of companies	865
R-squared	0.192

Note: This table determines the results of impact of debt type structure on return on assets (Eq.3) using fixed effects model. A denotes return on assets. F denotes banking financing ratio. T denotes mercantile credit ratio. C denotes the company's assets. G denotes revenue growth rate. B denotes board size. t-statistics in parentheses. Which is the p-values. *** p<0.01, ** p<0.05, * p<0.1.

Table 6 presents the results of the impact of debt financing on return on assets (company's assets) (Eq. 1) using a fixed effects model. By swapping, the impact of debt on the profitability of start-ups is examined by reversing the control variables from the firm's market capitalization to the firm's assets. From the results, it can be seen that after swapping the control variables, the effect of gearing on total assets return is negative. This is with a significance of 1% indicating that the results are extremely significant, in line with the results of the regression analysis. This also implies that there is an inverse relationship between

profitability and gearing of start-ups, with the higher the gearing of start-ups, the lower the profitability, in line with hypothesis 1.

The impact of debt maturity structure on the profitability of start-ups varies, as seen in the results, with the bank financing ratio having a negative impact on the return on total assets and the mercantile credit ratio having a positive impact on the return on total assets, and the results are extremely significant and consistent with the regression results.

5. Discussion

Firstly, from the perspective of debt level structure, the gearing ratio has a statistically significant negative impact on the return on total assets. This suggests that when a start-up has a need for financing and chooses to increase the proportion of debt financing, the profitability of the firm decreases. Although debt has the advantage of being tax deductible and debt financing does not require the sharing of excess profits with creditors, it is difficult for a start-up to be profitable in the beginning stages of its operations and the fact that debt financing requires interest repayments and the repayment of principal and interest within a specified period of time leads to an increased risk of bankruptcy if the borrowed funds are not repaid on time, which is supported by trade-off theory. This is in sharp contrast to empirical studies by Badi and Ishengoma (2021); Singh and Kumar (2017); and others. In line with the results of Yazdanfar and Öhman (2015).

The final findings show that different types of debt financing methods have different effects on the profitability of start-ups. The results indicate that early-stage firms choose bank financing, which can reduce the profitability of the firm. Due to the strict vetting procedures of banks and other financial institutions for loans to start-ups, coupled with the high threshold for firms to issue bonds in the market, start-ups may face higher interest rates for loans than larger firms or firms with superior credit when using bank financing, resulting in a situation where bank financing reduce the profitability of start-ups (Yin, Jianzhong, and Jundan Pi, 2017). But the use of mercantile credit instead increases the profitability of startups because mercantile credit usually occurs in commodity transactions and has a low financing threshold and no interest payment compared to other financing methods, making financing costs lower (Yan, 2017).

This study concludes that debt financing can reduce the profitability of start-ups and that the use of debt financing when revenues are insufficient may pose risks to start-ups, with the exception of mercantile credit. The limited financing resources, narrow access to finance and high risk of debt financing for start-ups are constraining the economic growth of start-ups and hindering their economic progress. Effective identification of debt financing risks for start-ups and timely control of the sources of risk are necessary to promote the healthy and sustainable development of start-ups.

6. Conclusion

The findings of this study have several practical and policy implications. Companies should use debt capital wisely and actively leverage their financial resources, thus helping them to use their capital efficiently. Startups should strengthen their businesses when raising capital, and the first thing they should consider is endogenous financing. Startups have relatively low earnings, so retained earnings are low and therefore internal source financing is insufficient. To solve such a problem, start-ups must focus on their own development and improve their overall business operations. Improve the ability of the business to continue as a going concern. Furthermore, a reasonable dilution of equity at the early stage of corporate development does maintain the stability of the company to some extent, since a higher concentration of equity allows the company to resist hostile mergers and acquisitions in the external market, but this situation is also prone to undemocratic and unscientific decision-making. Therefore, start-ups should dilute the company's equity reasonably and strategically bring in external investors to allocate resources appropriately for the betterment of the company while ensuring sound growth.

Finally, start-ups should enhance their credit awareness. Corporate credit is fundamental to the survival and development of a company, and good credit is crucial to the basis for cooperation in business development. As one of the main suppliers of financing for start-ups, banks play a crucial role in financing start-ups. Therefore, a positive banking relationship also determines the success of start-up financing, and the credit of the company is a decisive factor for a positive banking relationship. Start-ups should apply to their banks for a credit rating of their company to enhance their understanding of the overall situation of the start-up and to reduce information asymmetry. In addition, start-ups should actively cooperate with banks to enhance mutual trust and understanding, so that by generating a positive credit record and maintaining an excellent credit rating, they can obtain timely approval for loans when they need funds, thus reducing intermediate steps and gaining valuable time for the company; and when using business credit between companies, start-ups should also value their own credit and repay loans in a timely manner to avoid credit rating When using business credit between companies, start-ups should also value their own credit and repay their loans in a timely manner to avoid a decline in credit rating and a loss of good credit history, which could affect their ability to refinance. Before debt financing, start-ups should determine the financing process in strict accordance with the established investment direction and the required funds; at the same time, they should also measure their maximum financing capacity according to their own strength and debt-servicing capacity, not only to analyses the economic benefits and development opportunities brought by the investment project, but also to adjust the financing method and financing structure to the maximum extent to ensure the scientific nature of the decision.

7. Suggestions for Future Research

Based on the findings, this study suggests future research in the following areas. Firstly, this study only looks at start-ups in China. Future research could be expanded to include Asian

companies as a whole or worldwide, but it is important to note that different countries use different However, it is important to note that different countries use different tax systems and have a different level of financial development, and this study could be extended by examining the impact of debt financing on the profitability of start-ups in the Asian region. Secondly, and secondly, with the diversification of financing methods, the impact of alternative financing methods on profitability could be evaluated. Again, this can be done by examining the different sources of debt and by subdividing banks into different kinds of banks based on the institutions from which they borrow. Additionally, this can be accomplished by comparing the differences and offering ideas for bank reform. Future research could also be conducted on investor behavior, in the early stages of a business, to see whether investors are interested in investing in debt-financed start-ups or equity-financed start-ups.

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