

Study on Supply Chain Finance, Internal Control and SMEs Financing Constraints

Qihua Zhu¹, Yi Yang²

¹ School of Economics and Management, Guangxi University of Science and Technology, Liuzhou 545006, China

² Research Center for Industrial and Urban Development of Western Region, Guangxi University of Science and Technology, Liuzhou 545006, China

Abstract. Financing difficulties of small and medium-sized enterprises have always been a hot issue concerned by the government and academia, and supply chain finance is an effective way to relieve the financing constraints of SMEs. This paper uses the data of GEM listed companies from 2013 to 2015; uses the cash-cash flow sensitivity model to study the relationship between supply chain finance and financing constraints, and deeply explores the regulating action of internal control for relieving financing constraints of supply chain finance. The research found that supply chain finance can alleviate the financing constraints faced by GEM listed companies, and this relief effect is also affected by internal control of enterprises. Compared with enterprises with high internal control quality, supply chain finance has more obvious relief for enterprises financing constraints with low internal control quality.

Keywords: supply chain finance; small and medium-sized enterprises (SMEs); financing constraints; internal control.

1. Introduction

In 1931, Macmillan [1] proposed the famous "Macmillan Defect", since then the financing problem of SMEs has attracted much attention. As an important force of China's economic development, SMEs have made great contributions in promoting national economic development, solving national employment, alleviating social pressure and maintaining social stability, moreover, countries that regard SMEs as the main body of economic structure can better cope with economic fluctuations. However, due to the small scale, high degree of information asymmetry, high business risk, non-standard management and weak competitiveness of SMEs, their financing support is far from matching their position in the economy. Although SMEs are facing many problems, such as shortage of funds, irrational capital structure, unscientific development strategy, and objective economic environment is not conducive to self-development, the shortage of funds is the most critical factor that hinders their development.

Since the emergence of supply chain finance in the 20th century, it provides new solutions to alleviate the financing constraints of SMEs, and bring new competitive advantages to financial institutions; therefore, it has quickly become the focus of concern by academic circles at home and abroad. Supply chain finance realizes the feasibility of capital circulation and the optimization of financing cost through the core enterprise's information processing in the supply chain. Fellenz et al. (2009) [2] found that supply chain finance improved the effectiveness of financial management in supply chain finance and increased the overall efficiency of supply chain finance. Pfohl and Gomm (2009) [3] found that supply chain finance plays an active role in strengthening cooperation between the two parties, improving enterprise efficiency, reducing capital costs, and expanding competitive advantage of enterprise. Seifert (2011) [4] also concluded that supply chain finance can improve the competitive advantage of enterprises. The emergence of internal control regulates corporate governance and enhances the information disclosure quality of enterprises. Therefore, the study of internal control is of great significance to the development of enterprises. Bushman and Smith (2001) [5] found that improving the disclosure quality of accounting information has a positive effect on improving the information asymmetry between enterprises and investors, reducing agency costs and enhancing the financing ability of enterprises. Moreover, the strengthening of internal control not

only helps to improve the disclosure quality of enterprise accounting information (Ashbaugh-Skaife, 2007) [6], but also improves the corporate governance mechanism (Goh and Li, 2011) [7].

Many scholars have actively explored the supply chain finance and internal control, but they have not combined the two to conduct in-depth research. Therefore, this paper creatively combines supply chain finance with internal control to study the impact of supply chain finance on financing constraints and the regulating effect of internal control on supply chain finance to alleviate financing constraints. On the one hand, this paper enriches the relevant research on supply chain finance; on the other hand, it strengthens the academic research on internal control, thus providing effective data support and empirical evidence for supply chain finance to break the financing constraints of SMEs.

2. Theoretical Analysis and Research Hypothesis

2.1 Analysis of Financing Constraints of SMEs

Fazzari et al. (1988) [8] believed that financing constraints are a phenomenon in which the internal and external financing costs of a company show significant differences. Whether in developed or developing countries, it is very difficult for small enterprises to use external capital in their business growth, and financing is subject to many constraints. The research shows that the slow growth rate of small enterprises is due to the high financing barriers they face, and the financing barriers they face lead to the slow growth of small enterprises is about twice that of large enterprises (Berger and Udell, 1988) [9]. Compared with large enterprises, SMEs are small in scale, high in risk and poor in profitability, which causes investors' unwilling to finance for SMEs and often suffer unfair treatment in external financing, therefore, SMEs are at a disadvantage in financing (Beck et al., 2005) [10]. Faced with fierce external competition, SMEs are facing financing constraint problem. Based on the above analysis, the following hypothesis is proposed:

H1: There are obvious financing constraints in GEM listed companies.

2.2 Analysis of Supply Chain Finance Alleviating Financing Constraints of Enterprises

Supply chain finance can effectively alleviate the information asymmetry between banks and enterprises, improve the risk controllability of financial institutions, and promote SMEs to obtain credit support of bank. Because of the advantages of large-scale assets, high reputation and strong profitability, core enterprises have large scale of assets, high credibility, strong profitability and other advantages, the disadvantage of SMEs is alleviated through the effect of information transmission and diffusion. Under the traditional financing mode, because SMEs lack collateral and financing guarantee, banks are worried that there is no guarantee in case of credit risk, they should bear the credit risk alone and refuse to provide loans to SMEs. However, under the mode of supply chain financing, supply chain finance activates enterprises' stock and accounts receivable by using financial instruments such as chattel mortgage credit and accounts receivable bill, it overcomes the lack of financing collateral and financing guarantee for SMEs, successfully solves the bank's worries about assuming credit risk alone. Based on the above analysis, the following hypothesis is proposed:

H2: supply chain finance can effectively reduce the financing constraints of GEM listed companies.

2.3 Analysis of the Regulation Effect of Internal Control

High-quality internal control can effectively reduce information asymmetry and improve the allocation efficiency of funds. Moreover, the improvement of internal control quality will promote the improvement of corporate governance, and will also be accompanied by a better accounting information disclosure system, thus reducing the degree of information asymmetry in the capital market. Therefore, high-quality internal control can effectively ease the financing constraints of enterprises, and enterprises with low internal control quality will face greater financing constraints. The low internal control quality shows that corporate governance is not scientific and reasonable, and the performance of enterprises in their own management and supervision is poor. When the core enterprises screen the financial members of supply chain, the enterprises with low internal control quality have weak competitiveness and cannot be recognized by the core enterprises. Therefore, if

enterprises with low internal control quality join the supply chain finance, the easing of its financing constraints is stronger.

H3: Compared with enterprises with high internal control quality, supply chain finance has a stronger ease effect on financing constraints of enterprises with low internal control quality.

3. Research and Design

3.1 Sample Selection and Data Sources

This paper selects the data of GEM listed companies from 2012 to 2016 as the research samples. The internal control index is from Dibo database, and other data are from CSMAR research database. In order to ensure the validity of the results, the selected data were further screened and eliminated: (1) companies with less than three years of listed time were excluded; (2) companies with financial categories and special processing (ST/PT) were excluded; (3) companies with incomplete data, incomplete indicators and empty data were excluded. Considering the existence of extreme values, carry out 1% Winsor processing on all variable data. After screening, 346 companies' annual data were finally obtained. Excel and Stata 12.0 were used for regression analysis of random effects.

3.2 Model Setting

This paper chooses Cash-cash flow sensitivity model, Almeida et al. (2004)[11] used TobinQ value as an index to measure future investment opportunities in Cash-cash flow sensitivity model, but considering there are non-tradable shares in Chinese listed companies, its value cannot be accurately measured, which will have a certain impact on the research results. Therefore, this paper regards GRO and Tagr as indicators to measure future investment opportunities.

3.2.1. Construct a Model to Measure the Financing Constraints of Enterprises:

$$\Delta CASH_{i,t} = \alpha_0 + \alpha_1 CF_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 GRO_{i,t} + \alpha_4 \Delta NWC_{i,t} + \alpha_5 \Delta SD_{i,t} + \alpha_6 Exp_{i,t} + \varepsilon_{i,t}$$

3.2.2. Construct a Model of Supply Chain Finance for Alleviating Financing Constraint

$$\Delta CASH_{i,t} = \alpha_0 + \alpha_1 CF_{i,t} + \alpha_2 SCF_{i,t} \times CF_{i,t} + \alpha_3 SCF_{i,t} + \alpha_4 Size_{i,t} + \alpha_5 GRO_{i,t} + \alpha_6 \Delta NWC_{i,t} + \alpha_7 \Delta SD_{i,t} + \alpha_8 Exp_{i,t} + \varepsilon_{i,t}$$

3.3 Variable Description

Table.1 variable description

order number	variable name	variable symbol	variable definition
1	Changes in cash and cash equivalents	$\Delta CASH_{i,t}$	[t-year money-(t-1) year money]/total enterprise assets at the end of t year
2	cash flow	$CF_{i,t}$	net cash generated from operating activities / total assets at the end of t year
3	supply chain finance	$SCF_{i,t}$	(t-year short-term borrowing + t-year notes payable) / total enterprise assets at the end of t year
4	internal control	$IC_{i,t}$	Dibo internal control index, the higher the score of the index, the better the internal control quality
5	enterprise scale	$Size_{i,t}$	natural logarithm of the total enterprise assets at the end of t year
6	increase rate of main business revenue	$GRO_{i,t}$	[t-year operating income-(t-1) annual operating income]/(t-1) annual operating income
7	capital expenditure	$EXP_{i,t}$	t-year (cash in fixed assets, intangible assets and other assets, and cash recovered from disposal) / total enterprise assets at the end of t year
8	Non-cash operation capital changes	$\Delta NWC_{i,t}$	[t-year non-cash operation capital - (t-1) year non-cash operation capital] / total enterprise assets at the end of t year
9	short-term borrowing change	$\Delta SD_{i,t}$	[t-year current liabilities - (t-1) annual current liabilities] / total enterprise assets at the end of t year

3.4 Statistical Analysis

3.4.1 Descriptive Statistical Analysis

Descriptive statistical analysis of each variable in the model is shown in Table 2. Cash and cash equivalents of the enterprise Δ the maximum value of CASH is 0.5089, while the minimum value is -0.7037, the difference between the maximum value and the minimum value is quite obvious, it shows that the enterprise has a large difference in cash holding behavior. The mean value of cash flow (CF) is 0.0325, the standard deviation is 0.068, and the standard deviation is about 1.82 times of the mean value, it shows that the cash flow fluctuation of China's GEM listed companies is relatively small. The difference between the maximum and minimum values of internal control quality is obvious; it shows that there is a big difference in the internal control quality of each company.

Table.2 descriptive statistical analysis

variable	N	minimum value	maximum value	mean value	standard deviation
Δ CASH	1400	-0.7037	0.5089	-0.0209	0.0985
CF	1400	-0.3544	0.4876	0.0325	0.0681
SCF	1400	0.0000	0.6078	0.0927	0.0986
IC	1400	0.0000	7.7898	6.5381	0.8531
Size	1400	19.2895	24.1963	21.2337	0.7401
GRO	1400	-0.9106	5.8017	0.2876	0.5108
EXP	1400	-0.2523	0.3923	0.0574	0.0532
Δ NWC	1400	-0.5109	0.6914	0.0149	0.0955
Δ SD	1400	-0.9257	0.6221	0.0607	0.1031

3.4.2 Statistical Analysis of Relevance

Stata is used to calculate the correlation coefficient matrix of variables; the correlation coefficient of each variable is shown in Table 3. Changes in cash and cash equivalents and coefficient of cash flow are positive, and are significant at the 1% level; it is consistent with the expected assumptions. The correlation of the explanatory variables is low, and there is basically no multicollinearity.

Table 3 descriptive statistical analysis

variable	Δ CASH	CF	SCF	IC	Size	GRO	EXP	Δ NWC	Δ SD
Δ CASH	1								
CF	0.138***	1							
SCF	0.108***	-0.250***	1						
IC	0.067**	0.104***	-0.100***	1					
size	0.343***	-0.020	0.270***	0.051*	1				
GRO	0.174***	-0.060**	0.057**	0.180***	0.255***	1			
EXP	-0.135***	0.108***	0.010	0.084***	-0.107***	-0.038	1		
Δ NWC	-0.260***	-0.124***	-0.287***	0.052*	-0.075***	-0.025	-0.108***	1	
Δ SD	0.200***	-0.196***	-0.196***	0.154***	0.287***	0.454***	0.026	-0.478***	1

Note: *, **, *** represent significant at the 10%, 5%, and 1% levels, respectively, similarly hereinafter.

4. Empirical Analysis

4.1 Empirical Results

The data of 280 GEM listed companies are used; a stochastic model was used for regression. The return results of financing constraints of GEM listed companies are recorded in model 1; the empirical results of supply chain finance alleviating the financing constraints of GEM listed companies are recorded in Model 2; the classification is carried out by the internal control index, higher than average value is recorded as the high internal control group, lower than average value is recorded as the lower internal control group, and the regression result is recorded in the model 2. All regression results are shown in Table.4.

Table.4 regression results

variable symbol	model 1	model 2	model 2 low internal control	model 2 high internal control
CF	0.096* (0.057)	0.266*** (0.078)	0.511*** (0.127)	0.131 (0.100)
SCF*CF		-0.290*** (0.113)	-0.493*** (0.174)	-0.200 (0.153)
SCF		0.039*** (0.008)	0.041*** (0.012)	0.040*** (0.011)
Size	0.015*** (0.005)	0.008 (0.006)	0.004 (0.009)	0.012 (0.007)
GRO	-0.028*** (0.007)	-0.031*** (0.007)	-0.502*** (0.062)	-0.588*** (0.048)
ΔNWC	-0.555*** (0.039)	-0.556*** (0.038)	-0.597*** (0.084)	-0.667*** (0.070)
ΔSD	-0.641*** (0.055)	-0.650*** (0.054)	-0.022** (0.011)	-0.0411*** (0.011)
Exp	-0.214*** (0.081)	-0.222*** (0.080)	-0.421*** (0.133)	-0.127 (0.102)
C	-0.210*** (0.065)	-0.152** (0.067)	-0.095 (0.103)	-0.193** (0.089)
adjust R ²	0.295	0.318	0.285	0.357

According to the regression results in Table 4, it can be seen that the cash flow coefficient of the hypothesis 1 is 0.096, and it is significant at the 10% level, it shows that the GEM listed companies have cash-cash flow sensitivity, namely there are financing constraints in China's GEM listed companies, hypothesis 1 is verified. The core item in model 2, namely the interaction coefficient of cash flow and supply chain finance, is -0.290, and it is significant at the level of 1%, it shows that the use of supply chain finance can alleviate the financing constraints of GEM listed companies, and hypothesis 2 is verified.

By classifying the internal control index, it can be found that the cash-cash flow sensitivity coefficient of the enterprise with high internal control quality is 0.131, and the relief degree of financing constraints for the development of supply chain finance is -0.200. Compared with enterprises with high internal control quality, enterprises with low internal control quality face more serious financing constraints, their cash-cash flow sensitivity coefficient is 0.511 and it is significant at 1%, while the development of supply chain finance is more effective in alleviating financing constraints, it is -0.493. This shows that internal control the quality is inversely proportional to the degree of financing constraints of enterprise supply chain finance.

4.2 Analysis of Robustness

Real economic phenomena and outcomes are unlikely to change significantly as variables change. In order to ensure the stability and credibility of the results, the robustness analysis is required. Therefore, this paper will carry out the robustness test for supply chain finance to alleviate financing constraints, measure the future investment opportunities by replacing the growth rate of gross trading income with the growth rate of total assets, and the model (2) are return. The regression results were found to be not significantly different from the empirical analysis described above; it shows that the empirical analysis is robust and credible.

Table.5 test results of robustness

variable symbol	model 2		
	model 2	low internal control	high internal control
CF	0.233*** (0.073)	0.479*** (0.118)	0.099 (0.094)
SCF*CF	-0.275*** (0.105)	-0.524*** (0.161)	-0.140 (0.142)
SCF	0.036*** (0.008)	0.038*** (0.011)	0.038*** (0.011)
Size	0.025*** (0.006)	0.017** (0.008)	0.031*** (0.007)
Tagr	-0.084*** (0.008)	-0.068*** (0.011)	-0.101*** (0.011)
Δ NWC	-0.680*** (0.037)	-0.619*** (0.061)	-0.724*** (0.046)
Δ SD	-0.746*** (0.049)	-0.656*** (0.078)	-0.808*** (0.063)
Exp	-0.313*** (0.076)	-0.502*** (0.126)	-0.246** (0.096)
C	-0.324*** (0.066)	-0.232** (0.099)	-0.392*** (0.088)
adjust R ²	0.406	0.364	0.453

5. Conclusions and Suggestion

5.1 Research Conclusion

This paper takes the annual data of 280 GEM listed companies from 2012 to 2016 as the research samples, and uses cash-cash flow sensitivity model to explore the impact of supply chain finance on financing constraints of GEM listed companies, on this basis, the paper further studies the regulatory role of internal control on alleviating financing constraints of supply chain finance.

The main conclusions are obtained as follows: (1)there are indeed financing constraints in GEM listed companies in our country, namely there is obvious cash-cash flow sensitivity, (2) supply chain finance can effectively alleviate the financing constraints faced by GEM listed companies, so it can be used as a new channel for GEM listed companies to alleviate financing constraints, (3) supply chain finance relieves financing constraints of GEM listed companies, which is related to the internal control quality of GEM listed companies, compared with enterprises with high quality of internal control, the relief effect of supply chain finance for financing constraints of enterprises with low internal control quality is more obvious. Moreover, these conclusions are still set up after the robustness test.

5.2 Policy Suggestions

Supply chain finance as a powerful means to alleviate the financing constraints of SMEs, the government, financial institutions and SMEs must work together to take measures to help SMEs get rid of financing difficulties. Internal control also plays an obvious regulating role for supply chain finance to alleviate financing constraints, so it is necessary to pay more attention to internal control. The government should strengthen the emphasis degree and propaganda effort of supply chain finance, strictly supervise and manage the members of supply chain finance, and promulgate relevant laws and regulations to ensure its healthy and orderly development. Moreover, we should continue to improve the construction level of internal control in our country, strengthen the detailed disclosure and supervision mechanism of internal control, and ensure the authenticity and validity of the information disclosed. Financial institutions should launch independent SMEs' supply chain financing business, establish professional management system, actively make innovations for corresponding financial products, timely and moderately relax the condition limit for SMEs financing, and expand their mortgage scope. SMEs should attach importance to their own supervision, strengthen management and administration, improve operational capacity of enterprise, maintain good financial situation and constantly expand enterprise scale. Moreover, it is necessary to strengthen the internal control and constantly improve the disclosure system of internal control information, which will play a positive role in alleviating self-financing constraints and successfully relying on supply chain finance.

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