Industrial Agglomeration, Financial Development and Financing Constraints of Small and Medium-sized Enterprises

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Abstract-This paper chooses the data of new three-board listed industrial enterprises from 2014 to 2016 as samples, and tests the relationship between industrial agglomeration, financial development and financing constraints of small and medium-sized enterprises through empirical analysis. The study finds that industrial agglomeration is conducive to alleviating the financing constraints of SMEs, and the lagging of financial development, the more significant the mitigation effect of industrial agglomeration on the financing constraints of SMEs.

Keywords-industrial agglomeration; financial development; small and medium-sized enterprises; financing constraints

I. INTRODUCTION

Since the 20th century, small and medium-sized enterprises in China have made tremendous progress with the economic growth, making important contributions to GDP growth, tax revenue and employment promotion. However, limited by the low capacity of SMEs and the external environmental conditions, insufficient funds and financing difficulties have always been a major dilemma faced by SMEs in China, seriously restricting the survival and development of enterprises. Since 2014, the new third board market has expanded its scope to the whole country, which provides a new platform for the development of small and medium-sized enterprises. Compared with A-share listed companies or large state-owned enterprises, the new three-board listed companies are generally small-scale start-up innovative enterprises, facing a more serious level of financing constraints.

Although there has been a considerable accumulation of research on the influencing factors of financing constraints, few studies consider it from the meso-level of industrial agglomeration. In recent years, various industrial parks have been constructed in various parts of China. The agglomeration effect produced by these industrial agglomeration areas not only promotes regional economic growth, but also creates various favorable conditions for enterprises in the agglomeration area, which provides a new method to solve the financing constraints faced by SMEs. In addition, the higher the level of financial development, the better the external financing environment of enterprises, which may have a moderating effect on the relationship between industrial agglomeration and financing constraints.

Therefore, based on the financing constraints of SMEs, this paper explores the relationship between industrial agglomeration, financial development and financing constraints of SMEs.

II. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

A. *Industrial Agglomeration and Enterprise Financing Constraints*

The external effects of industrial agglomeration bring positive economic effects to enterprises in agglomeration areas, which make enterprises in agglomeration areas have more advantages in obtaining external financing. Firstly, Industrial agglomeration promotes the formation of business credit. Because of the low credit of SMEs, they often face the predicament of "credit rationing" when they obtain external financing, and the external effects of industrial agglomeration can promote the development of enterprises in agglomeration areas, and help to establish a good cooperative relationship between enterprises, thus promoting the formation of business credit of enterprises (Dei Ottati, 1994) [1], then it reduces the level of financing constraints of enterprises. Secondly, industrial agglomeration reduces the credit cost of financial institutions. Because of the close geographical location, enterprises in industrial agglomeration areas have faster information dissemination, higher information quality and less adverse selection problems caused by information asymmetry (Rajan et al, 2004) [2]. Enterprises in agglomeration areas can also apply for loans collectively, which reduces the cost of bank credit and also reduces the credit risk (Seidel and Von Ehrlic, 2011) [3]. Generally speaking, industrial agglomeration reduces the credit cost of financial institutions; Thirdly, industrial agglomeration reduces the capital demand of enterprises. On the one hand, industrial agglomeration promotes specialization and division of labor, so that a single enterprise can only take charge of one link in the whole production chain, which to some extent reduces the capital demand of enterprises(Stigler,1951;Schmitz and Nadvi,1999;Long and Zhang,2011)[4][5][6]. On the other hand, enterprises in agglomeration areas can alleviate the plight caused by lack of funds through price concessions, credit sales and interbank lending. It also reduces the degree of financing

constraints of enterprises. Therefore, the hypothesis H1: Industrial agglomeration is conducive to alleviating the financing constraints of SMEs.

B. Industrial Agglomeration, Financial Development and Corporate Financing Constraints

Although some studies have shown that industrial agglomeration can promote regional economic growth, there is an "inflection point" effect in this role, and some regions have already experienced excessive agglomeration or even agglomeration decline. That is to say, the mitigation effect of industrial agglomeration on financing constraints is not the same for all enterprises. For those enterprises with higher level of financing constraints, the mitigation effect of industrial agglomeration on financing constraints should be more obvious.

After Rajan and Zingales (1999) proposed that the mechanism of financial development promoting economic growth should be explored from a micro perspective [6], scholars began to study the impact of financial development on corporate decision-making based on the corporate level, and further investigate the role of financial development on corporate financing constraints. Financial development can reduce the imperfection of financial market, improve the efficiency of resource allocation and reduce the cost of external financing, thus reducing the level of financing constraints of enterprises (Bekaert and Harvey,2000;Wurgler,2001) [8] [9]. Therefore, from the perspective of the level of regional financial development, the perfect regional financial environment indicates that the financing channels of enterprises are more extensive. Besides the bank credit financing channels, enterprises can meet the financing needs through other financial institutions, commercial credit, private equity, venture capital and other means, that is, the level of financing constraints of

enterprises is low. Therefore, even if the agglomeration degree of enterprises' industries is high, it will not have a great impact on their financing situation, and industrial agglomeration can alleviate the financing difficulties of small and medium-sized enterprises caused by the backward level of regional financial development. Therefore, the hypothesis H2 is given: the lagging of financial development, the more significant the mitigation effect of industrial agglomeration on financing constraints of SMEs.

III. RESEARCH DESIGN

A. Sample Selection and Data Sources

This paper chooses the relevant data of industrial enterprises listed on the "New Third Board" from 2014 to 2016 as the research sample. The financial data and financial development data of listed enterprises are from the CSMAR database, and the related data of industrial agglomeration calculation are mainly from the "China Industrial Statistics Yearbook".

B. Variable Design and Model Setting

Financing constraints, that is, there is information asymmetry in imperfect capital market, which leads to the cost of external financing is greater than that of internal financing. This paper uses the investment-cash flow sensitivity model (Fazzari et al, 1988) [9] to measure the financing constraints of enterprises. The greater the sensitivity coefficient of investment cash flow, the higher the degree of financing constraints. Considering the low activity of stock trading in the new third board market, Tobin Q may not accurately reflect the growth opportunities of enterprises. In this paper, we use the growth rate of operating income ($GROW_{i, t-1}$) to replace Tobin Q in the model to control investment opportunities. The financing constraints model is constructed as follows:

$$INVEST_{i,t}/ASSET_{i,t-1} = \alpha_0 + \alpha_1 CF_{i,t}/ASSET_{i,t-1} + \alpha_2 GROW_{i,t-1} + \alpha_3 SIZE_{i,t-1}$$
$$+\alpha_4 LEV_{i,t-1} + \alpha_5 AGE_{i,t} + \sum IND + \sum YEAR + \varepsilon_{i,t} \quad (1)$$

Industrial agglomeration is the core explanatory variable of this paper, which refers to the high concentration of the same industrial enterprise in a specific region. This paper uses location entropy to calculate the degree of industrial agglomeration at provincial level. Based on the binary code under the classification standard of national economy industry, the formula of industrial agglomeration is as follows: $HE_m = (X_{mn}/X_n)/(X_m/X_N)$. Among them, X_{mn} represents the industrial sales value of M Industry in n

provinces, X_n represents the total industrial sales value of n provinces, X_m represents the national industrial sales value of M industry, X_N represents the national industrial sales value of all industrial industries. On the basis of model (1), On the basis of model (1), industrial agglomeration and the multiplier of industrial agglomeration and cash flow are added to construct the multivariate regression model as follows.

$$INVEST_{i,t}/ASSET_{i,t-1} = \alpha_0 + \alpha_1 CF_{i,t}/ASSET_{i,t-1} + \alpha_2 CF_{i,t}/ASSET_{i,t-1} \times HE_{i,t}$$
$$+\alpha_3 HE_{i,t} + \alpha_4 GROW_{i,t-1} + \alpha_5 SIZE_{i,t-1} + \alpha_6 LEV_{i,t-1}$$
$$+\alpha_7 AGE_{i,t} + \sum IND + \sum YEAR + \varepsilon_{i,t} \quad (2)$$

This paper chooses financial development (FD) as a moderating variable. Specific variables are described as

shown in Table 1.

TABLE1 SUMMARY OF VARIABLES

Variable type	Variable name	Variable interpretation
Interpreted variables (Financing constraints)	INVEST	Cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets
	CF	Net cash flow from operating activities
	ASSET	Total End-of-Term Assets of Enterprises
	GROW	Increase rate of business income
Explanatory variable	HE	The agglomeration degree of enterprises'industries in their provinces
Moderator variable	FD1	End-of-year loan balances of regional financial institutions/GDP of each region in the same year
	FD2	Annual gross domestic product of regional financial industry/current GDP of each region
control variable	SIZE	Natural logarithm of total assets
	LEV	Asset-liability ratio
	AGE	Sample Observation Year - Enterprise Establishment Year
	INDUSTRY	Industry Fixed Effect
	YEAR	Annual fixed effect

IV. ANALYSIS OF EMPIRICAL RESULTS

In order to test H1, this paper divides the sample enterprises into two groups according to the median of industrial agglomeration index, and then makes regression on model (1). Then regression analysis of the whole sample to model (2) is carried out, and the results are shown in Table 2 below. The coefficient α_1 in column (1) - (4) is significantly positive at the 1% level, which indicates that there are financing constraints in the new three-board listed companies. In column (2), α_1 (0.0597) is less than that (0.0766) of column (3), and α_2 of column (4) is significantly negative at the level of 10%(-0.0155), indicating that the degree of industrial agglomeration is conducive to easing the financing constraints of enterprises. The results confirm hypothesis H1.

TABLE 2 IMPACT OF INDUSTRIAL AGGLOMERATION ON FINANCING CONSTRAINTS

	$INVEST_{i,t}/ASSET_{i,t-1}$	$INVEST_{i,t}/ASSET_{i,t-1}$	$INVEST_{i,t}/ASSET_{i,t-1}$	$INVEST_{i,t}/ASSET_{i,t-1}$
	Full sample	**High Industrial Agglomeration**	**Low Industrial Agglomeration**	**Full sample**
	(1)	**(2)**	**(3)**	**(4)**
$CF_{i,t}/ASSET_{i,t-1}$	0.0689***	0.0597***	0.0766***	0.0881***
	(7.617)	(5.065)	(5.384)	(6.189)
$CF_{i,t}/ASSET_{i,t-1}*HE_{i,t}$				-0.0155*
				(-1.783)
$HE_{i,t}$				0.00439***
				(2.823)
$GROW_{i,t-1}$	0.0268***	0.0233**	0.0304***	0.0274***
	(3.990)	(2.565)	(3.011)	(4.069)
$SIZE_{i,t-1}$	-0.00472***	-0.00612***	-0.00327	-0.00481***
	(-3.684)	(-3.616)	(-1.641)	(-3.750)
$LEV_{i,t-1}$	-0.0172**	-0.0113	-0.0252**	-0.0181***
	(-2.560)	(-1.281)	(-2.382)	(-2.696)
$AGE_{i,t}$	-0.00199***	-0.00219***	-0.00166***	-0.00199***
	(-7.130)	(-5.994)	(-3.750)	(-7.130)
INDUSTRY EFFECTS	Yes	Yes	Yes	Yes
YEAR EFFECTS	Yes	Yes	Yes	Yes
Constant	0.196**	0.218**	0.110	0.199**
	(2.245)	(2.498)	(1.153)	(2.279)
R-squared	0.074	0.083	0.079	0.076
Adjusted R^2	0.0652	0.0669	0.0607	0.0666
F	8.51***	5.27***	4.41***	8.36***
N	4,955	2,741	2,214	4,955

Note: The t value corresponding to regression coefficient in parentheses is significant at 1%, 5% and 10% levels respectively. Same below.

In order to test H2, this paper divides the sample into two groups based on the median of financial development level, and carries on the regression analysis of model (2) separately. The results are shown in table 3. It can be seen

that whether using FD1 or FD2 to measure the level of financial development, the results tend to be consistent, that is, in the sample with lower level of financial development, α_2 is significantly negative at the level of 1%, while α_2 is no longer obvious in the sample with higher level of financial development. It shows that when the level of financial development is low, the mitigation effect of industrial agglomeration on financing constraints is more obvious, confirming the hypothesis of H2.

TABLE 3 INDUSTRIAL AGGLOMERATION, FINANCIAL DEVELOPMENT AND FINANCING CONSTRAINTS

	$INVEST_{i,t}/ASSET_{i,t-1}$ High level of financial development	$INVEST_{i,t}/ASSET_{i,t-1}$ Low level of financial development	$INVEST_{i,t}/ASSET_{i,t-1}$ High level of financial development	$INVEST_{i,t}/ASSET_{i,t-1}$ Low level of financial development
	（Loan Balance of Financial Institutions）		（Gross financial product）	
	(1)	(2)	(3)	(4)
$CF_{i,t}/ASSET_{i,t-1}$	0.0602***	0.106***	0.0385*	0.126***
	(2.860)	(5.289)	(1.870)	(6.118)
$CF_{i,t}/ASSET_{i,t-1}*HE_{i,t}$	0.00644	-0.0335***	0.0144	-0.0405***
	(0.481)	(-2.865)	(1.136)	(-3.248)
$HE_{i,t}$	0.00309	0.00376	0.000778	0.00750***
	(1.187)	(1.577)	(0.316)	(2.931)
$GROW_{i,t-1}$	0.0270***	0.0258**	0.0298***	0.0243**
	(3.005)	(2.510)	(3.566)	(2.158)
$SIZE_{i,t-1}$	-0.00331*	-0.00680***	-0.00210	-0.00844***
	(-1.902)	(-3.506)	(-1.274)	(-4.085)
$LEV_{i,t-1}$	-0.0288***	-0.00422	-0.0242***	-0.00842
	(-3.093)	(-0.426)	(-2.756)	(-0.794)
$AGE_{i,t}$	-0.00220***	-0.00172***	-0.00203***	-0.00193***
	(-5.775)	(-4.125)	(-5.597)	(-4.328)
INDUSTRY EFFECTS	Yes	Yes	Yes	Yes
YEAR EFFECTS	Yes	Yes	Yes	Yes
Constant	0.166*	0.171*	0.139	0.198**
	(1.824)	(1.874)	(1.591)	(2.083)
R-squared	0.086	0.082	0.084	0.087
Adjusted R2	0.0691	0.0632	0.0681	0.0678
F	5.19***	4.44***	5.29***	4.53***
N	2,711	2,244	2,819	2,136

V. CONCLUSION

This paper argues that industrial agglomeration is conducive to alleviating the financing constraints of SMEs, and the lower the level of financial development, the more significant the improvement effect of industrial agglomeration on the financing constraints of SMEs. This study provides some reference for solving the financing constraints of small and medium-sized enterprises in China. At the same time, it also provides relevant policy suggestions for relevant departments to guide the formation of industrial agglomeration and promote the further improvement of capital market.

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