Analysis of the factors affecting the financing of small and micro enterprises based on credit scoring model

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Abstract. One of the important reasons for small and medium enterprises' difficulties in financing is that capital lender under asymmetric information will face moral hazard. To obtain financing, small and medium enterprises must have sufficient owned capital as guarantee. Having compared the minimum owned capital amount required to be satisfied for bank, internet finance and logistics finance in loan, it is clear that small and medium enterprises combine their own capital situations to choose appropriate capital lender to finance under the circumstances of different interest rates, private benefits and ratios of remaining value as well as monitoring costs. The research result shows that small and medium enterprises can obtain loans more easily by logistics finance, internet finance and other newly-emerged financing ways.

Key words. Small and medium enterprises, Capital, Bank, Internet finance, Analysis of trust, Financing
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1. Introduction

In recent years, domestic and foreign theorists have conducted researches on the financing of small ad medium enterprises in multiple aspects [1-2]. Research by Chen Cheng, etc. shows that commercial bank's innovation in credit business is an important way to solve the difficulties of small and medium enterprises in financing, and at the same time, it demonstrates the rationality of commercial banks of our country in developing the credit business of small and medium enterprises by choosing breakthrough innovation paths [3]. Chen Shou, et.al. think that the more real the information that enterprise gives to bank is, the higher the actual

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average revenue of bank will become. Therefore, improving the construction of enterprise's credit system and reducing the bank's cost in collecting information can effectively improve the availability of enterprise obtaining financing from bank and reduce financing cost of enterprise [4]. Zhong Tianli, et. al think that defects in endogenous system of financial service mechanism of small and medium enterprises cause the financial market failure, and defects & low efficiency of policy guarantee system can not satisfy the guaranteed financing demands of a large number of scattered enterprises of low levels as well. The endogenous power of setting up mutual guarantee, credit relation basis of mutual organization and motivate mechanism of action of mutual guarantee as well as reduction of agency cost for small and medium enterprises, all helps to make it the best choice for small and medium enterprises' guarantee financing mode, which provides the theoretical basis for the feasibility of guaranteeing peer of the same industry [5]. Aryeetey points out that under the circumstance of "group punishment", when repayment behavior will continuously add future profits that are higher than the short-term profits caused by default, then borrowers will choose to perform the contract [6]. Hinson R and Yadav M S thinks that the financing mode of new e-commerce trading platform has changed the way of traditional finance institutions in carrying out financing loans to small and micro enterprises independently in structure, and credit investigation system supported by informatization and platformization converts network transaction history into credit loan, which more accords to the financing characteristics and demands of small and micro enterprises [7-8]. Pan Mi has analyzed the value of each participation subject in internet finance, researched the innovative financial business mode of financing service provided by e-commerce enterprises to small and medium enterprises with the support of advantages in data, technology and platform by taking the financial service of Alibaba as an example, and has pointed out that internet finance will become one of the development tendencies of future financial industry [9]. Zhou Yu points out that internet finance is a big concept including broad sense and narrow sense. At present, there are still many disputes in the connotative definition and influence evaluation of internet finance, and one part of internet lending and borrowing business conducted by e-commerce company or financial institution shows a relatively good momentum of development. These companies use their own unique resources, namely big data of customers, to rate and classify credits, which has relieved asymmetric information problem [10]. John Mathis F points out it a correct option for logistics enterprises to satisfy customer demands with reasonable cost so as to realize the maximization of long-term profits, therefore, it is necessary to provide financing support for customers at each link of supply chain [11]. Li Yixue, et. al have summarized the connotation and basic structure of logistics finance of current stage, set up the theoretical research frame of logistics finance discipline, and have conducted systematic generalization on relevant literatures of domestic and foreign logistics finance from three aspects such as basic research on logistics finance business, logistics operation decision of enterprise under capital constraint, and risk control decisions of bank and logistics enterprise in logistics finance [12]. Based on the financial background of supply chain, Yu Bo proposes a third logistics information platform with logistics enterprise as operation subject and integration

of P2P network financing function innovatively, which integrates the unique advantage of logistics enterprise into the financial service of supply chain and realizes the efficient integration of logistics, information flow and capital flow, thus providing a systematic and comprehensive solving plan for the development of supply chain [13]. Xie Shiqing, et. al have analyzed that the main mode of logistics enterprise represented by American United Parcel Service, Inc (UPS) in supply-chain finance [14]. Cao Jing has introduced the operation mode of UPS logistics finance in details, and she thinks the industry integration mode of logistics and finance mutually promoting and developing together represents the direction of future logistics finance service [15]. Ruili S has built the game model of loan enterprise, bank and logistics finance under incomplete information, analyzed the risk strategy of logistics enterprise and has proposed corresponding decisions as reference [16].

2. Model description and basic assumptions

The Paper builds a model to discuss in following background: as for investment in a fixed-scale project, small and medium enterprises need to invest I for the purchase of raw materials (real material object) in total. Enterprise has owned capital A. There will be a total profit R with no remaining value when the project is successful, but if the project fails, remaining value C will be produced and discounted to cash at a certain ratio of remaining value since there are materials remaining that are not used up or finished products that are not sold out. Enterprise will obtain a private profit of b when it chooses to shrink responsibility. According to its private information, small and medium enterprises can be divided into good enterprise (strong strength, good credit and top technology) and bad enterprise (weak strength, poor credit and weak technology), about which the capital lender knows little. In implementing projects, small and medium enterprises may face sufficient owned capital ($A < I$) and need loan, and the capital lender (such as traditional bank, internet finance company and logistics finance company) will have a basic expected return rate r in lending money but he is also faced with moral hazard influence at the same time.

From the perspective of small and medium enterprises, the Paper analyzes that the income of small and medium enterprises protected by limited liability can not be negative. In the loan process, the key decision that small and medium enterprises shall make is that: to make clear to whom they can apply for a loan under the constraint of moral hazard.

Definitions of other symbols and variables are as follows:

P_H^G : the successful probability of project investment when good small and medium enterprises fulfill their duties;

P_H^B : the successful probability of project investment when bad small and medium enterprises fulfill their duties ($P_H^G > P_H^B$);

P_L^G : the successful probability of project investment when good small and medium enterprises shrink their responsibilities ($P_H^G > P_L^G$);

P_L^B : the successful probability of project investment when poor small and medium enterprises shrink their responsibilities ($P_H^B > P_L^B$);

$\Delta P^i = P_H^i - P_L^i$ in which, $i = G, B$.

3. Different capital lenders' requirements on loan enterprises

3.1. Traditional bank's requirements on small and medium enterprises

In the Paper, parties involved in applying to traditional bank for loan include bank, small and medium enterprise and guarantee enterprise. In which, guarantee enterprise is in the same industry as small and medium enterprises and has supervision obligation over small and medium enterprises, thus making small and medium enterprises will obtain a private profit b_1 when they shrink responsibilities but they need to pay external supervision cost x_1. If the project is successful, then bank, small and medium enterprises and guarantee enterprise involved will divide R in accordance with certain principles; if the project fails, the remaining value C will be taken out as guarantee and guarantee enterprise will obtain $\delta_1 C$ ($0 < \delta_1 < 1$) after discounting the remaining value into cash, besides, guarantee enterprise of the same industry shall compensate bank with certain money $\beta_g \delta_1 C$ ($0 < \beta_g < 1$). The expected basic return rate of bank in lending money is r_1. And the profits of bank, small and medium enterprises and guarantee enterprise are respectively: R_b^i, R_l^i, R_g^i. The profit relations among three parties are shown in Table 1:

Table 1. Profit relations table

		Total sum	Bank	Small and medium enterprises	Guarantee enterprise
Success	Fulfilling duties	R	R_b^i	R_l^i	$R_g^i - x_1$
	Shrinking responsibilities	R	R_b^i	$R_l^i + b_1$	$R_g^i - x_1$
Failure	Fulfilling duties	C	$\beta_g \delta_1 C$	0	$(1 - \beta_g)\delta_1 C - x_1$
	Shrinking responsibilities	C	$\beta_g \delta_1 C$	b_1	$(1 - \beta_g)\delta_1 C - x_1$

In which, $R = R_b^i + R_l^i + R_g^i (i = G, B)$.

In order to prevent moral hazard of small and medium enterprises, satisfy the conditions that bank agrees to lend money as well as satisfy the participation and supervision constraints of guarantee enterprise of the same industry, model I is built when $A < I$:

max $P_H^i \cdot R_l^i - A$

s.t.
$$\begin{cases} P_H^i \cdot R_l^i \geq P_L^i \cdot R_l^i + b_1\,, & (1) \\ P_H^i(R - R_l^i - R_g^i) + (1 - P_H^i)\beta_g \delta_1 C \geq (I - A)(1 + r_1)\,, & (2) \\ P_H^i \cdot R_g^i + (1 - P_H^i)(1 - \beta_g)\delta_1 C - x_1 \geq 0\,, & (3) \\ P_H^i \cdot R_g^i + (1 - P_H^i)(1 - \beta_g)\delta_1 C - x_1 \geq P_L^i \cdot R_g^i + (1 - P_L^i)(1 - \beta_g)\delta_1 C\,. & (4) \end{cases}$$

Instructions for model I:

When the equal sign is taken in equality (1), it is got that the minimum profit of small and medium enterprises is $R_l^i = \frac{b_1}{\Delta P^i}$. Obviously, small and medium enterprises will obtain private profit B ($B > b1$) when they shrink responsibilities under no supervision, at the moment, to make small and medium enterprises fulfill their duties, the minimum income of small and medium enterprises shall be: $\frac{B}{\Delta P^i}$. Since $\frac{b_1}{\Delta P^i} < \frac{B}{\Delta P^i}$, when the profit of small and medium enterprises is $\frac{b_1}{\Delta P^i}$, small and medium enterprises will fulfill duties under supervision but will shrink responsibilities under no supervision, thus producing inequality (3) and (4). Inequality (4) guarantees that profit guarantee enterprise obtains under supervision is higher than that under no supervision, so guarantee enterprise is bound to supervise small and medium enterprises. Inequality (3) satisfies the participation constraint of guarantee enterprise, namely guarantee enterprise has positive profits in supervision. Inequality (2) guarantees the participation constraints of banks when small and medium enterprises fulfill duties under supervision. Solve the set of inequalities and it can be got that:

$$A \geq \overline{A_1}^i = I - \frac{P_H^i(R - \frac{b_1}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_1}(i = G, B).$$

Therefore, when the owned capital amount of small and medium enterprises is higher than or equal to $\overline{A_1}^i$, small and medium enterprises can apply to bank for loans, and the bank, small and medium enterprises and guarantee enterprise involved will all obtain profits.

3.2. Internet finance's requirements on small and medium enterprises

In the Paper, the loan mode of internet finance studied refers to the mode that internet finance company issues loan to small and medium enterprises directly by regarding e-commerce company and internet enterprise as subject, absorbing social idle capital as the main capital source and making use of its unique platform resources. When small and medium enterprises apply to internet finance company for loans, internet finance company, small and medium enterprises and guarantee enterprise of the same industry will be involved. And the guarantee enterprise of the same industry will supervise but shall be paid with external supervision cost x_1. Internet finance company having big data, cloud computing and microcredit technology makes internet finance company can understand the operation behavior and credit rating of small and medium enterprises more comprehensively and helps it in a more perfect database and network credit system, making small and medium enterprises obtain private profit b_2 when they shrink responsibilities. If the project is successful, internet finance company, small and medium enterprises and guarantee enterprise involved will divide R in accordance with certain principles; if the project fails, remaining value C will be taken out as guarantee and guarantee enterprise will obtain $\delta_1 C$ ($0 < \delta_1 < 1$) after discounting C into cash, and at the same time, the guarantee enterprise of the same industry shall compensate internet finance company

with certain money $\beta_g \delta_1 C$ $(0 < \beta_g < 1)$.The expected basic return rate of internet finance company in loans is r_2. The profits of internet finance company, small and medium enterprises and guarantee enterprise are respectively R_h^i, R_l^i, R_g^i. And the profit relations among the three parties are shown in Table 2:

Table 2. Profit relations table

		Total sum	Internet finance company	Small and medium enterprises	Guarantee enterprise
Success	Fulfilling duties	R	R_h^i	R_l^i	$R_g^i - x_1$
	Shrink responsibilities	R	R_h^i	$R_l^i + b_2$	$R_g^i - x_1$
Failure	Fulfill duties	C	$\beta_g \delta_1 C$	0	$(1 - \beta_g)\delta_1 C - x_1$
	Shrink responsibilities	C	$\beta_g \delta_1 C$	b_2	$(1 - \beta_g)\delta_1 C - x_1$

In which: $R = R_h^i + R_l^i + R_g^i (i = G, B)$

In order to prevent the moral hazard of small and medium enterprises, satisfy the conditions that internet finance company agrees to lend money and satisfy the participation and supervision constraints of guarantee enterprise of the same industry, model II is built when $A < I$:

max $P_H^i \cdot R_l^i - A$

s.t.
$$
\begin{cases}
P_H^i \cdot R_l^i \geq P_L^i \cdot R_l^i + b_2 & (5) \\
P_H^i(R - R_l^i - R_g^i) + (1 - P_H^i)\beta_g \delta_1 C \geq (I - A)(1 + r_2) & (6) \\
P_H^i \cdot R_g^i + (1 - P_H^i)(1 - \beta_g)\delta_1 C - x_1 \geq 0 & (7) \\
P_H^i \cdot R_g^i + (1 - P_H^i)(1 - \beta_g)\delta_1 C - x_1 \geq P_L^i \cdot R_g^i + (1 - P_L^i)(1 - \beta_g)\delta_1 C & (8)
\end{cases}
$$

Instructions for model II:

When the equal sign is taken in equality (5), it is got that the minimum profit of small and medium enterprises is $R_l^i = \frac{b_2}{\Delta P^i}$. Obviously, small and medium enterprises will obtain private profit B $(B > b2)$ when they shrink responsibilities under no supervision, at the moment, to make small and medium enterprises fulfill their duties, the minimum income of small and medium enterprises shall be: $\frac{B}{\Delta P^i}$. Since $\frac{b_2}{\Delta P^i} < \frac{B}{\Delta P^i}$, when the profit of small and medium enterprises is $\frac{b_2}{\Delta P^i}$, small and medium enterprises will fulfill duties under supervision but will shrink responsibilities under no supervision, thus producing inequality (7) and (8). Inequality (8) guarantees that profit guarantee enterprise obtains under supervision is higher than that under no supervision, so guarantee enterprise is bound to supervise small and medium enterprises. Inequality (7) satisfies the participation constraint of guarantee enterprise, namely guarantee enterprise has positive profits in supervision. Inequality (6) guarantees the participation constraints of internet finance company when small and medium enterprises fulfill duties under supervision. Solve the set of

inequalities and it can be got that:

$$A \geq \overline{A_2}^i = I - \frac{P_H^i(R - \frac{b_2}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_2}(i = G, B).$$

Therefore, when the owned capital amount of small and medium enterprises is higher than or equal to $\overline{A_2}^i$, small and medium enterprises can apply to internet finance company for loans, and the internet finance company, small and medium enterprises and guarantee enterprise involved will all obtain profits.

3.3. Logistics finance's requirements on small and medium enterprises

In the Paper, the operation mode of logistics finance is mainly based on UPS which integrates logistics, capital flow and information flow and owns the integrated financing product & service specially provided by UPS Capital Corporation, its wholly-owned subsidiary. As a logistics enterprise, UPS can also realize some businesses equivalent to financial function such as logistics finance, global trade financing and payment solutions, etc. at the same time. And the logistics finance company studied here can provide loan service to small and medium enterprises independently and supervise them through its own logistics information platform. When small and medium enterprises apply to logistics finance company for loans, logistics finance company and small and medium enterprises are involved. Logistics finance company can not only provide loans, but also conduct internal supervision on small and medium enterprises in aspects such as logistics transportation, accounts receivable and inventory, etc, thus paying internal supervision cost x_2. Small and medium enterprises can obtain private profit b_3 when they shrink responsibilities under logistics finance. When the project fails, logistics enterprise can discount remaining value into cash and obtain $\delta_2 C$. The expected basic return rate of logistics finance company in loan is r_3. The profits of logistics finance company and small & medium enterprises are respectively R_w^i, R_l^i. And the profit relations between two parties are shown in Table 3:

Table 3. Profit relations table

		Total amount	Small and medium enterprises	Logistics finance company
Success	Fulfill duties	R	R_l^i	$R_w^i - x_2$
	Shrink responsibilities	R	$R_l^i + b_3$	$R_w^i - x_2$
Failure	Fulfill duties	C	0	$\delta_2 C - x_2$
	Shrink responsibilities	C	b_3	$\delta_2 C - x_2$

In which: $R = R_l^i + R_w^i (i = G, B)$
Model III is built when $A < I$:

$\max P_H^i \cdot R_l^i - A$

$$\text{s.t.} \begin{cases} P_H^i \cdot R_l^i \geq P_L^i \cdot R_l^i + b_3 & (9) \\ P_H^i(R - R_l^i) + (1 - P_H^i)\delta_2 C - x_2 \geq (I - A)(1 + r_3) & (10) \\ P_H^i(R - R_l^i) + (1 - P_H^i)\delta_2 C - x_2 \geq P_L^i(R - R_l^i) + (1 - P_L^i)\delta_2 C & (11) \end{cases}$$

Instructions for model III:

When the equal sign is taken in equality (9), it is got that the minimum profit of small and medium enterprises is $R_l^i = \frac{b_3}{\Delta P^i}$. Obviously, small and medium enterprises will obtain private profit B $(B > b3)$ when they shrink responsibilities under no supervision; since $\frac{b_2}{\Delta P^i} < \frac{B}{\Delta P^i}$, when the profit of small and medium enterprises is $\frac{b_3}{\Delta P^i}$, small and medium enterprises will fulfill duties under supervision but will shrink responsibilities under no supervision, thus producing inequality (10) and (11). Inequality (11) guarantees that guarantee enterprise is bound to supervise small and medium enterprises. Inequality (10) satisfies the participation constraint of logistics finance company when small and medium enterprises fulfill their duties under supervision. Solve the set of inequalities and it can be got that:

$$A \geq \overline{A_3}^i = I - \frac{P_H^i(R - \frac{b_3}{\Delta P^i} - \delta_2 C) + \delta_2 C - x_2}{1 + r_3}.$$

Therefore, when the owned capital amount of small and medium enterprises is higher than or equal to $\overline{A_3}^i$, small and medium enterprises can apply to logistics finance company for loans, and both parties can obtain profits at the moment.

3.4. Comparative analysis of three loan ways

$$\overline{A_1}^i - \overline{A_2}^i = \frac{P_H^i(R - \frac{b_2}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_2} \\ - \frac{P_H^i(R - \frac{b_1}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_1}, \tag{12}$$

$$\overline{A_1}^i - \overline{A_3}^i = \frac{P_H^i(R - \frac{b_3}{\Delta P^i} - \delta_2 C) + \delta_2 C - x_2}{1 + r_3} \\ - \frac{P_H^i(R - \frac{b_1}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_1}, \tag{13}$$

$$
\begin{aligned}
\overline{A_2}^i - \overline{A_3}^i ={}& \frac{P_H^i(R - \frac{b_3}{\Delta P^i} - \delta_2 C) + \delta_2 C - x_2}{1 + r_3} \\
& - \frac{P_H^i(R - \frac{b_2}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_2},
\end{aligned}
\tag{14}
$$

Observe equality (12), (13) and (14), and it can be got that:

I. When the traditional bank, internet finance company and logistics finance company have the same evaluation on loan risk, namely the expected basic return rates required are the same (r1= r2= r3), and the close relations and mutual communication of information between the industry where logistics finance company and small and medium enterprises are and the enterprise of the same industry, namely the ratios of remaining value after cash realization are the same ($\delta_1 = \delta_2$), no matter to whom small and medium enterprises apply for loans, they can obtain the same private benefits ($b_1 = b_2 = b_3$); when the external supervision cost of guarantee enterprise is the same as that of logistics finance company ($x_1 = x_2$), $\overline{A_1}^i = \overline{A_2}^i > \overline{A_3}^i$ will indicate that at the moment, the owned capital required for small and medium enterprises in applying to logistics finance company for loans shall be lower than that for it in applying to traditional bank and internet finance company, and logistics finance company has more advantages at the moment.

II. Expected basic return rate *r1, r2 and r3* are respectively offered by traditional bank, internet finance company and logistics finance company; if capital lender knew about the owned capital *A* of small and medium enterprises in quotation of *r1, r2 and r3*, when *A* is known and $\delta_1 = \delta_2, b_1 = b_2 = b_3, x_1 = x_2$, from $A = \overline{A_1}^i = \overline{A_2}^i = \overline{A_3}^i$, it can be got that $r_1 = r_2 < r_3$, $(I - A)(1 + r_1) = (I - A)(1 + r_2) < (I - A)(1 + r_3)$), namely, under such situation, logistics finance company can propose a higher expected return rate to increase its profits.

III. No matter for traditional bank, internet finance company or logistics finance company, the higher the expected return rate is, the higher the owned capital required becomes. When $\delta_1 = \delta_2, b_1 = b_2 = b_3, x_1 = x_2, r_1 \neq r_2 \neq r_3$, if $r_1 > r_2$, then $\overline{A_1}^i > \overline{A_2}^i$, $I - \overline{A_1}^i < I - \overline{A_2}^i$, indicating that the owned capital required by traditional bank is relatively high, and compared to the internet finance company which is not willing to invest too much capital in a project, internet finance company has more advantages at the moment, otherwise, traditional bank has more advantages; if $r_1 > r_3$, then $\overline{A_1}^i > \overline{A_3}^i$, indicating that logistics finance company has more advantages; if $r_1 < r_3$ and $\frac{P_H^i(R - \frac{b_3}{\Delta P^i} - \delta_2 C) + \delta_2 C - x_2}{1 + r_3} > \frac{P_H^i(R - \frac{b_1}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_1}$, then $\overline{A_1}^i > \overline{A_3}^i$, indicating that logistics finance company has more advantages, otherwise, traditional bank has more advantages; if $r_2 > r_3$, then $\overline{A_2}^i > \overline{A_3}^i$, indicating that logistics has more advantages; if $r_2 < r_3$ and $\frac{P_H^i(R - \frac{b_3}{\Delta P^i} - \delta_2 C) + \delta_2 C - x_2}{1 + r_3} > \frac{P_H^i(R - \frac{b_2}{\Delta P^i} - \delta_1 C) + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}}{1 + r_2}$, then $\overline{A_2}^i > \overline{A_3}^i$, indicating logistics finance company has more advantages, otherwise, internet finance company has more advantages.

IV. No matter for traditional bank, internet finance company or logistics finance

company, the higher the ratio of remaining value after cash realization is, the higher the owned capital required becomes. Greater δ means greater guaranteed amount provided in failure, which is in more favor of capital lender. When $r_1 = r_2 = r_3, b_1 = b_2 = b_3, x_1 = x_2, \delta_1 \neq \delta_2$, if $(\beta_g - P_H^i)\delta_1 C - P_H^i \frac{x_1}{\Delta P^i} < (1 - P_H^i)\delta_2 C - x_2$, then $\overline{A_1}^i = \overline{A_2}^i > \overline{A_3}^i$, indicating that logistics finance company has more advantages at the moment, otherwise, traditional bank and internet finance company have more advantages.

V. No matter for traditional bank, internet finance company or logistics finance company, the higher the private profit small and medium enterprises obtain when they shrink responsibilities is, the higher the owned capital required becomes. When $r_1 = r_2 = r_3, \delta_1 = \delta_2, x_1 = x_2, b_1 \neq b_2 \neq b_3$, if being outside the external supervision of guarantee enterprise of the same industry, internet finance can also develop its information platform advantages to increase worries of small and medium enterprises in shrinking responsibilities, namely when $b_1 > b_2$, then $\overline{A_1}^i > \overline{A_2}^i$, indicating that internet finance requires a lower owned capital and it has more advantages, otherwise, traditional bank has more advantages; If the internal supervision of logistics finance is more effective than the external supervision guaranteed by the same industry, namely if $b_1 > b_3$, then $\overline{A_1}^i > \overline{A_3}^i$, indicating that logistics finance requires a lower owned capital and has more advantages; if $b_1 < b_3$, and $-P_H^i \frac{b_3}{\Delta P^i} + \delta_2 C - x_2 > -P_H^i \frac{b_1}{\Delta P^i} + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}$, then $\overline{A_1}^i > \overline{A_3}^i$, indicating that logistics finance company has more advantages, otherwise, traditional bank has more advantages; if the supervision of logistics finance is more effective that that of internet finance, namely if $b_2 > b_3$, then $\overline{A_2}^i > \overline{A_3}^i$, indicating that logistics finance requires a lower owned capital and has more advantages; if $b_2 < b_3$ and $-P_H^i \frac{b_3}{\Delta P^i} + \delta_2 C - x_2 > -P_H^i \frac{b_2}{\Delta P^i} + \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}$, then $\overline{A_2}^i > \overline{A_3}^i$, indicating logistics finance company has more advantages, otherwise, internet finance has more advantages.

VI. No matter for traditional bank, internet finance company or logistics finance company, the higher supervision cost means that guarantee enterprise of the same industry or logistics enterprise is more unwilling to supervise, the moral hazard is greater and more owned capital is required as guarantee. When $r_1 = r_2 = r_3, \delta_1 = \delta_2, b_1 = b_2 = b_3, x_1 \neq x_2$, if the internal supervision cost of logistics finance is lower than the external supervision cost of guarantee enterprise of the same industry, namely if $x_1 > x_2$, then $\overline{A_1}^i = \overline{A_2}^i > \overline{A_3}^i$, indicating that logistics finance requires a lower owned capital and has more advantages; if $x_1 < x_2$, and $\delta_2 C - x_2 > \beta_g \delta_1 C - P_H^i \frac{x_1}{\Delta P^i}$, logistics finance requires a lower owned capital and has more advantages, otherwise, traditional bank and internet finance company have more advantages.

4. Conclusion

When small and medium enterprises apply for loans, they shall firstly consider their owned capital and determine to whom they can apply for loans under different interest rates, private benefits, ratios of remaining value and supervision costs. If the owned capital is insufficient, it means that moral hazard influences shall not be

overcome and loan can not be obtained. Certainly, the Paper is a discussion under the background that small and medium enterprises conduct one-time investment on a project with fixed scale; sometimes, in the mid-term of project implementation, small and medium enterprises sign contracts with new investors and conduct a second financing to obtain the capital necessary for deepening investment, and the scale of project investment shall change along with the increase of capital invested by small and medium enterprises. Beside, comparisons of three loan channels when project needs to be reinvested shall also be researched later.

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