An Effect Analysis on Government Financial Subsidies of SME Credit Guarantee

Xue-song LI
The Party School of CPC Shenyang Municipal Committee, Shenyang 110036, China

Keywords: Small and medium enterprises, Credit guarantee, Effect analysis.

Abstract. Under the condition of incomplete information, the guarantee institution charges the premium and the counter-guarantee product will change the enterprise's income function, thus reduces the enterprise’s income and makes some enterprises that unable to provide the counter-guarantee exit from the credit market, leading to the credit guarantee paradox. The government financial subsidy can effectively alleviate the credit guarantee risk of SME, and realize the win-win of bank and guarantee institutions through the amplification effect of guarantee loan scale.

Introduction

Since 2008, the external environment of China’s SME has undergone dramatic changed, many of them are facing a serious survival crisis and closed down, which become a social hot issues. Unlike large enterprises, because of the low information transparency, low credit rating, short of collateral and other defects, the screening costs that SME apply for loans is too high. At the same time, the bank will also face the adverse selection and moral hazard of SMEs. Therefore, the "credit rationing" has become a rational choice for banks to small and medium enterprises. In order to solve this problem, the international practice is to establish a credit guarantee system for SME. Improve the credit of financing enterprises, through the coordination of security agencies, cooperative banks and financing company’s tripartite interests and risks. Then alleviate the financing difficulties of small and medium enterprises, through the guarantee institutions to achieve the scale of the amplification effect.

A Model of Credit Guarantee for SME

For more than 30 years, the theoretical research on credit guarantee has been carried out in the framework of information asymmetry. In foreign countries, credit financing guarantee research originated from the credit market equilibrium and credit rationing research. R·J·Barro (1976) proposed a complete credit financing guarantee model that gave a relatively independent research status to credit financing guarantees. However, in his theoretical model, the guarantee is only a mechanism for implementing a loan contract \[^1\]. Stiglitz & Weiss (1981) analyzes the rationing characteristics of the information asymmetric credit market from the bank loan interest rate and guarantee requirement respectively. Then, put forward the theory of reverse selection guarantee \[^2\]. D·Besanko (1987) analyzed the credit rationing in different market structures, and suggested that the introduction of third-party guarantee institutions with information superiority could reduce the amount of guarantees required by banks and increase the profit \[^3\]. Fu (2004) \[^4\] and Yang (2006) \[^5\] analyzed the adverse selection of SME after the introduction of the guarantee institutions, and pointed out that the involvement of the guarantee institutions will increase the loan cost of the enterprises and intensify the adverse selection of the enterprises. They believe that only when the enterprise can provide full counter-insured goods, adverse selection problems will be alleviated, and the involvement of the guarantee institutions to achieve SME financing Pareto improvement.

Assuming that the guarantee institution is limited to the registered capital, it can only guarantee the \(\lambda m(0 < \lambda < 1)\) SEMs with less risk of investment, and the profitability of the secured SEMs is uniformly \([p_2 - \varepsilon(p_2 - p_1), p_2]\) distributed. \(\varepsilon \in [\lambda, 1]\) is the information advantage parameters of
guarantee agency. When the guarantee agency does not have the information advantage, the profitability of the guaranteed enterprise is still uniformly $[P_1, P_2]$ distributed. When the guarantee has complete information, the profitability of the secured enterprise will be subject to $[P_2 - \lambda(P_2 - P_1), P_2]$ uniform distribution.

Because the commercial guarantee institution want to maximize their expected profit. Considered the adverse selection risk of SEMs, the guarantee institution will require the SMEs provide the collateral $C_D$ for the counter-guarantee, the premium rate is $f_D$, and $W_n > C_D + Cf_D$. That means any SME can apply for loans by paying the premium or providing the counter-collateral. The amount of counter-guarantee is a monotonically increasing function $C_D = \phi(\varepsilon) > 0$ of $\varepsilon$. That means the more information of SME the guarantee institution have, the less amount of counter-guarantee required by the SME. When the guarantee institution has complete information, the SME no longer needs to provide counter-guarantee. When $\varepsilon = \lambda$, $C_D = 0$. Therefore, we can obtain the expected function of the SMEs and the guarantee institutions are:

$$
\begin{align*}
E\pi_E[(1 + r), P_1] &= Y_0 - (1 + r)B P_1 - (1 - P_1)C_D - Cf_D \\
E\pi_D = Cf_D - (1 - P_1)(C - C_D)
\end{align*}
$$

The bank's earnings expectations for the loan of $\lambda m$ ($\lambda m > i > 1, 0 > \lambda > 1$) SEMs are:

$$
E\pi_B(1 + r) = \int_{p_1 - \varepsilon(p_2 - p_1)}^{\rho^*} [p_1 B(1 + r) + (1 - p_1)\beta C - T_0 - B] \frac{\lambda m}{\varepsilon(p_2 - p_1)} dp_1
$$

For $\frac{\partial(Cf_D + C_D)}{\partial\varepsilon} > 0$, with the increase information of the guarantee institutions, corresponding, the premiums and counter-guarantees which SMEs need to be provided are reduced. The average amount of loans received by the secured SMEs increased accordingly. When the guarantee agency has complete information, the enterprise obtains the largest scale of the loan. The risk of reverse selection is minimal, and credit allocation achieves the Pareto optimal. However, due to the commercial nature of the guarantee institution, when $\frac{\partial E\pi_D(f_D)}{\partial f_D}$:

$$
p^* = \frac{Y_0 - C + [(1 + r)B - C_D(P_2 - \varepsilon(P_2 - P_1)]}{2(1 + r)B - C_D - C}
$$

That means $p^* > p^\lambda$. That means in incomplete information condition, guarantee institutions ask for premiums and counter-guarantee will change the SEMs' revenue function and reduce the income. Some low-risk enterprises that cannot provide counter-insured will withdraw from the credit market, leading to the emergence of credit guarantee paradox. Therefore, when the enterprise information has not yet been transparent, it is particularly important for the government to provide financial subsidies to credit guarantees.

The Impact of Government Financial Subsidies on Credit Guarantee

Listeri (1997) demonstrated that as a risk-sharing party, the financial support of government and industry association could effectively address the credit financing paradox of SMEs [6]. Arping (2008) believes that the government, as a risk-sharing party, provides financial subsidies to the sponsoring institution, which is more efficient than the mandatory loan or other intervention mechanism [7]. Wilcox & Yasuda (2008) confirmed that government subsidies to credit guarantees could increase the amount of unsecured loans and secured loans at the same time [8]. Based on the study of Wilcox & Yasuda (2008), this paper analyzed the impact of government financial subsidy on SME credit guarantee.
Assumption: the registered capital of the guarantee institution is $M$, the loan guarantee period is $n$ years, the guarantee ratio is $\alpha$, and the guarantee fee is $f_D$, the guarantee rate is $R_D$, the bank deposit rate is $R_D'$, the loan amount is $L$, the loan interest rate is $r_c$, the compensation rate is $R_{BD}'$, the other fee is $f_B$; The subsidy ratio provided by each government guarantee is $r_g$, the recovery rate of the guarantee agency is $\beta R_D$. Therefore, when $nr_s \alpha L - \alpha LR_{G_S} \geq 0$, government subsidy ratio is $r_s \geq \frac{R_o}{n}$, banks and commercial guarantee institutions will adopt a standardized cooperation strategy. The income functions are:

\[
\begin{align*}
\pi_o &= Mn r_c + n \alpha LR_o - \alpha LR_o - f_o + \beta \alpha LR_o + n \alpha Lr_s \\
\pi_s &= nLr_o - (1 - \alpha) LR_{G_S} - f_s
\end{align*}
\]

If the guarantee institution is fully public, that is $\pi_o = 0$ and $L = \frac{f_o - nMr_c}{\alpha(nR_o - R_o + \beta R_o + r_s)}$. Into the formula (3) available

\[
\pi_s = \frac{nr_o(f_o - nMr_c)}{\alpha(nR_o + (\beta - 1) R_o + r_s)} - \frac{(1 - \alpha) R_{G_S}(f_o - nMr_c)}{\alpha(nR_o + (\beta - 1) R_o + r_s)} - f_s
\]

Regardless the transaction costs between the guarantee institution and the bank in the course of the credit loan, the maximum amount of government subsidy is:

\[
M_{MaL} = \frac{nMr_c}{\alpha(1 - \beta) R_o - nR_o}
\]

(5)

Seeking $r_s$ partial derivative, we can see that the government improves the subsidy ratio, which can effectively enlarge the maximum guarantee scale, namely:

\[
\frac{\partial M_{MaL}}{\partial r_s} = -\frac{nMr_c}{\alpha(1 - \beta) R_o - nR_o - r_s}^2
\]

(6)

When enlarging the size of the guarantee, at the same time, the government's financial subsidies bring additional benefits to the banks and guarantee institutions:

\[
\begin{align*}
\Delta \pi_s &= \frac{nM r_s \alpha L}{\alpha[(1 - \beta) R_o - nR_o - r_s][(1 - \beta) R_o - nR_o]} \\
\Delta \pi_o &= \frac{nM r_s \alpha L}{\alpha[(1 - \beta) R_o - nR_o - r_s][(1 - \beta) R_o - nR_o]}
\end{align*}
\]

(7)

In summary, the government financial subsidies shared the risk in the SME credit financing, amplified the scale of secured loans, and improved the bank and the guarantee institutions of the proceeds.

Conclusion and Countermeasure

Commercial guarantee institutions increase the number of SMEs that have obtained loans. The average amounts of loans obtained by the secured enterprises increases accordingly. However, due to the asymmetry information between guarantee institution and SMEs, in order to avoid risks, the guarantee institutions increase premiums and collateral, which reduce the enterprise income and make some low-risk enterprises that cannot provide collateral withdraw from the credit guarantee market, and leading to the credit guarantee paradox. Government financial subsidies can effectively alleviate
the market risk of SME credit financing and improve the income of banks and guarantee institutions. However, it should be noted that government subsidies expand the amount of credit guarantees, which made the SMEs more inclined to adopt the risk strategy, and increase the bankruptcy risk of SMEs \(^9\). Should take appropriate countermeasures and measures:

**Improve the Risk Compensation Mechanism of the Guarantee Institution**

The credit guarantee alleviated the information asymmetry of the credit market. However, the asymmetry and local exclusivity of the income and risk of SME credit guarantee institutions determine that the credit guarantee of SMEs should belong to the category of quasi-public goods. The high-risk and low-yield characteristics of SMEs' credit guarantees and the externalities making the private sector generally reluctant to intervene or, leading to the market cannot achieve effective supply. Then, the government's financial support is a matter of course.

**Ease the Degree of Information Asymmetry**

First, strengthen the SME information disclosure system and improve the transparency of its credit, reduce the degree of information asymmetry between SMEs and credit guarantee institutions; Second, improve the SME credit risk rating system, according to the applicant's risk level to determine the rate, reduce the risk of security agencies; Third, establish the risk assessment system, so that security agencies can select investment potential project from a number of high-risk investment projects; Fourth, develop the relationship-based credit guarantee, reduce the degree of information asymmetry between security agencies and SMEs.

**Strengthen the Cooperation between Banks and Guarantee Institutions**

The benefit sharing and risk sharing mechanism between the credit guarantee institution and the commercial bank helps to alleviate the adverse selection and the credit guarantee rationing. The guarantee institution should choose the cooperative bank with high enthusiasm and good creditworthiness as the commercial credit guarantee business of SMEs. The guarantee institution shall avoid the full guarantee and should reasonably share the risk between the guarantee institution and the cooperative bank through the appropriate guarantee proportion in order to establish the risk sharing mechanism between the guarantee institution, the bank and the enterprise, so that the guarantee institution and the cooperative bank share the risk of financial support for SMEs. Cooperative banks should share credit risk as an obligation to strengthen cooperation and jointly strengthen the supervision of the guarantee activities and prevent and take risks of adverse selection of small and medium enterprises.

**Establish a Flexible Counter-guarantee System**

The counter-guarantee means a guarantee by which the debtor or a third party may make to the guarantor and make a settlement. It is a mechanism for making a settlement to the guarantor, when the guarantor suffered a loss due to the debt of the debtor. When the SME's expected on investment projects reaches a certain level, the increasing counter-guarantee can increase the success probability of investment projects; When the SME's expected return on investment projects is not high enough, the increasing counter-insured goods hinder the success probability of investment projects. Therefore, a flexible counter-guarantee system can weak the motivation of adverse selection and consequence.

**References**

[1] Yang Sheng Gang; Hu HaiBo. On the Credit Guarantee for Small and Medium- sized Enterprises under the Information Asymmetry [J]. Journal of Financial Research, 2006(1): 118-125.

[2] Stiglitz, Weiss. Credit rationing in markets with imperfection [J]. American Economics Review, 1981, 71(3): 393-410.
[3] Besanko.D, Thakor, A. V. Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Markets [J]. International Economic Review, 1987, 28: 671-689.

[4] Fu JunWen, Li Qi. The credit guarantee and adverse selection: research on the financing problem of SMEs [J]. Quantitative & Technica Economics, 2004(8): 127-133.

[5] Yang ShengGang; Hu HaiBo. On the Credit Guarantee for Small and Medium-sized Enterprises under the Information Asymmetry [J]. Journal of Financial Research, 2006(1): 118-125.

[6] Llisterri, J. Credit guarantee systems: Preliminary Conclusion [J]. The Financier, 1997, 4(1&2): 95-99.

[7] Arping, S. Gyongyi, L.Alan, M. Public Initiative to Support Entrepreneurs: Credit Guarantees Vs Co-Funding [R]. World Bank Mimeo, 2008.

[8] Wilcox, J. A.Y. Yasuda. Do Government Loan Guarantees Lower or Raise Bank’Non-Guaranteed Lending? Evidence from Japanese Banks’ Mimeo[R]. Hass School of Business, University of California, Berkley, 2008.

[9] Hao Lei, Guo Xi. Different Guarantee Institutions and Their Effect on the Financing of Small and Medium-Sized Enterprises [J]. Economic Research Journal, 2005(9): 58-65.