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# Bank's Credit Strategy for Small and Medium Sized Enterprises

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***ABSTRACT.*** *Small and medium-sized enterprises are the main force of economic development in contemporary China. They play an important role in the economic structure. However, due to its small scale, weak profitability and low credibility, banks are faced with credit discrimination and other problems. This paper mainly discusses and analyzes the impact of SMEs' profitability and reputation on bank credit policies, so as to help banks make decisions on loans for SMEs. In this paper, logistics regression method was used to analyze the small and medium-sized enterprises with credit records, and established an effective mathematical model to predict the default rate of small and medium-sized enterprises, to find out the influence of different enterprise credit degree on bank credit decision-making, to get the corresponding enterprise credit strategy.*

***KEYWORDS:*** *logistics regression, credit strategy*

## 1. Introduction

In practice, due to the relatively small scale of small and medium-sized enterprises and the lack of mortgage assets, banks usually provide loans to enterprises with strong strength and stable supply-demand relationship based on credit policies, transaction note information of enterprises and the influence of upstream and downstream enterprises, and can give preferential interest rates to enterprises with high reputation and small credit risk. [1]

## 2. Methodology

### *2.1 Factor construction*

We used accounting information in fapiao of 123 small and medium-sized enterprises from 2017 to 2019 to construct five indicators (average input amount, average sales amount, average rate of profit, average profit growth rate and advanced quality customers) as the factors to predict the default rate of these

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enterprises. In the enterprises' dataset, if one's credit rating was A or B, who could be seen as an advanced quality customer (Advanced quality customers=1). And if one's credit rating was C or D, who was not an advanced quality customers (Advanced quality customers=0). Due to the large number of average sales amount and average input amount, logarithms were taken respectively for the robustness of the model.

*Table 1 descriptive statistics of model 1 indicators*

| | lg(average sales amount) | lg(average input amount) | Average rate of profit | Average profit growth rate | Advanced quality customers |
|---|---|---|---|---|---|
| **count** | 104 | 112 | 96 | 96 | 123 |
| **mean** | 6.685 | 6.105 | 104.191 | -0.910 | 0.528 |
| **STD** | 0.997 | 1.252 | 407.366 | 12.442 | 0.501 |
| **Min** | 4.080 | 2.420 | -0.877 | -117.804 | 0 |
| **25%** | 6.035 | 5.408 | 0.217 | -0.531 | 0 |
| **50%** | 6.900 | 6.150 | 2.082 | 0.093 | 1 |
| **75%** | 7.230 | 7.063 | 11.931 | 0.868 | 1 |
| **Max** | 9.120 | 9.280 | 2935.439 | 15.341 | 1 |

### *2.2 Logistics regression*

Logistics regression is the core algorithm of classical rating. In the field of credit evaluation, after knowing various prediction indicators that affect consumer credit quality, the credit risk probability of small and medium-sized enterprises (or the probability of "default" and "no default" of small and medium-sized enterprises) was predicted through the model. The "default" and "non default" of SMEs were represented by *y*, *y* = 1 is "default", *y* = 0 is "non default". Since the relationship between probability and independent variables of binary classification problem was usually S-shaped curve, logistics regression can deal with these problems. [2] The basic formula is as followed:

$$P_i = \frac{1}{1+e^{-(\theta+\theta_1 X_{i1}+\theta_2 X_{i2}+\cdots+\theta_5 X_{i5})}} \quad \textbf{(}i\textbf{=1,2,3,...,123)} \tag{1}$$

$\theta_1 \sim \theta_5$ represents five indicators (average input amount, average sales amount, average rate of profit, average profit growth rate and advanced quality customers), and *i* represents one of 123 SMEs. The results of logistics regression show that the variable coefficients are significant, and the overall prediction accuracy is 92.5%, which proves that this strategy is effective.

$$P_i = \frac{1}{1+e^{-(11.407+0.002X_{i1}+0.356X_{i2}-4.44X_{i3}-2.994X_{i4}+1.113X_{i5})}} \tag{2}$$

Then we used sales and input information in fapiao of another 302 SMEs ' to verify, and found that the model was still robust and reliable, so this model can be introduced to other similar situations. It is worth noting that the data of "advanced quality customers" was based on the previous credit rating of enterprises by banks,

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so it may be difficult to obtain. Therefore, when it is necessary to predict the default rate of some enterprises without credit records, we recommend using k-means clustering to group the credit categories of enterprises, and then carry out logistic regression analysis.

## 3. Impact of emergencies

Sudden factors, such as the COVID-19 pandemic, often have different influences on institutions and units with different characteristics. Therefore, we used logistics model to analyze the impact of the pandemic from the perspective of self-employed persons and companies. The impact of the pandemic on self-employed persons was greater than that of companies. First of all, from the logistics regression results of self-employed persons and companies, we found that regression coefficients of self-employed persons were significantly higher than that of companies. And it may due to the instability of the internal structure of self-employed persons [3]. On the basis of this model, we can find that the reaction to the internal factors is not the same in these two kinds of enterprises. Therefore, from the results and analysis of the model, it can be considered that bank loans to self-employed persons are facing greater risks than companies. So banks can reduce the amount of loans to self-employed persons or increase their loan interest rates if they only focus on profitability. But in our view, focusing too much on profitability is not entirely beneficial to the whole market since SMEs play an important role in social economy

## 4. Conclusion

In order to formulate the credit strategy of small and medium-sized enterprises, we have obtained 123 SMEs' input and output fapiao and constructed five indicators. The risk degree of these enterprises, namely default rate, was quantified by using logistics regression model. The results show that the model is accurate and reliable, so it is recommended to be popularized. Then we analyzed the heterogeneity of enterprises, and made a deeper research on the bank loan strategy from the perspective of self-employed and company. In terms of specific credit strategies, from the perspective of individuals and companies, we found that self-employed persons tend to show a greater probability of default in the face of sudden factors such as pandemic. So banks can reduce the amount of loans to self-employed persons or increase their loan interest rates if they only focus on profitability. But as an important part of social economy, self-employed persons often need more financial support when facing the impact of sudden market factors. So the basic loan strategy should be used as usual, but it is necessary to adjust when there are special situations.

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