

A New Model System of Optimal Revenue and Rating Classification Based on Credit Strategy

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Abstract: According to the credit, scale, strength and other indicators of different enterprises, banks comprehensively judge whether they want to lend to enterprises, the amount of loan, interest rate and term. Small, medium and micro enterprises occupy a large scale in the market. How to analyze the credit risk of small, medium and micro enterprises and get the optimal credit strategy? In this paper, a new model system is established, which is called “optimal revenue and rating classification”. The “optimal revenue” is the optimal revenue risk model, and the “credit rating” is the credit rating classification model. This paper analyzes eight indicators of credit risk, uses *Python* to quantify the data, imports them into *Matlab* for grey correlation analysis, and normalizes the results. Analyze and explain the standardized data, get the reciprocal weight of each enterprise credit risk, establish the optimal income risk model according to the principle of high income and low risk, solve the model with *Matlab*, and get the optimal annual interest rate for each enterprise. According to the different credit rating of enterprises, combined with the risk index to determine the credit line formula.

1. Introduction

The premise of bank lending to enterprises is to get high profit and low risk. Small and medium-sized and micro enterprises occupy a large part of the enterprises in China, but the scale of these enterprises is relatively small, and there are differences in strength, credit, credit risk, etc. some enterprises have the situation of borrowing but can not afford. Therefore, it is very important for banks to determine whether to lend to enterprises, as well as the lending amount, annual interest rate and other credit strategies. Based on the above problems, this paper defines a new model system: “Optimal Revenue and Rating Classification” system.

“Optimal Revenue and Rating Classification” System:

1. “Optimal Revenue”: the optimal revenue risk model. The goal of this model is to achieve high return and low risk. The expressions of return and risk are standardized, and then given a certain weight to get the credit return risk model for each enterprise. This paper compares and discusses the income risk of different weights, and finds out the enterprise loan interest rate which makes the income risk index optimal. At this time, the interest rate is our optimal result.

2. “Rating Classification”: credit rating classification model. According to the data information of the attachment, the credit rating classification model based on the forest discriminant method is

established, which is applied to the credit rating classification of the enterprises in the attachment in question 2. After the credit rating data is obtained, the credit risk of the enterprises is analyzed and the model is established to solve the problem, and the credit strategy is obtained.

For the loan line, because it is affected by the credit risk, so after analyzing the data, according to the known data, we can get the factors that affect the enterprise credit risk in the table: enterprise scale, transaction rate, average daily profit, number of customers (number of downstream enterprises), number of suppliers (number of upstream enterprises), credit rating, default situation. By using the grey correlation analysis, the correlation between the above factors and the reference series of each company is obtained, and the correlation is analyzed, processed and explained, and the expression of each enterprise's loan line on the bank's annual total credit is obtained. For the loan interest rate, we should achieve the combination of high yield and low risk. Therefore, the optimal income risk model is established (that is, the income is as large as possible, and the risk is as small as possible): the income and risk value are standardized, and then the income and risk are given certain weights, and the credit income risk expression for each enterprise is obtained. The income risk with different weights is compared and discussed, and the enterprise loan interest rate that makes the income risk index optimal is obtained, at this time, the interest rate is the best result.

2. The Establishment of the Model

2.1 Model Analysis

Credit strategy is a collection of methods and means adopted by banks to improve the level of credit services and reduce the rate of non-performing loans in the process of providing loans to those who need funds according to their own development goals and credit management methods. Credit strategy is an integrated system, including the selection of credit customers, the establishment of credit model, the improvement of credit products, the improvement of credit process, and the control of credit risk. In this paper, we analyze from the aspects of selecting credit customers, controlling credit risk and establishing credit model, and give the corresponding strategies.

Choose credit customers, that is, whether to lend. According to the description of the subject and my own understanding, I decide whether to lend according to the credit rating. Considering that all the enterprises with the credit rating of *D* have default experience, if we give them loans, the risk is great. Therefore, in principle, we only provide credit to the enterprises with the credit rating of *A*, *B* and *C*. However, customers with a credit rating of *D* can not be wiped out. Therefore, special discussions will be held on customers with a credit rating of *D*.

Controlling credit risk refers to the quantitative analysis of the influencing factors of credit risk to obtain the loan line provided by banks for enterprises. Through the analysis of the attachment, we get the factors that affect the credit risk: enterprise scale, transaction rate, average daily profit, number of customers (number of downstream enterprises), number of suppliers (number of upstream enterprises), credit rating, default.

The establishment of credit model refers to the bank's credit line and interest rate for each enterprise.

2.2 Quantitative Analysis of Credit Risk

The enterprise scale is reflected by the average daily input amount. It is not difficult to understand that the more the input amount of an enterprise, the larger the scale of the enterprise. The time span of the data of each company given in the table is different. For the convenience of comparison, we consider the enterprise input amount as the average daily input amount. Average daily input amount of company J_i is:

$$J_i = \frac{j_i}{d_i}$$

Attention, J_i is the total input amount of the company, D_i is the total number of days that the input of the i th company spans.

Transaction rate is divided into input transaction rate and output transaction rate. The input transaction rate reflects the reputation of the enterprise to a certain extent, while the output transaction rate reflects the quality of the enterprise's goods to a certain extent. Therefore, the two transaction rates are considered. Sales turnover rate for the third enterprise η_i . Make the total number of sales orders of the enterprise (i.e. the number of invoices issued) S_i . The number of negative invoices is S_{i1} , the number of voided invoices is S_{i2} : Then the turnover rate of sales is:

$$\eta_i = \frac{S_i - 2S_{i1} - S_{i2}}{S_i}$$

The transaction rate of input for the i th enterprise ζ_i . Make the total number of orders (i.e. all invoices issued) of the enterprise input as T_i . Negative invoice number is T_{i1} , the number of voided invoices is T_{i2} , the transaction rate of input is: for average daily profit, S_i represents the average daily profit of the i th enterprise. In China, according to the sales of goods or services, the output tax is calculated according to the specified tax rate, and then the VAT paid when the goods or services are obtained is deducted, that is, the input tax, and the difference is the tax payable by the added part. This calculation method reflects the principle of tax calculation according to the value-added factors [2]. For enterprises, the output tax is borne by consumers, and the input tax is borne by the enterprise itself, then the total profit of the i th enterprise is s_i :

$$s_i = W_{i1} + W_{i2}$$

Attention, W_{i1} represents the total amount of sales of the third enterprise, W_{i2} is the total amount of input price tax of the third enterprise. Then the average daily profit of the third enterprise is S_i :

$$S_i = \frac{W_{i1} - W_{i2}}{D_i}$$

Attention, D_i represents the total number of days the i th company sold its products.

For the convenience of analysis, it is quantized. As we will conduct grey correlation analysis on the data, the larger the other indicators are, the smaller the credit risk will be, and the higher the credit rating will be. Therefore, the credit rating of A , B , C and D is assigned to 4, 3, 2 and 1 respectively, the non default enterprise is assigned to 1, and the default enterprise is assigned to 0. The credit rating of the i th enterprise is recorded as X_i , and the default of the i th enterprise is recorded as Y_i .

Table 1: Quantitative Analysis of Risk Indicators (part)

| 企业代号 | X_i | Y_i | ζ_i | η_i | J_i | S_i | G_i | K_i |
|------|-------|-------|-----------|----------|----------|----------|-------|-------|
| E1 | 4 | 1 | 0.9029 | 0.916 | 6098414 | -2854716 | 436 | 352 |
| E2 | 4 | 1 | 0.9679 | 0.8615 | 136155.9 | 384518.6 | 3625 | 1579 |
| ... | | ... | ... | ... | ... | ... | ... | ... |
| E61 | 3 | 1 | 0.967 | 0.9413 | 751.44 | 14537.78 | 44 | 65 |
| E62 | 3 | 1 | 0.9943 | 0.6575 | 1083.96 | 7488.02 | 148 | 27 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... |
| E123 | 1 | 0 | 1 | 0.5077 | 1.08 | 197.62 | 2 | 5 |

3. Conclusion

According to the credit, scale, strength and other indicators of different enterprises, banks comprehensively judge whether they want to lend to enterprises, the amount of loan, interest rate and term. Small, medium and micro enterprises occupy a large scale in the market. How to analyze the credit risk of small, medium and micro enterprises and get the optimal credit strategy? In this paper, a new model system is established, which is called “optimal revenue and rating classification system”. The “optimal revenue” is the optimal revenue risk model, and the “rating classification” is the credit rating classification model.

The number of enterprises is large, and the situation of different enterprises is different. This paper first selects the indicators of credit risk for quantitative analysis, and skillfully uses the data obtained from the gray correlation analysis for standardized processing, so as to represent the weight of bank loans to different enterprises. However, the enterprise scale index in credit risk analysis considers the average daily total input, which is not comprehensive enough, and does not take into account the simultaneous occurrence of a variety of unexpected factors.

References

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