Computational Models to Evaluate Risks of Loans by Online Financial Supply Chains

Qinghua Fu

Economic and Management School, Wuhan University, China.

Abstract – In this paper we deal with developing and evaluating computational models to assess the risks involved in personal loans provided online through financial supply chains. We test our system by using real data of past loans. The data sets were collected from investment archives of financial network operators with a total of 70 personal loans application records. The first 65 records were used to determine the parameters of the risk assessment models and the last five records were used for prediction of the outcome data, which shows good agreement with the supplied actual data.

Keywords - Transaction cost supply chain, Data Processing, Evaluation Model, Mathematical Model.

I. INTRODUCTION

We use back propagation method from artificial neural networks to determine the supply chain quality from the several inputs such as age, education, marriage, housing, career and violation. Numerical methods were used by different research communities in different contexts, which were discovered and rediscovered, until in 1985 it found its way into connectionist research in computational science. Comprehensive evaluation of artificial neural network is intended to establish closer to human thinking mode of qualitative and quantitative selection model, through the sample of pattern of learning, acquiring knowledge evaluation from experts, experience, subjective judgment and a tendency to target the importance of when to make a comprehensive evaluation of the supplier.

II. LITERATURE REFERENCES

Shidler adopts a computerized system creating and pricing synthetic supply chain products (Bauman et al., 2008). Huang and Huang draw the conclusion by adjusting each models consistent with data on the historical default loss experience that there is robust across structural models (Huang & Huang, 2012). Forsythe finds out the obstacles for the consumers’ reluctance to purchase online (Forsythe & Shi, 2003). Atiya reviews the bankruptcy prediction using neural network models (Atiya, 2001). Jimenez, Ongena, Peydro and Saurina identify the effects of monetary policy analyzing the granting of loan applications from the concurrent changes (Jimenez, Ongena, Peydró, & Saurina, 2014). Altman, Resti and Sironi develop the supply chain risk models treating the RR and its relationship with PD (Altman, Resti, & Sironi, 2004). Andersson, Mausser, Rosen and Uryasev examine a new method for supply chain risk optimization (Andersson, Mausser, Rosen, & Uryasev, 2001). Jarrow and Turnbull discuss the two approaches to pricing supply chain risky instruments (Jarrow & Turnbull, 2000). Allen and Carletti prove the relationship between the two sectors under the uniform demand banks face for liquidity (Allen & Carletti, 2006). He and Xiong show the conflicts between the liquidity premium and default premium (He & Xiong, 2012).

III. ORGANIZATION OF THE TEXT

PPDai, Peer-to-Peer lending system in China, was established in June 2007 and called “Shanghai Financial Information Service Co., Ltd.”. It is headquartered in Shanghai international financial center as China’s first Transaction cost network supply chain lending platform. PPDai is also the first special approval platform by the Department of Industry and Commerce and obtained financial information services qualification. The data are collected from the investment area, most of which are from the area of network operators with a total of 70 personal loan application records. The first 65 records from the model prediction examine the application of the neural networks and the last five records are for prediction which shows good result. The transfer function and error function are as follows:

Threshold transfer function:
\[ f(u) = \begin{cases} 1, & u \geq 0 \\ 0, & u < 0 \end{cases} \]  \hspace{1cm} (1)

Piecewise transfer function:
\[ f(u) = \begin{cases} 1, & u \geq 1 \\ au + b, & -1 < u < 1 \\ 0, & u \leq -1 \end{cases} \]  \hspace{1cm} (2)

Sigmoid transfer function:
\[ f(u) = \frac{1}{1 + e^{-au}} = \begin{cases} 1, & a \rightarrow +\infty \\ 0, & a \rightarrow -\infty \end{cases} \]  \hspace{1cm} (3)
Error function, \( d_i(n) \) refers to the expected output of
neuro \( i \) while \( O_i(n) \) the actual output of neuro \( i \) at time \( n \).

\[
E_i(n) = d_i(n) + O_i(n) \tag{4}
\]

The last five prediction turns out to be well fit for the
actual output, most of which are 0.4 (with the actual output
0.5) and 0.9 (with the actual output 0.8). Assessment of the
risk of lending money online platform and the radial BP
neural network model based on the proposed network, etc.,
will be the new direction of research in artificial neural
network model. Evaluation method based on neural
networks cannot be replaced by other evaluation methods
such as AHP, Fuzzy comprehensive evaluation and so on
because learning neural network training sample model
evaluation method needs resulting from the results of these
methods. When evaluating condition changes (such as
changes in the evaluation index system) the prediction
must also be obtained by means of traditional methods of
training samples of neural network models.

### IV. THE POLITICAL TRANSACTION COST IN THE
INDUSTRIAL CLUSTER

The amount of the political transaction cost itself is not
determined by firm autonomously, but in the cluster exist
large number of similar firms and they take the
responsibilities of supervising, maintaining and altering the
industrial cluster’s formal and informal political
organization expense and operation expense together,
including the cost of building and maintaining the
infrastructures of the area where the industrial cluster located
in, the cost of building and maintaining related regulation
institutions, etc. The political transaction cost share taken by
each firm varies inversely with the number \( N \) of firms.

\[
T_p = \frac{C_p}{N} \tag{5}
\]
CP in the formula is the total political transaction cost in the cluster. In the industrial cluster there exist many firms that produce homogeneous or similar production and the necessary infrastructure and equipments of these firms are the same or can be generally used. On the one hand, sharing these infrastructures together can effectively reduce the political transaction cost; on the other hand, it can sharply reduce the input of special asset and then reduce the possible sunk cost. As to \( y=nb \), when \( b \) is a constant and \( n \) is a variable, \( y \) is the reduced function about \( n \). Thus, \( T_0 \) also is the reduced function about \( n \). Then with the increasing of the transaction number \( n \), the endogenous transaction cost during the transaction process of the firms in the cluster will gradually decrease. At the same time, in the case that \( b<0 \), the smaller \( b \) is, the higher the inclination of the Graphic \( y=nb \) is (see Figure 2, \( b_1<b_2 \)), the more fast the endogenous transaction cost during transaction process in the cluster descends.

Descent rate \( f(\rho) \) is the increased function about the degree \( \rho \) of information sharing inside the cluster, thus \( b \) is the reduced function about \( \rho \) and \( b<0 \). Therefore, the faster information spread and the higher the degree of information sharing is, the smaller \( b \) is and the more fast the endogenous transaction cost during transaction process in the cluster descends. \( P_0 \) is the probability of occurrence of opportunistic behaviors during the transaction process in the cluster. Thus, how to reduce transaction cost is a significant issue in the development of the entire industrial cluster. The government plays a vital role in reducing the transaction cost in the industrial cluster.

1. Perfect the network system in the industrial cluster. The government should actively introduce all kinds of intermediary agencies to perfect the network system in the industrial cluster and reduce transaction cost. For instance, the education and training agencies can help firms reduce the management transaction cost by improving employees’ abilities and management.

2. Build an efficient and transparent information platform. The efficient and transparent information platform contributes to reducing information-seeking cost by helping firms promptly obtain technical information, trade information, and demand information inside and outside cluster.

3. Actively promote the system construction in the industrial cluster. The government should perfect the formal system (laws and regulations) to the largest extent, fulfill the duty of supervision, restrain illegal actions during the transaction process and create a fair competition environment. The healthy and positive informal system (elements of morality, custom, etc.) and perfect formal system are beneficial for the establishment of trust and the standardization of cooperation. The trust between firms can reduce the complication and uncertainty of the organizations in the clusters, make it easier to build cooperation relation with each other, restrain the opportunistic behavior in transaction and thus reduce the endogenous transaction cost to a large degree.

VI. CONCLUSION

The private banks should focus on supporting small and micro enterprises, but based on the nature of the bank’s lending for the purpose of profit, small and micro enterprise lending and repayment capacity is much higher than the risk of large-scale enterprise. Recommendations are given that there should be timely and effective measures to drop risky loans, strengthen loan management, establish hierarchical, strict supply chain access. Not only based a single indicator of some enterprises, but also there should be assessment according to the financial situation of enterprise multidimensional indicators of the impact of the financial
situation, so the key steps and difficulty of these methods are to identify and assess the model selection index system, such as statistical methods, expert system and neural network technology.

REFERENCES