Financial logistics risk assessment and management based on the warehouse receipt pledge

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ABSTRACT

Warehouse receipt pledge is more mature business model in China's financial logistics area，it can be a good solution to small and medium-sized enterprises in financing and loan. Through the risk analysis of warehouse receipt pledge and the third party logistics, a level 3 risk index system is established. Selecting fuzzy evaluation method to establish a evaluation model of warehouse receipt pledge for there are quantitative and qualitative indicators in this system, and according to the actual cases of China shipping logistics, gives the right of the index system by busing Delphi method, then evaluates the risk by that model, finally finds the risk level of the case is safer, that can provide a scientific basis for enterprise decision.

Keywords: financial logistics, warehouse receipt pledge, index system of risk, evaluation model
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INTRODUCTION

A production of combine financial with logistics business, financial Logistics is a new direction of modern logistics industry. With the development of modern logistics, financial logistics slowly being accepted by the people, as a new concept, beyond the purely financial service between financial company and logistics industry, greatly improving the overall efficiency of the two. Warehouse receipt pledge as a classic business model of financial logistics, to solve the difficult problem of financing for small and medium-sized enterprises, as a new product, despite is developed promptly, but lacks standard and has some risk. In order to make the logistics business, customer, and financial institution can achieve win-win and get the maximum effectiveness, business risk identification and management is must be studied and discussed.

China researchers began discussion from1997 about the issue of the warehouse receipt pledge, the definition of "logistics finance" was proposed at that time [1]. In the article of risk management analysis of warehouse receipt pledge, based on the risk analysis put forward the corresponding preventive measures, it summarized the risk of warehouse receipt pledge as: selection risk of chattel pledge, credit risk, warehouse receipt risk, legal risk, internal management and operational risk [2]. Foreign researchers in financial logistics are mainly European and American scholars, the Commercial Finance Association(CFA) provided a summary report of seminar feeds about inventory financing, it included the common inventory financing types that used by CFA members, promoting countermeasures about financing inventory was proposed[3]. Don P. Holdren and Craig A. Hollingshead conjunction inventory control problem with company's financial management and commercial lending, proposed inventory management methods would affect the enterprise operation cost of capital; commercial loan officer could determine the financing risk and benefit depending on different types of inventory [4].

MATERIALS AND METHODS

A.   Definition and risk classification of warehouse receipt pledge

Warehouse receipt pledge refers to financing company store their goods which have full ownership on the logistics center specified financial institution, and pledges warehouse receipt issued by the logistics enterprises in financial institution as security for financing, financial institution provides short-term special trade financing business according to warehouse receipt. Warehouse receipt established have legal effect and can circulate in the market, the subject matter in principle is given priority to with real estate, but not limited to, the law allows some personal property such as vehicles, so pledged subject matter is usually real estate or right.

As a new business, warehouse receipt pledge is facing different risk with financing business, there are many risk in carrying out warehouse receipt pledge due to human factors, process factors, external event factors, the risk may be faced by the pledge of warehouse receipt attributed to the following eight categories [5]: internal risk management, operational risk, technology risk, market risk, security risk, environmental risk, legal risk, credit risk and so on.

B.   The third-party logistics risk analysis

The third-party logistics is the core of financial logistics business, bears the main risk. Bank is not involved in specific operations, risk borne also can be transferred to third-party logistics cooperation through agreements, so the risk to evaluate for the agent-based financial logistics, to a certain extent, the third-party logistics perspective must be selected to the analysis [6].The main risk in warehouse receipt pledge exists in the process that warehouse receipt issued, credit review, assessment, the pledge of warehouse and so on. For the enterprise, risk mainly concentrates on customer credit, choose the pledge of goods, regulatory technical and internal operation and management.

C.   Establish the risk index system of warehouse receipt pledge

Warehouse receipt pledge is relative complexity because of it has many associate with logistics, finance companies, it is necessary to determine the risk evaluation to consider not only the interest of all companies, but also the mutual restraint between enterprises, the selection of indicators need really react the overall business risk, and can not have too much interaction between the indicators. Combined research scholars and third-party logistics research, sure to select the evaluation index from four aspects which are customer credit risk, pledge goods risk, supervision technology risk, internal management and operational risk[7] [8], table 1 is the risk index system of the warehouse receipt pledge established.

TABLE1. THE RISK INDEX SYSTEM OF THE WAREHOUSE RECEIPT PLEDGE

customer credit risk U1	The operation capability of financing enterprise U11
	The profitability capability of financing enterprise U12
	The Debt paying ability of financing enterprise U13
	The credit record of financing enterprise U14
pledge goods risk U2	Pledge goods choice U21
	The market price stability of the pledge goods U22
	Legal rights and ownership of the pledge goods U23
supervision technology risk U3	Warehouse receipt pledge supervision system technology U31
	To evaluate the pledge goods technology U32
	Warehouse receipt pledge information system technology U33
internal management and operational risk U4	Logistics enterprise staff quality U41
	Logistics enterprise safety management system and facilities U42
	Related experience in business U43

D. The risk assessment model of warehouse receipt pledge

Logistics enterprises to participate in the warehouse pledge business is affected by many factors, it can be seen from Table 1, evaluation system contains qualitative indicators, such as logistics enterprise staff quality and related experience in business, as well as a large number of quantitative indicators, for instance the operation capability of financing enterprise, the profitability capability of financing enterprise. For such complex evaluation system, select fuzzy comprehensive evaluation method to establish the warehouse receipt pledge risk assessment model, as follows:

● Step1: Give the choice object and warehouse receipt pledge business data;
● Step2: To determine the index set, the index set as: U= {U1, U2,... , Un}. Among them, U1={U11，U12，…，U1n}，U2= {U21，U22，…，U2n}，Un ={Un1，Un2，…，Unn}, ensure   each factor is separate according to the level;
● Step3: To determine the weight of each index factor.

● Step4: Give the factor level reviews V={v1，v2，···，vm}, which is divided into m level;
● Step5: According to the indicators of index set U, single factor evaluation matrix R can be constructed reference Rank V for every factor;

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \vdots & \vdots & & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nm} \end{bmatrix}$$

● Step6: Find comprehensive evaluation matrix B.

$$B = V \cdot R = \begin{bmatrix} v_1 & v_2 & \cdots & v_n \end{bmatrix} \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \vdots & \vdots & & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nm} \end{bmatrix}$$

The calculation of integrated matrix is the risk assessment result of warehouse receipts pledge business [9].

I. Risk assessment of warehouse pledge for China shipping logistics
China shipping Logistics is based on the comprehensive needs of customers in the financial and supply chain, and union bank, state-owned enterprises and other financial institutions to provide integrated logistics service, to build customer, financial institution, trade supplier of all kinds of logistics participation, cooperation and win-win and common development, "Finance-supply Chain" converged multi-service platform, now has signed a "general total" agreement with Industrial and Commercial Bank of China, Bank of China, China Construction Bank, Bank of Communications and other 16 state-owned commercial banks, joint-stock commercial banks, city commercial Bank.

A. Warehouse receipt pledge business background
1) Business person
Pledgee: Qingdao branch of the China citic bank Chengyang branch (hereinafter referred to as "CITIC Bank")

Pledgor: Qingdao AB stevia sugar hi-tech co., LTD (hereinafter referred to as "Qingdao AB")

Supervisor: China Shipping Shandong Logistics Co., Ltd. (hereinafter referred to as "China shipping logistics")

2) Regulatory approach
According to the bank line of credit, financing company pledges entire warehouse goods to CITIC Bank, China Shipping Logistics seals warehouse, financing company is not allowed out of the library if have no the bank's outbound instruction in writing.

B. Determine index weight coefficient
Index weighting coefficient and the level of risk assessment are obtained by using the Delphi method and survey employee who long-term management and operation warehouse receipt pledge business in China shipping logistics [10], as shown in table 2.

TABLE 2. INDEX WEIGHT COEFFICIENT TABLE

Risk Index	Customer credit risk U1 0.25	Pledge goods risk U2 0.45	Supervision technology risk U3 0.15	Internal management and operational risk U4 0.15	Evaluation results
U11	0.15				0.0375
U12	0.25				0.0625
U13	0.45				0.1125
U14	0.15				0.0375
U21		0.25			0.1125
U22		0.55			0.2475
U23		0.20			0.0900
U31			0.55		0.0825
U32			0.25		0.0375
U33			0.20		0.0300
U41				0.25	0.0375
U42				0.60	0.0900
U43				0.15	0.0225

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C. Risk assessment of warehouse receipt pledge

The evaluation index weight set derived from table 2, W = {0.25 0.45 0.15 0.15}, w1 = {0.15 0.25 0.45 0.15}, w2 = {0.25 0.55 0.2}, w3 = {0.55 0.25 0.2}, w4 = {0.25 0.6 0.15}, according to the fuzzy comprehensive evaluation method, establish risk assessment grade V, V = {low V1, lower V2, general V3, higher V4, the highest V5}. Evaluation index weight and risk level are determined through survey employee of China shipping logistics, establish evaluation matrix R1, R2, R3, R4.

$$R1 = \begin{bmatrix} 0.5 & 0.4 & 0 & 0.1 & 0 \\ 0.6 & 0.3 & 0 & 0 & 0.1 \\ 0.4 & 0.4 & 0.1 & 0.1 & 0 \\ 0.8 & 0.1 & 0.1 & 0 & 0 \end{bmatrix} \qquad R_2 = \begin{bmatrix} 0.7 & 0.2 & 0 & 0.1 & 0 \\ 0.4 & 0.3 & 0 & 0.1 & 0.2 \\ 0.9 & 0 & 0.1 & 0 & 0 \end{bmatrix}$$

$$R_3 = \begin{bmatrix} 0.2 & 0.1 & 0.5 & 0.2 & 0 \\ 0.2 & 0.1 & 0.4 & 0.1 & 0.2 \\ 0.6 & 0.2 & 0 & 0.2 & 0 \end{bmatrix} \qquad R4 = \begin{bmatrix} 0.7 & 0 & 0.1 & 0.2 & 0 \\ 0.1 & 0.2 & 0.4 & 0.2 & 0.1 \\ 0.8 & 0 & 0.2 & 0 & 0 \end{bmatrix}$$

Then seek a comprehensive evaluation matrix

$B_1 = W_1 \cdot R_1$

$$= \begin{bmatrix} 0.15 & 0.25 & 0.45 & 0.15 \end{bmatrix} \cdot \begin{bmatrix} 0.5 & 0.4 & 0 & 0.1 & 0 \\ 0.6 & 0.3 & 0 & 0 & 0.1 \\ 0.4 & 0.4 & 0.1 & 0.1 & 0 \\ 0.8 & 0.1 & 0.1 & 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0.525 & 0.33 & 0.06 & 0.06 & 0.025 \end{bmatrix}$$

$B_2 = W_2 \cdot R_2$

$$= \begin{bmatrix} 0.25 & 0.55 & 0.2 \end{bmatrix} \begin{bmatrix} 0.7 & 0.2 & 0 & 0.1 & 0 \\ 0.4 & 0.3 & 0 & 0.1 & 0.2 \\ 0.9 & 0 & 0.1 & 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0.575 & 0.215 & 0.02 & 0.08 & 0.11 \end{bmatrix}$$

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$$R = \begin{bmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{bmatrix} = \begin{bmatrix} 0.525 & 0.33 & 0.06 & 0.06 & 0.025 \\ 0.575 & 0.215 & 0.02 & 0.08 & 0.11 \\ 0.28 & 0.12 & 0.375 & 0.175 & 0.05 \\ 0.355 & 0.12 & 0.295 & 0.17 & 0.06 \end{bmatrix}$$

$B = W \cdot R$

$$= \begin{bmatrix} 0.25 & 0.45 & 0.15 & 0.15 \end{bmatrix} \begin{bmatrix} 0.525 & 0.33 & 0.06 & 0.06 & 0.025 \\ 0.575 & 0.215 & 0.02 & 0.08 & 0.11 \\ 0.28 & 0.12 & 0.375 & 0.175 & 0.05 \\ 0.355 & 0.12 & 0.295 & 0.17 & 0.06 \end{bmatrix}$$

$$= \begin{bmatrix} 0.48525 & 0.21525 & 0.1245 & 0.10275 & 0.07225 \end{bmatrix}$$

Definition a risk assessment grade V, V = {Low V1, lower V2, general V3, higher V4, the highest V5}, assignment processing, that V = {9 8 5 3 2}. Q value calculated in table 3 can be divided into five risk level.

TABLE 3. THE RESULT OF RISK ASSESSMENT

The result of risk assessment	Safe	Safer	General	More dangerous	Most dangerous
Q value	8-9	7-8	5-7	3-5	2-3

For the above risk assessment of warehouse receipt pledge, there are

$$Q = \sum_{i=1}^{5} B_i \cdot V_i$$

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=0.48525×9＋0.21525×8＋0.1245×5＋0.10275×3＋0.07225×2=7.1645

Assessment Q∈ [7,8], so risk level of warehouse pledge business between China shipping logistics and Qingdao AB are relatively safe.

CONCLUSION

Financial Logistics provides a good platform to closer cooperation among financial institution, supply chain enterprise and the third-party logistics service, through the risk evaluation of warehouse receipt pledge business process and risk analysis in operation process, we can draw following conclusion:

a) The warehouse receipt pledge in our country carry out a short time, but it attracts a large number of logistics companies, and become a new growth point of profit for them.

b) The development of small and medium-sized enterprises rapidly, thus the the emergence of financial crisis, financing for these enterprises are more difficult because of the credit and scale, receipt pledge business bring new vitality to these enterprises.

c) With the development of warehouse receipt pledge in China, logistic company and financial institution will continue to deepen, so as to promote the comprehensive development of financial logistics, the logistics industry will be more walk more far.

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