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Research on Credit Default Swap Risk Mitigationbased on Logistics Finance

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***ABSTRACT*:** *When considering financial institutions such as banks in the logistics finance to provide financing services for small and medium-sized enterprises, most of the risks are borne by themselves, and this paper constructed a risk transfer model based on financial institutions such as insurance companies and core enterprises or logistics enterprises. Mathematical modeling is used to solve the optimal compensation rate of banks when purchasing credit default swaps (CDS) or reverse credit default swaps (RCDS). The result shows that: the participating entities in logistics finance tend to participate in the CDS model in order to maximize the benefits, and the banks are willing to purchase their products.*

Keywords: *Credit default swaps (CDS); Reverse credit default swaps (RCDS); Logistics finance; Risk mitigation*

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I. INTRODUCTION:

Logistics finance(Tang and Ma2014) is the product of mutual integration with financial links generated by the survival and development needs of enterprises in the development process of China's logistics industry.Its coreessence is to coordinate the logistics, information flow, commercial flow and capital flow in the supply chain, alleviate the financing difficulties of SMEs, and promote the development of the real economy.Its main business models are warehouse bill pledge financing, chattel pledge financing, payment collection and credit financing(Hofmann,2009). Gelsomino et al. (2016) note that although logistics finance can solve the financing bottleneck of many SMEs, risk control,as the core problem of logistics finance, has always troubled commercial Banks and other financial institutions.The "treasure island" case in 2018 brought irretrievable economic losses to financial institutions and Banks, which also exposed the shortcomings of credit risk control in the field of logistics and finance.Logistics finance as an important tool to help the development of SMEs. In the process of development, due to the imperfect legal system, the imperfect ecological system, the good and bad of the participants and other reasons, some enterprises take advantage of the opportunity to enter. The frequent occurrence of malicious fraudulent loans and credit risks has brought negative impacts to the whole logistics and financial industry(Song et al.2014).In this study,the risk release function of credit default swap is applied to logistics finance innovatively, and its risk release effect is verified by modeling method.

The rest of the paper is designed as follows. Section 2 discusses t previous literature relevant to the topic. The next section discusses about the problems and assumptions regarding the selected topic. Section 4 constructs the different models according to the decisions. Section 5 presents the results of the analysis of thisdifferentmodelsand the final section provides the conclusion of the present study along with references.

II. LITERATUREREVIEW:

2.1Credit Risk in Logistics Finance

The credit risk of logistics finance refers to the phenomenon that financing enterprises are unable or unwilling to repay due to their own subjective factors or objective factors in the external environment, which brings financial losses to financial institutions and commercial Banks(Mehdi et al.2016).The fundamental cause of credit risk is the information asymmetry between financing enterprises and Banks(Zhang and Ma 2017).On the one hand, as non-direct participants in logistics finance, it is difficult for Banks to integrate into logistics finance, and they can only make credit judgments on financing enterprises based on the information provided by the third party institutions such as credit investigation links and core enterprises.On the other hand, information between financial institutions such as Banks and logistics regulatory enterprises is still not transparent, and logistics regulatory enterprises lack regulatory impetus.

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2.2Credit Default Swap

In terms of managing credit risk, many scholars recognize the role of credit default swaps. JP Morgan first proposed the concept of credit default swap (CDS), aiming to separate the credit risk problems in the financing process from commercial Banks and other financial institutions, so as to innovate the ways and means of risk control and realize the market transaction and liquidity of risks.Criado and Rixtel(2008)thought that CDS can effectively reduce the probability of default events. Chang and Luo (2017)also revealed that Credit default swaps have the function of the separation trade risk. A system of ordinary differential equations is constructed to solve the value of contingent claims and premium payments on credit default swaps by Wang et al.(2010) revealed that CDS premium rates and CDS values also differ between bond classes, thus managing credit risk. Chen et al. (2017) distinguishedthe risk contagion mechanism of CDS counterparties from different perspectives, on the basis of CDS innovation mechanism and trading mechanism. The result of the study revealed that information asymmetry and complexity of participants in CDS caused the risk of contagion. In addition, Reverse credit default swaps were first proposed by Pang(2016).And the core of reverse credit default swap is to control the source of risk so as to reduce its default risk. In reverse credit default swap, the seller is the manager of the financing enterprise, and the manager of the financing enterprise plays a restraining role on the loan enterprise in the name of insulation, reducing the information asymmetry in the bank financing process and improving the repayment willingness of the financing enterprise. Many scholars believe that it is necessary for CDS to change the financing mix and optimize the financing effect. However, there are few systematic studies on the effectiveness verification of credit default swaps.

2.3Credit Risk Mitigation

Risk mitigation refers to the process of using certain technical means and corresponding risk management methods to reduce the probability of risk occurrence and reduce the risk loss (Chu and Xu,2011). At present, the main method of mitigating credit risk in logistics finance is to strictly control the warehouse receipt and movable property of small and medium-sized enterprises. These measures include the use of technological means such as Internet of things, core enterprise credit to increase credit or provide repurchase guarantee for SMEs, credit evaluation and credit prevention mechanism(Deng,2018;Zhang and Wang,2015;Song and Yang,2018). Although these three methods have played a certain role in the release of credit risk, what they have in common is the lack of liquidity of risk. Under this kind of prevention mechanism, Banks are still in the state of self-retained risk and it is difficult to truly avoid the harm of credit risk to Banks(John et al.2004).Therefore, the three existing mainstream methods above are more passive and cannot really solve the harm of credit risk.

III. THE PROBLEMDESCRIPTION AND ASSUMPTION:

3.1Problems description

Information asymmetry is the main cause of financing difficulties for SMEs(Berger et al.2006;Lu et al.2019;Song and Lu,2017). In order to alleviate the financing difficulty of small and medium-sized enterprises, this paper, from the perspective of Banks and other investors, applies CDS to the logistics financial business, reduces the self-retention risk of Banks, helps Banks and other investors to release the risk, and improves the willingness of Banks to provide loans to small and medium-sized enterprises. In addition, this article also on the basis of the CDS extension RCDS, with core enterprise or logistics enterprises as the main body, further study of its risk slow-release effect so as to reduce the information asymmetry of small and medium-sized enterprise financing difficulties, give full play to the role of the incentive of logistics enterprises, to alleviate and avoid the logistics financial credit risk guidance of theory and practice, to further promote the small and medium-sized enterprise financing, promoting the development of the real economy.

3.2 Assumptions

According to the comparison of expected returns of Banks when they do not buy CDS, buy CDS and buy RCDS, the differences of default probability of financing enterprises under several different trading models are compared, and the optimal compensation rate and optimal default probability decisions of Banks are given respectively. In order to facilitate the analysis and research and effectively combine the actual situation, this paper makes the following assumptions and symbol definitions of the relevant situations in logistics finance:

(1) Suppose the loan amount of SMEs is$L$ and the loan interest rate is$r$.

(2) The level of supervision efforts of logistics enterprises and core enterprises is w. The probability of SMEs defaulting is $\beta_i(w).i\epsilon(n,e,f),\beta_i(w) = -aw^2 + \beta_0(a > 0,\beta_i > 0)$,which used to describe the feature of the diminishing margin of w for the values of $\beta_i(w)$. That is, the higher the level of regulatory efforts of the core enterprises or logistics enterprises, the lower the probability of default of SMEs.

(3)Assuming that insurance companies and other financial institutions participate in CDS, the supervision efforts of logistics enterprises or core enterprises are 0%, and the default probability of SMEs is equal toβ_n.That is β_0.When logistics enterprises and core enterprises participate in RCDS, in this case, logistics enterprises or core

enterprises have supervision efforts, and the default probability of financing enterprises is denoted as β_f.
(4)Assuming that the recovery rate of bank loans will beδafter SMEs default(assuming that the capital recovery rate and mortgage rate are consistent, the higher the mortgage rate, the higher the recovery rate).
(5)Suppose the default loss compensation rate of the credit protection seller against the bank isσ.
(6)Assuming that insurance companies and other financial institutions participate in CDS, the fixed rate that Banks pay to sellers of credit protection is β_n , $\theta = 1/2\,k\sigma^2$, $(k > 0)$, which is used to describe the marginal increasing characteristics ofθoverσ.The higher the default compensation rate, the higher the fixed rate paid. When logistics enterprises and core enterprises participate in RCDS, the fixed rate paid by the bank to the seller of credit protection is$\theta = 1/2\,(\beta_0 - \beta_f)^2$, $(s > 0)$ which is used to describe the marginal diminishing characteristics of fixed rateθ with respect to β_f. The lower the β_f the higher the fixed rate θpaid by the bank.
(7)Assume that Banks expected return for $\Pi(N)$
(8)Assumptions in the model for RCDS, core enterprises earnings as$\Pi(C)$, sales revenue for Q.
(9)Assuming that logistics enterprises or core enterprises earnings for$\Pi(3PL)$, P_1, P_2 represents the benefits of monitoring, evaluating services and logistics services, respectively.

IV. MODEL CONSTRUCTION IN DIFFERENT DECISION-MAKING ENVIRONMENTS:

4.1 CDS decision-making model involving insurance companies and other financial institutions

Insurance companies and other financial institutions involved in CDS, assumes that the bank did not have CDS contracts. At this time, the bank's earnings $\Pi(C)$ contains two parts: small and medium-sized enterprises (SMEs) there is no defaultloan proceeds, small and medium enterprises loan losses, which can be expressed as:

$$\mathrm{Max}\Pi(N) = (1-\beta_0)rL - \beta_0(1-\delta)L \quad (1)$$

Assume that Banks have CDS contracts, the expected return of the bank $\Pi(C)$ contains four parts: SMEs there is no default of the loan proceeds, Banks pay credit protection seller's insurance premium, SMEs' loan losses when default, the compensation fees from the seller for SMEs default,which can be expressed as

$$\mathrm{Max}\Pi(E) = (1-\beta_0)rL - 1/2k\sigma^2 - \beta_0(1-\delta)L + \sigma\beta_0(1-\delta)L \quad (2)$$

Proposition 1 In the traditional logistics financial model, there is information asymmetry between Banks and SMEs, and the supervision level of logistics enterprises is 0%. SMEs will exaggerate their assets and operation information to get more loans and lower mortgage rate.

Prove Put $w$equals 0 into$\beta_i(w) = -aw^2 + \beta_0, \beta_i(0) = \beta_0$.Therefore, β_0 is denoted as the initial default probability of the financing enterprise. According to the hypothesis, $L$is negatively correlated with β_0 , and the mortgage rate is positively correlated withβ_0.The lower $\beta_0$is, the larger the loan$L$available for financing of SMEs is, and the lower the mortgage rate is. Therefore, SMEs will exaggerate their assets and other information to increase their own earnings. Sothe proposition is proved.

As can be seen from proposition 1, in order to obtain bank loans, SMEs may conceal their own bad information during the financing process, thus causing the Banks to make mistakes in the credit evaluation of SMEs. In a competitive market, the expected income of Banks will not exceed a fixed amount, and the failure of credit evaluation of SMEs will reduce the expected income of Banks or even be negative. As a result, Banks are conservative about risk and refuse to lend to undercapitalized SMEs.

Proposition 2 When Banks to carry out the logistics financial business ,the decision to buy CDS allows the bank to be compensated by credit-protection sellers of the SMEs default .At this time ,banks are willing to provide loans to finance enterprise,because the expected return to the bank is always greater than the expected return if the bank does not buy the CDS.

Prove The expected return when the bank purchases CDS minus the expected return when the bank does not buy CDS is denoted as D_1, then D_1 is equal to equation (2) minus equation (1), that is:

$$D_I = \mathrm{Max}\Pi(E) - \mathrm{Max}\Pi(N) = -\frac{1}{2}\sigma^2 kL + \sigma\beta_0(1-\delta)L \quad (3)$$

Based on the leverage characteristics of CDS, Banks pay less for insurance than investors such as insurance companies. In other words, the expected return on the bank's decision to buy CDS is always greater than 0. Therefore $D_1 > 0$.
Proposition is proved.

According to propositions 1 and 2, from the perspective of Banks, CDS improves their lending enthusiasm to some extent. Even if there is information asymmetry between the bank and SMEs, and SMEs default, the bank can also get a certain proportion of compensation, the default loss reduced, the expected income increased. On this basis, it is easier for SMEs to obtain loan support from Banks. From the perspective of financial institutions such as insurance companies, participating in CDS has two advantages. First, risk sharing. By assuming a certain proportion of risks, financial institutions such as insurance companies reduce the high concentration of credit risks in Banks and disperse credit risks in the financial system. Second, revenue sharing. Participation in CDS increases the investment opportunities of financial institutions such as insurance companies, which can obtain the capital gains in the credit market without paying any cost of capital.

Proposition 3 when the bank carries out logistics finance business,when $\frac{\beta_0(1-\delta)}{\mathrm{k}} > 1$, the bank is in an advantageous position and can obtain 100% compensation. When$\frac{\beta_0(1-\delta)}{\mathrm{k}} \leq 1$, buy insurance company involved in financial institutions, such as CDS, Banks can get the credit protection rate of the seller's optimal compensation$\sigma^* = \frac{\beta_0(1-\delta)}{\mathrm{k}}$, the optimal expected revenue for$\Pi^* = (\mathrm{E})$.

Prove Taking the derivative of the parameter $\sigma$of equation (2), the following is obtained:

$\frac{\mathrm{d}\Pi(\mathrm{E})}{\mathrm{d}(\sigma)} = -\sigma\mathrm{kL} + \beta_0(1-\delta)\mathrm{L}$（4）

Let equation (4) equal to 0, and deduce that:

$\sigma^* = \frac{\beta_0(1-\delta)}{\mathrm{k}}$（5）

Substitute equation (5) into equation (2) to obtain the optimal expected earnings of the bank:

$$\Pi^*(E) = (1-\beta_0)rL - \frac{1}{2}k\left[\frac{\beta_0(1-\delta)}{k}\right]^2 L - \beta_0(1-\delta)L + \frac{\beta_0(1-\delta)}{k}\beta_0(1-\delta)L$$（6）

Simplified:

$$\Pi^*(E) = (1-\beta_0)rL - \beta_0(1-\delta)L + \frac{1}{2}\frac{[\beta_0(1-\delta)]^2}{k}L$$（7）

The original proposition is proved.

According to proposition 3, when$\frac{\beta_0(1-\delta)}{k} > 1$, the payment coefficient $k$is lower than the market value, the bank can get 100% compensation. The optimal compensation rate exists when $\frac{\beta_0(1-\delta)}{k} \leq 1$, divided into the following three conditions: when $0 < \sigma < \frac{\beta_0(1-\delta)}{k}$, the bank can obtain a higher expected gain by increasing the amount of credit θ paid to the seller of credit protection. When $\frac{\beta_0(1-\delta)}{k} < \sigma < 1$, the bank increases the fixed payment rate paid to the seller of credit protection, the expected return of the bank decreases gradually, that isθ.The bank does not get more expected income by increasing the payment rate. When $\sigma = \frac{\beta_0(1-\delta)}{k}$, the optimal expected gain is obtained.

Table I optimal compensation rate and decision of the bank

Parameters of the relationship	Optimal compensation rate	Expected return	Decision
$\frac{\beta_0(1-\delta)}{k} > 1$	100%	$\Pi(E)$	Buying CDS, the transaction cost is low
$0 < \frac{\beta_0(1-\delta)}{k} \leq 1$	σ^*	$\Pi^*(E)$	Getting the best expected return by buying CDS

Lemma 1 The optimal compensation rate of the bank is correlated with σ^* default probability, δrecovery rate, coefficient β_0, and no correlation with the financing rate r. The optimal compensation rate increases with the increase of default probability β_0, and decreases with the increase of capital recovery rate and coefficient k.

Prove Easy to verify:

$$\frac{d\sigma^*}{d(\beta_0)} = \frac{(1-\delta)}{k} > 0, \frac{d\sigma^*}{d(\delta)} = -\frac{\beta_0}{k} < 0, \frac{d\sigma^*}{d(k)} = \frac{-\beta_0(1-\delta)}{k^2} < 0$$

Proposition is proved.

4.2 RCDS decision-making model involving logistics enterprises and core enterprises

When logistics enterprises do not participate in RCDS trading, the benefits obtained from participating in logistics finance can be expressed as:

$Max\Pi(3PL) = P^1 + P^2$(8)

When the core enterprise does not participate in RCDS trading, its income from participating in logistics finance is its income from sales contracts with small and medium-sized enterprises, which can be expressed as

$Max\Pi(C) = Q$ (9)

When the bank owns the RCDS agreement, the expected earnings of the bank can be expressed as

$Max\Pi(F) = (1-\beta_f)rL - \frac{1}{2}s(\beta_0 - \beta_f)^2 L - (1-\delta)L$ (10)

Proposition 4 When Banks carry out logistics financial business and purchase RCDS participated by logistics enterprises or core enterprises, with the increase of supervision efforts of logistics enterprises or core enterprises w, the default probability of SMEs decreases, and Banks are willing to provide loans to SMEs. The bank is willing

to pay the optimal default probability determined during RCDS trading with logistics enterprises and core enterprises$\beta_f{}^* = \beta_0 - \frac{r+(1-\delta)}{s}$. Bank to obtain the optimal expected revenue for$\Pi^*(E)$.

Prove By differentiating the parameter $\beta_f$of equation (10), we can get:

$\frac{d\Pi(F)}{d(\beta_f)} = -rL + s(\beta_0 - \beta_f)L - (1-\delta)L$（11）

Let equation (11) equal to 0, and deduce that:

$\beta_f{}^* = \beta_0 - \frac{r+(1-\delta)}{s}$（12）

According to equation (12),$\frac{r+(1-\delta)}{s} > 0$，therefor $\beta_f{}^* < \beta_0$。It is $0 \le \beta_f{}^* < \beta_0$。

Substitute equation (12) into equation (10) to obtain the optimal expected earnings of the bank:

$\Pi^*(F) =$

$\left(1 - \beta_0 + \frac{r+(1-\delta)}{s}\right) rL - \frac{1}{2} s \left(\frac{r+(1-\delta)}{s}\right)^2 L - \left(\beta_0 - \frac{r+(1-\delta)}{s}\right)(1-\delta)L$（13）

Simplified：

$\Pi^*(F) =$

$(1-\beta_0)rL - \beta_0(1-\delta)L + \frac{1}{2}\frac{[r+(1-\delta)]^2}{s} L$（14）

Proposition is proved.

According to proposition 4, the optimal default probability $\beta_f{}^*$of RCDS is less than β_0.When logistics enterprises and core enterprises participate in RCDS trading, they can really reduce the credit risk caused by information asymmetry between Banks and SMEs. From the perspective of logistics enterprises or core enterprises, in order to pursue the maximization of their own interests, they will strengthen the supervision of SMEs. They give full play to their advantages in information symmetry to SMEs, improving the supervision and constraints on SMES' capital, operation and other information. Besides, they urge SMEs to pay their debts on time, which will eventually reduce the default rate of SMEs. From the perspective of Banks, with the participation of logistics enterprises or core enterprises in RCDS decision-making, the credit risk of SMEs is reduced, and Banks are more willing to pay a certain fee to reduce the default probability of SMEs. Banks are more likely to obtain financing returns than to buy CDS decisions involving financial institutions such as insurance companies. In this respect, Banks are more willing to provide loans to SMEs.

Lemma 2 The optimal default probability $\beta_f{}^*$that a bank is willing to bear is related to the default probability of small and medium-sized enterprises (smes) of β_0, the financing interest rate$r$, the recovery rateδ and the coefficient s.The default probability of small and medium-sized enterprises$\beta_f{}^*$increases with the increase of β_0, capital recovery rateδ and coefficient$s$, and decreases with the increase of financing interest rate$r$.

Prove Easy to verify $\frac{d\beta f^*}{d(\beta_0)} = 1 > 0$，$\frac{d\beta f^*}{d(\delta)} = \frac{1}{s} > 0$，$\frac{d\beta f^*}{d(s)} = \frac{(1-\delta)}{s^2} > 0$，$\frac{d\beta f^*}{dr} = -\frac{1}{s} < 0$。

Proposition is proved.

Proposition 5 from the perspective of supply chain, when Banks carry out logistics financial business, they purchase the RCDS participated by logistics enterprises or core enterprises, which increases the value of the supply chain system. Specifically, it is reflected in the increase of income of logistics enterprises and core enterprises, the reduction of credit risk of small and medium-sized enterprises, and the increase of possibility of interest income of bank loans.

Prove In the case that Banks buy RCDS, the benefits of logistics enterprises participating in logistics finance can be expressed as follows:

$\Pi(3PL) = P^1 + P^2 + \frac{1}{2} s(\beta_0 - \beta_f)^2 L$（15）

Compared with equation (8), that is, the logistics enterprise does not participate in RCDS trading, and the logistics enterprise gains value-added income $\frac{1}{2} s(\beta_0 - \beta_f)^2 L$。

In the case that Banks buy RCDS, the benefits of core enterprises participating in logistics finance can be expressed as follows:

$\Pi(C) = Q + \frac{1}{2} s(\beta_0 - \beta_f)^2 L$（16）

Compared with equation (9), that is, the core enterprise does not participate in RCDS trading, and the core enterprise gains value-added income $\frac{1}{2} s(\beta_0 - \beta_f)^2 L$。

Proposition is proved.

Secondly, according to proposition 4, when Banks buy RCDS, the default probability of small and medium-sized enterprises decreases, that is, the default of small and medium-sized enterprises becomes a small probability event, so the possibility of Banks obtaining loan interest increases.

According to propositions 4 and 5, it can be concluded that the system value of RCDS agreement purchased by Banks is as follows:

First, the bank has the best expected return. To a certain extent, Banks can obtain the best expected returns by purchasing RCDS agreements involving core enterprises or logistics enterprises. Secondly, the credit risk of participants is reduced. In logistics finance, the role of logistics enterprises and core enterprises has changed from passive to active, actively managing and constraining SMEs. Meanwhile, compared with traditional logistics finance, the moral hazard of each participant is reduced under RCDS. Third, the increase in value across the supply chain. The financing difficulty of SMEs is an important factor affecting the integrity of the supply chain. In this model, not only the bank profits, but also the financing of SMEs are helped. From this point of view, the value of the whole supply chain system increases.

V. CDS AND RCDS COMPARATIVE ANALYSIS:

Proposition6 The bank chooses to buy RCDS when$\beta_0 < \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$; When $\beta_0 > \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$, the bank chooses to buy the CDS; When$\beta_0 = \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$, the expected return of the bank when buying RCDS from a logistics enterprise or a core enterprise is equal to the expected return of the bank from a financial institution such as an insurance company. Banks choose to buy CDS or RCDS to get the same expected return.

Prove Equation (14) is subtracted from equation (7) to get:

$$\Pi^*(\mathrm{F}) - \Pi^*(\mathrm{E}) = \frac{1}{2}\frac{[r+(1-\delta)]^2}{s}\mathrm{L} - \frac{1}{2}\frac{\beta_0{}^2(1-\delta)^2}{k}\mathrm{L} \quad (15)$$

Let equation (15) =0, and deduce that:

$$\beta_0 = \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right] \quad (16)$$

Let $\Pi^*(\mathrm{F}) - \Pi^*(\mathrm{E}) > 0$,and deduce that:

$$\beta_0 < \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right] \quad (17)$$

Let $\Pi^*(\mathrm{F}) - \Pi^*(\mathrm{E}) < 0$,and deduce that：

$$\beta_0 > \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right] \quad (18)$$

From proposition 6, it can be seen that the initial default probability of SMEs is the key for Banks to decide whether to buy RCDS or CDS.Of small initial probability of default $\beta_0$below $\sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$, the bank was willing to pay a certain amount. It will be part of the credit risk transfer to logistics enterprises and the core enterprise, therefore, with the help of core enterprise in the logistics enterprises or SMEs default probability reduce decision of optimal probability of default to the bank, the bank to obtain the optimal expected profits, and the expected revenue is greater than the bank to buy CDS. When the initial default probability of SMEs $\beta_0$is greater than $\sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$,the bank was willing to pay a certain amount. It will be part of the credit risk transfer directly to the insurance companies, financial institutions, such as the logistics enterprise, the core enterprise under the environment of supervision efforts will not bring the bank expected revenue increase, under the condition of the Banks to buy CDS, obtain the optimal expected profits. And it is greater than the purchase of RCDS expected return. When the initial default probability of SMEs $\beta_0$is equal to $\sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$,buying RCDS or buying CDS can bring the same expected return to the bank. The bank's decision to buy CDS is shown in table 2.

Table II decisions of Banks to buy CDS

Parameters of the relationship	Expected return	Decision
$\beta_0 < \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$	$\Pi^*(\mathrm{F})$	Buy RCDS from logistics enterprises or core enterprises
$\beta_0 = \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$	$\Pi^*(\mathrm{E})$	Buy CDS or buy RCDS
$\beta_0 > \sqrt{\frac{k}{s}}\left[1+\frac{r}{(1-\delta)}\right]$	$\Pi^*(\mathrm{E})$	Buy CDS from financial institutions such as insurance companies

VI. CONCLUSION:

In this paper, with the risk management functions of CDS as the breakthrough point. It is applied to the logistics finance and build the model, which get the following conclusions:First, building to insurance companies and other financial institutions involved in CDS model, helps Banks and other financial institutions in the slow release of the risk and improve bank's expected return and in different conditions. Second, building with logistics companies and enterprises to participate in the core model of RCDS helps Banks and other financial institutions to obtain the optimal expected profits at the same time, greatly inspired the core enterprises and logistics enterprises in the logistics financial supervision role. When signing the agreement with the bank, it can alleviate the credit risk caused by information asymmetry.Based on the model of the study, it gives the managements of the banks could transfer the risks to others so that they can share risks together as well as enlighten the logistics finance.This study will offer some handy information to the banks, SMEs, logistics enterprise, core enterprises.

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