

Analysis of the Cost and Benefit of the Combination Product of Chattel Financing and Factoring

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Abstract

First we introduced business processes of the chattel financing and factoring financing mix. Then we built a model of costs and benefits from the perspective of banks and SMEs, and discussed the main factors affecting net profits of both supply and demand in the supply chain finance portfolio of products. At the same time we compared the difference from net profits of both supply and demand in the supply chain finance portfolio of products, finding that the bank's net income is higher than the combination of a single supply chain finance product, but depending on the gap between potential shortage costs of a single product chattel and the financing costs plus insurance costs. Finally, we made use of dynamic game theory and game equilibrium point between the two sides, and assisted in decision-making with models.

Index terms— cost-benefit analysis, combination product, chattel financing and factoring.

1 Introduction b) Agent Analysis for Demand

To carry out the need-analysis, let's take Huaneng Power Plant, a coal dealer for example. Due to the coal dealer inventory of goods sent to the downstream power plant, and the inventory can be reduced, if there's not a certain amount of safety stock, goodwill will decline because of shortages, so the partnerships with downstream customers greatly reduced. Thus it's necessary to utilize own movable chattel to apply the bank for mortgage, getting some advance procurement funds for replenishment needs. When the borrower get the receivable accounts after sending goods to the downstream power plant in North China, due to the need to repay the loan, borrowers have to the needs for factoring financing.

Borrower's funding gap:

2 c) Advantages

The product use factoring financing to replace previous chattel financing, so the borrower's business chain get combined, in line with the borrowing enterprise business needs, while echoing the former to achieve closed financing as well as reducing the pressure on the credit risk of its own funds and enterprises. For banks, due to multiple financing, loan fees can be increased, and the rate of return improved.

For most SMEs, they need to rely on highspeed turnover of inventory profit, while banks in the mortgage business inventories often set rigid regulations that companies must pick up after filling the funding gap with their own funds, which bring SME dealers a certain amount of pressure on cash flow. Once the cash flow risk appears, they will not be able to complete delivery. The combination of chattel financing and factoring financing provides a good solution to this problem.

3 d) Suitable Users

For dealers having a certain amount inventory as well as requiring safe stock, they're more suitable for combination products are often used in the coal power industry chain of coal dealers, steel trade enterprises of steel construction industry chain, tire dealers of rubber automobile industry chain, and dealers of oil, iron and other industries.

4 II.

Introduction to the Business Process of the Combination Product of Factoring Financing and Chattel Financing

There are three kinds of typical supply chain financial product portfolio. And the cost-benefit model of purchase order financing and factoring portfolio construction is close to chattel financing and factoring combination, this is due to the proximity of the purchase order financing and stock financing objective, that is, to purchase; the bank loan amount are similar, namely as a percentage of the price of the goods; factoring financing purpose are borrower to return previously. So in order to simplify the research, as well as focus on the point and avoid repeated exposition, also because the reality real estate financing are more and more common, order financing requirements is relatively high, so we only study on estate financing and factoring product portfolio, confirming warehouse and factoring product portfolio.

The figure of inventory financing and factoring process (see figure ??):

Figure ?? : Inventory financing and factoring process Dealer (SME supply chain system) first chattel mortgage by way of its own stock pledged to the banks financing after the sale of goods to the core business, factoring financing for loans to return chattel mortgage, and finally downstream core businesses will be paid to play dedicated factoring into the bank account, ending combination product financing.

Operation of the process is described as follows: logistics, warehousing regulated firm and the borrower and the bank signed a tripartite cooperation agreement, the borrower to the warehousing company issued a notice quality, storage company sent a doublesite supervision goods, logistics and warehousing company issued a quality notification letter to the bank stating goods already regulated, and completed the quality procedures, banks provide financing to the borrower. Submitted by the borrower from the bank downstream from the list prepared statement available to downstream buyers, accounts receivable factoring financing chattel mortgage repayment of bank financing, the requirements of the goods, the bank internal downstream buyers approved line of credit, to logistics and warehousing the company issued a regulatory directive shipment, after the company received regulatory warehouse delivery instruction bank to release the goods to the borrower, the borrower submits invoices and contracts and other materials to the bank, the bank borrowers issuing factoring financing: Bank closed transfer insurance factoring financing, inventory financing for early return until the downstream core businesses will be paid into the bank account factoring, the bank principal and interest after deducting factoring financing, the remaining funds returned to the borrower to complete the combination of financing.

5 III.

6 Costs and benefits Model of the Combination Product of Chattel Financing and Factoring Financing

There are several hypothetical model of inventory financing and factoring financing mix, in reality, due to the vastly different enterprise's own situation and the difference of supply chain financial products of each ? Business inventories sales rate is constant. According to the model assumptions, the sales pace is constant, with the time change, inventory change over time. (see figure 2). ii. The Definition of the Parameters Parameters and their meanings shown in Table 2. Net profits of the borrower's enterprise

7 b) Bank Cost-Benefit Analysis

In the combination of business financing inventory financing and factoring, the earnings is interest in both periods, the cost is the interest paid to depositors of two cycles. It follows that the bank's net income is:(see equation 1)?? ?? = ?? 2 ? ? ?????? * ? 1 (?? 1 2 1 ? ?? 0)?? 1 + ?? 2 * ? ?????? * ? 2 (?? 2 2 1 ? ?? 0)?? 2(1)

We can clearly see, the more spread of the borrower sale of goods is, the higher the income is. And the main business is just the cost of borrowing the bank's earnings, so companies want to lower borrowing and lending rates, as well as to compress financing time.

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Volume XV Issue VI Version I Year 2015() C t1 t2 T1 t Q(t)

i. Borrower cost-benefit analysis In the combining products of chattel financing mixed by factoring financing, the costs of SMEs are mainly paid to the bank's interest, premiums paid to the insurance company and the costs of logistics and warehousing company. Benefits are spread from sales of goods, then we get net income derived there from for SMEs as:?? ?? = (?? 2 ? ? 1) ? ? ?????? 2 1 ? ?? ? ?? 2 ? ? ?????? ? ?? 2 1 ? ?? 2 ? ? ??????(2 1 ? 1 ? ?? 1 ? ?? 1 + ? 2 ? ?? 2 ? ?? 2)(2)

We can clearly see, the more spread loan companies traded goods, the higher the income. And the main business is just the cost of borrowing the bank's earnings, so companies want to lower borrowing and lending rates, as well as financing time.

large, that is, F cost more than the sum of chattel financing and insurance expenses, that is: $F > ?? 2 ? ?$?????
 $? (? 1 ? ?? 1 ? ?? 1 + ?? 2 1$
 $)$, the borrower can choose a combination of financing, at this time the dynamic equilibrium is point C. If the
 shortage cost F is less than the sum of chattel financing costs and insurance cost, that is: $F < ?? 2 ? ?$?????
 $(? 1 ? ?? 1 ? ?? 1 + ?? 2 1$
 $)$, the borrower would choose a single factoring financing, then the dynamic equilibrium is point A.
 IV.

12 Empirical Analysis a) Case Background

i. Introduction Let's take enterprise X for example, a coal dealer in Huaian City, Jiangsu Province. X was established in July 2001, the registered capital is 300 million yu an, and the legal representative invested 2 million yu an accounting for 67% while other individual shareholders accounted for 33 percent. It is a limited liability company. The company's main business is coal operation in Huaian, as well as transportation of deputy battalion coal and other commodities. There are 30 employees.

13 ii. Enterprise production and management

Enterprise X has run business in Huai'an area for many years. It acquired a good reputation in the market and produced a relatively high quality coal, and has become one of the major coal Huaian local dealer. Its annual average sales are 90 million, and average annual net profit is 5 million, with the assets debt ratio of 65%, below the lower level of traders. The financial risk is relatively controllable, as well as the inventory turnover rate is faster than their peers accounts, and receivable payment is guaranteed. The company's management has a wealth of management experience, hoping to forge ahead and expand high-quality market, but they are more sensitive to market risk.

Enterprise X on downstream customers is relatively stable, long-term cooperation with the upstream Zaozhuang Coal Co., Ltd. Wang Chao. Wang Chao Coal is one of the largest coal mine in Zaozhuang Tengzhou City, with more than 1,800 employees, up to 80 million tons of coal reserves, more of which is 5500 kcal high-quality coal. Since Huai'an and Zaozhuang are similar cities along the Beijing-Hangzhou Grand Canal, the cost for coal to arrive at Huaian by sea is low. The two sides have much cooperation and high degree of mutual trust. Enterprise X's downstream major customers is local power plant in Huaian, such as Huaneng Huaiyin Power Plant, Plant Huai'an, Huai'an biomass power plant, as well as a small amount of coal supplied to the needs of enterprises and institutions. Most of downstream customers have a fairly good comprehensive strength, and the repayment of accounts receivable is timely and stable with good reputation. In addition, the enthusiasm of cooperation is high.

iii. Introduction of bank-enterprise cooperation Bank S is the national joint-stock commercial bank which entered into Huai'an early. Compared to state-owned banks, the customer acceptance is lower in third-tier cities, so bank S actively runs characteristic business, which mainly targets SMEs. With a supply chain financial services to open the market, SMEs favour bank S most. Enterprise X and bank S began factoring financing cooperation in 2012 and achieved win-win cooperation, and in 2014 they started to carry out a combination of business personal property financing and factoring financing, so the recognition between the two parties is high.

14 b) Enterprise X's Application of Chattel Financing and Factoring Financing

On May 1 2014, Enterprise X and Huaneng Huaiyin Power Plant signed a supply contract, which required supply 18,000 tons standard coal of 5,500 kcal or more to prepare for the summer peak before June 1, 2014. The two sides agreed on a purchase price for P2 (550 yuan / ton), and an account period for T2 (about three months).

Enterprise X has Q (O) (20,000) tons of inventory in the Zaozhuang Grand Canal Dock (purchase price Pi is 500 yuan / ton) to provide for the downstream buyers. Because Wang Chao coal mine is relatively strong, Enterprise X is required to pay the bill in advance in each purchase, and it takes 1-2 weeks before freight arrives at Zaozhuang Grand Canal Dock. At the same time due to the slow shipping from Zaozhuang to Huai'an, which takes a week and a half, Enterprise X needs long time to stock and transport.

Enterprise X needs five days to complete transporting 18,000 tons of coal, and the daily transportation is D (3600 tons). The average transport is 600 tons per vessel in the Beijing-Hangzhou Grand Canal, which needs six ships a day. The price is 25 yuan per ton from Zaozhuang to Huai'an, and logistics costs 450,000 and warehousing costs 10,000 yuan. So the total is C (46 million). Inventory changes (see Figure 4).

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16 C

Interpretation of contract between enterprise X and upstream or downstream companies i.

17 ? Signing a chattel financing contract

Enterprise X is using trade finance with stronger competence, at the same time, it carries out direct marketing to the downstream plant, and its repayment ability is guaranteed with low risk, so the bank S agreed to give X corporate chattel financing. On May 1, 2014, Enterprise X and bank S signed a chattel financing agreement. The chattel financing ratio can not exceed 70% of the value of freight, and the loan interest rate is RI (9%), and the period T1 is no more than three months. In the period from the date of the application of the borrower to the sales to power plant, the first beneficiary of property ownership is bank S, Enterprise X assume joint responsibility to protect individuals, and must apply for property insurance. The first beneficiary is bank S.

18 ? Signing factoring financing contract

Huaneng Huaiyin Power Plant is an important branch of business of Huaneng Group, and is the largest thermal power plant in Northern regions. The total installed capacity is 1.8 million kilowatts with strong profitability, so the plant is the core customer of bank S. The bank agreed to grant factoring financing.

Enterprise X and bank S signed the factoring financing contract. The contract stipulates factoring financing ratio does not exceed 70% of the accounts receivable, and the loan interest rate is R2 (8%), and the financing terms T2 does not exceed six months.

19 c) Parameter Assignment

Parameters and their meanings, values shown in Table 2: ii.

Calculation of bank-enterprise costs and benefits i. $?? = ?? \cdot 2 \cdot ? \cdot ????? \cdot ? \cdot 1 \cdot (?? \cdot 1 \cdot 2 \cdot 1 \cdot ? \cdot ?? \cdot 0) \cdot ?? \cdot 1 + ?? \cdot 2 \cdot ? \cdot ????? \cdot ? \cdot 2 \cdot (?? \cdot 2 \cdot 2 \cdot 1 \cdot ? \cdot ?? \cdot 0) \cdot ?? \cdot 2(6)$

$?? \cdot ?? = 550 \cdot ? \cdot 3600 \cdot ????? \cdot ? \cdot 0.65(9\%)$ Obviously, now bank S's earnings in combined financing is higher than the previous single factoring financing.

20 ? ROE comparison of enterprise X

Previously what enterprise X applied to the bank is factoring financing, according to equation 4, we can calculate the net benefit of the borrower in single factoring financing from equation 9: see equation 9. $?? \cdot ??$ (single) = $(?? \cdot 2 \cdot ? \cdot ?? \cdot 1) \cdot ? \cdot ? \cdot ????? \cdot ? \cdot 2 \cdot 1 \cdot ? \cdot ?? \cdot ? \cdot 2 \cdot ? \cdot ? \cdot ? \cdot ? \cdot ? \cdot ? \cdot ? \cdot 2 \cdot 1 \cdot (9) \cdot ?? \cdot ??$ (single) = $(550 \cdot ? \cdot 500) \cdot ? \cdot 3600 \cdot ????? \cdot 6 \cdot 1 \cdot ? \cdot 460000 \cdot ? \cdot 550 \cdot ? \cdot 3600 \cdot ????? \cdot ? \cdot 0.7 \cdot ? \cdot 8\% \cdot ? \cdot 1 \cdot 4 \cdot ? \cdot 150000 = 15,040\text{yuan}$ **6 1**

In the research process, the corporation highly recognized compared to single factoring financing, chattel financing and factoring financing can advance a certain period to get liquidity as well as pre-arranged purchasing stocking. Wang Chao coal mine requires getting money 1-2 weeks before delivery, and transportation by ship from Zaozhuang to Huai'an also needs about 1-2 weeks, so the two cycles equal to nearly a month, and this is just X's chattel financing business cycle. So compared to the original one, single factoring financing is able to solve the problem of pressure on the stock, and to meet the urgent needs of power plant orders.

Based on past experience, there will be many plants suddenly asking enterprise X for goods in the year, and their inventory can not only meet a one-time large orders, but also is difficult to guarantee delivery plant at a predetermined time. Power thus considers X having insufficient strength, and may turn to dealers of other coal purchased next time. Years of hard business enterprise market share of X will decline. Profits on the account will suffer an annual loss of \$ 150,000, not

21 Calculation of enterprise X's costs and benefits

According to equation 1 we can obtain the net benefit of the bank: see equation 7. $?? \cdot ?? = (?? \cdot 2 \cdot ? \cdot ?? \cdot 1) \cdot ? \cdot ? \cdot ????? \cdot ? \cdot 2 \cdot 1 \cdot ? \cdot ?? \cdot ? \cdot 2 \cdot ? \cdot ? \cdot ????? \cdot (2 \cdot 1 \cdot ? \cdot 1 \cdot ? \cdot ?? \cdot 1 \cdot ? \cdot ?? \cdot 1 + ? \cdot 2 \cdot ? \cdot ? \cdot ? \cdot ? \cdot 2) \cdot (7) \cdot ?? \cdot ?? = (550 \cdot ? \cdot 500) \cdot ? \cdot 3600 \cdot ????? \cdot 6 \cdot 1 \cdot ? \cdot 460000 \cdot ? \cdot 550 \cdot ? \cdot 3600 \cdot ????? \cdot ? \cdot 0.3\% \cdot 6 \cdot 1 \cdot ? \cdot 550 \cdot ? \cdot 3600 \cdot ????? \cdot (6 \cdot 1 \cdot 0.65 \cdot ? \cdot 9\% \cdot ? \cdot 1 \cdot 12 + 0.7 \cdot ? \cdot 8\% \cdot ? \cdot 1 \cdot 4) = 223,400\text{yuan}$

Bank-enterprise game analysis of equilibrium ? Spreads contrast of bank S Bank S obtained conventional income of single factoring financing interest.

According to equation 3, we can calculate the net benefit of the bank in single factoring financing from equation 8: see equation 8.

ii.

iii.

including losses resulting goodwill. F therefore is more than 15 million.

22 d) Dynamic game analysis

According to the analysis of models and assumptions of dynamic game model with complete information in 1.3.2, we obtained bank-enterprise treelike figure as follows (corporate in the front, the bank in the post), (see Figure 5). According to backward induction deduction, let's begin to analyze from bank S. Bank's selection to loan or not is based on the comparison of other loan products, if other comprehensive income products are high, bank S may not give supply chain financial products loans. Because supply chain finance has a core business of credit repayment guarantee to do, the bank's risk is lower compared to other products, while banks can greatly the

core business as a link to the upstream and downstream industry customers. In this process the bank can also provide consulting, financial and other intermediary services for related enterprises. Therefore bank S will choose to lend.

The borrower enterprise X choose combining products of chattel financing mixed by factoring financing or single factoring financing? It depends on which situations has higher returns for enterprise X. Compared to single factoring financing , combining products costs higher in two parts, one is the cost of insurance, and the second is interest generated in chattel financing period. And compared to single factoring financing, combining products have a shortage cost F, according to X's own situation, F strikes \$150,000, more than two parts of cost of a single product. Therefore, enterprise X will choose the combining products, and the equilibrium point at this time is C.^{1 2}



Figure 1:

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Parameters	Meanings
Q(t)	Change in inventory over time
D	Slope of inventory over time(positive value)
P 1	Purchasing price(yuan/ton)
P 2	Sales price(yuan/ton)
? 1	Inventory pledge rate
T 1	Time for inventory financing(year)
?	Insurance rates
R 0	Bank average cost(interest paid to customers)
R 1	Inventory financing rates
T 2	Time for factoring financing(year)
C	Storage costs and others
R 2	Factoring financing rates
? 2	Factoring financing ratio
F	Opportunity cost of shortage
? 1	Net profits of the bank
? 2	

Figure 2: Table 1 :

2

Q(t)	
20000	
18000	
	1
Enterprise X signed a financing contract with the bank	5 6

Parameters	Q(t)	Meanings	Change in inventory over time	Initial inventory	Slope of inventory over time(p
Q 0	D	P 1	P 2	?	
1	T 1	?	R 0	R 1	T
2	C				

R 2	Factoring financing rates
? 2	Factoring financing ratio
F	Opportunity cost of shortage
? Calculation of bank S's costs and benefits	

Figure 3: Table 2 :

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