

Measuring Supply Chain Risks in China from the Bank Perspective

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Abstract

This paper is to focus on Supply Chain Financing (SCF) customers from the bank perspective in China. We develop a credit risk assessment framework based on the supply chain risk stress test, individual performance and collaborative performance of SCF clients, and individual performance of their core firms (which enter into some sort of trilateral agreements with the bank and clients). We leverage some concepts from the “2012 Supply Chain Management (Finance) survey in China”, which was conducted by the Ping An Bank Co, Ltd.

Keywords: risk assessment; supply chain financing

1 Introduction

Supply Chain Financing (SCF), based on our definition developed from literatures (e.g. Mazars, 2011; Demica, 2009), can be referred to a set of solutions designed to facilitate the flow of goods from the origin to the destination along the supply chain and to strengthen the chain of activities between the buyers and sellers by resolving the financial problems of some supply chain members through collaborative arrangements between the bank, the banking client and the core firm in the supply

chain. The SCF has gained in popularity in recent years (Demica, 2011a), and spread in big developing economies such as China rapidly (Demica, 2011b).

A significant portion of SCF customers or financing firms are SMEs. They got the SCF services successfully from their banks with the credit support of their larger core firms, which are also called “counterparties” - the other party that participates in a business transaction with the financing firm.

In 2005, the Ping An Bank Co.,Ltd. (Ping An Bank) offered the SCF services to its SCF customers or financing firms (SDB & China Europe International Business School, 2009), which embarked on the growth of SCF market in China. Many Chinese banks, including China Guangfa Bank, Shanghai Pudong Development Bank, Industrial Bank Co., Ltd., Hua Xia Bank Co., Ltd., China Merchants Bank, China Minsheng Banking Corp., Ltd., and the state-owned banks, have fought hard for the market shares. (iResearch, 2012) While the great market potentials of SCF are still untapped in China, their aggressive campaigns actually backfire because many banks do not fully comprehend the financing needs of their potential SCF customers and the risks inherent in the supply chain. For the risk assessment of SCF, the Chinese commercial banks are obviously lack of experience. (SDB & China Europe International Business School, 2009)

As the quote suggests, there is no exact limit to how complicated things can get, on account of one thing always leading to another. For example, the bank that offers SCF services to the companies within a fragile supply chain has to bear potential losses if the supply chain disrupts. (iResearch, 2012) A big managerial challenge ahead is how to offer SCF services to the suitable customers and control the credit risk by controlling supply chain risks.

This paper is focused on SCF customers from the bank perspective in China. We develop a credit risk assessment framework based on the supply chain and finance literatures.

2 Bank's Credit Risks

From the bank perspective, supply chain financing is a set of financial services to the bank clients, which are usually supported by their core firms. The banks are exposed to “bank risks”, which are referred to the threat of any loss, liability, or any other negative consequences that are caused by external factors (i.e. market volatility, political instability, supply chain disruption of the financing firm, and etc.) or internal factors (i.e. bank operation failures). In general, the bank risk includes the two dimensions: (i) variance of returns given a risk is fixed, (ii) the unexpected loss incurred from a default. (Altman & Saunders, 1998)

Credit risk refers to the risk of loss of principal or interest payment incurred from a

financing firm's failure to meet its contractual obligations to the bank can be regarded as the "credit risk". (Investopedia) If a financing firm (i.e. borrower) fails to make payments which it is obligated to, a bank will suffer the credit losses including the loss of principal and interest, disruption to cash flows, and increased collection cost. In general, the credit risk is composed of two dimensions: (i) the exposure of outstanding obligation when the default occurs and (ii) the uncertainty in recovery through financial re-arrangements.

In order to increase the credit recovery rate and minimize the outstanding obligation, the banks need to check with the credit quality of the financing firms, and to anticipate the likelihood of default. For the loans to the small and medium sized SCF financing firms, the banks have to obtain the information about those financing firms and review the information about those firms' supply chain to avoid extending the line of credit to excessive supply chain risks.

As implied in Chopra & Sodhi (2004), supply chain risk refers to any negative deviation from the expected performance targets of the focal firm due to the systematic and non-systematic problems in the supply chain. The problems may include: disruptions, delays, forecast inaccuracies, systems breakdowns, intellectual property breaches, procurement failures, inventory problems and capacity issues.

Specifically, disruption risks are referred to the material flows disruptions caused by natural and man-made disasters. (Tang, 2006) Disruptions to material flows anywhere in the supply chain are unpredictable and rare but often destructive. Examples of disruption risks that abound are the halts of material flows caused by natural disasters, labor strikes, fires and terrorism. (Chopra & Sodhi, 2004)

Delay risks are referred to the material flows delays caused by suppliers who are unable to respond to the changes in demand. (Chopra & Sodhi, 2004) Obviously, delay risks are supplier related risks.

To mitigate the supply chain risks, it is also important for the banks to consider the information transparency of the firm. Non-transparency risks refer to the risk of not having efficient flow of information within and among supply chain, possibly caused by information distortions and delays. (Akkermans et al., 2003)

Equally important, the banks should consider the stability of cash inflows and outflows of the financing firms. Because the sales of the financing firms are the source of the SCF repayments, it would affect the credit exposure and quality if the sales of the firms are unreliable. Specifically, the banks should assess two related risks: procurement risks and receivable risks.

Procurement risks refer to unanticipated increases in acquisition costs resulting from fluctuating exchange rates or supplier price hikes. (Chopra & Sodhi, 2004) They are supplier related risks.

Receivables risk, the possibility of being unable to collect on receivables, can torpedo the performance of any company. (Chopra & Sodhi, 2004) They are customer related risks.

The above-mentioned five supply chain risks, including, disruptions, delays, transparency of information, procurement and receivables, are shown in Fig. 1.

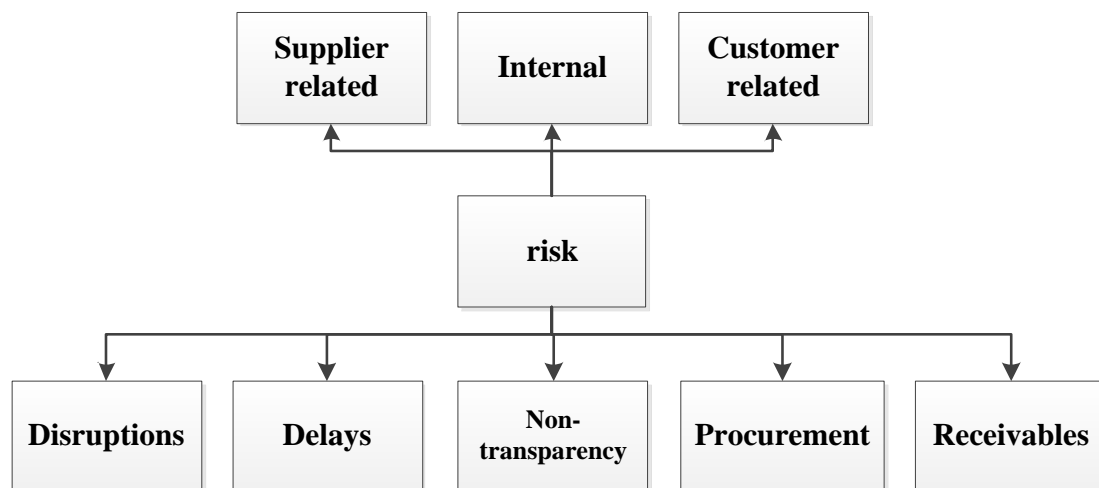


Fig 1. Supply chain risks in SCF

2.1 Directions on Credit Risk Assessment

As the supply chain risks will subsequently transfer to banks, it becomes imperative for the banks to identify the supply chain risks and forecast the potential implications on credit risks before providing the SCF solutions to their bank clients. In fact, the

Ping An Bank has put a significant emphasis on the counterparty qualification, which accounts for 40% of total weight in credit risk assessment (see Table 1).

Table 1 Risk assessment items of SC transaction status

(Source: SDB & China Europe International Business School, 2009)

Categories(weight)	Items	Weight
Counterparty's qualification (40%)	Industry characteristics	8%
	Industry position	15%
	Asset-liability ratio	8%
	Accounts receivable/net asset	6%
	Profit ratio of sales	3%

Based on the discussion with Ping An Bank's manager, the bank is revising its credit risk assessment with a special emphasis on core firms' supply chain characteristics and client relationship characteristics, which will be discussed next section.

The Ping An bank can be exemplified to demonstrate the importance of supply chain risks in the credit risk assessment. Three different levels of credit risks should be highlighted: first, the possibility of a debt holder (bank) to bear losses due to the reduction in debt paying ability of the debtors; second, the possibility of a debt holder (bank) to bear losses due to diminishing repaying willingness; third, the potential

losses inherent in the poor credit rating. (Bai, S.,2009; Ye, S., 2008) It is important for banks to understand the supply chain environment and network, the background of trading partners (i.e. suppliers and buyers), the credit level and future cash flows of the banking clients and their core firms (Li, T., 2007; SDB & China Europe International Business School, 2009) to ensure the repayment ability and willingness of the financing firms.

2.2 Recent Improvement Practices on Credit Risk Assessment

Given the importance of SC risks in the credit risk assessment, the bankers are needed to develop a more comprehensive framework that incorporate the supply chain risk assessment. Unfortunately, the relevant assessment tools for SCF are insufficient. (Hofmann, 2005)

To better improve the current credit risk assessment system and to better comprehend the needs of potential customers, Ping An bank developed “2012 SCM (Finance) survey in China”, which is a national survey with 821 samples collected from eight industries in China between May and August in 2012. The selected industries in the sample include Machinery, Electronics, Chemical, Pharmaceutical, Retail, Coal, Iron and steel, and Automobile. Key questions pertinent to supply chain risks are highlighted in Table 2.

As shown in Table 2, Ping An bank highlights the supply chain characteristics of core firms and the characteristics of relationship between the financing firms and core

firms. From the bank perspective, the inclusion of core firms' supply chain characteristics into the credit scoring system is necessary because the bank can better assess the financing firms through the core firms. In general, the core firm's suppliers would have higher credit rating and greater debt paying ability if the core firm has clearer criteria for supplier qualification.

From the bank perspective, the inclusion of the characteristics of relationship between the financing firms and core firms is also necessary. In general, the financing firms, which may be the suppliers of the core firms, would have greater debt paying ability if these financing firms have collaborated with their core firms for a long time.

Table 2 Supply Chain Risk Items in Ping An's Supply Chain Financing Survey

Categories	Items (Questionnaire NO.)
Core firms' supply chain characteristics	Clearer criteria for supplier qualification (B10/B11) ^a
	Frequency of supplier assessment (B8) ^a
	Clearer criteria for customer qualification (C32) ^b
	Clearer criteria for dealer qualification (C35) ^b
	Risk management mechanism in SCM (B36)
	Kinds of risks that would affect SCM (B37)
Financing firms' relationship characteristics with core firms	Average cooperation period with the financing firms' main suppliers (B7) ^b
	Average annual number of new suppliers (B44) ^b
	Percentage of the financing firms' total sales that core customers/dealers accounting for (C9) ^a

	Average cooperation period with the financing firms' core customer/dealers (C10) ^a
	Average annual change rate of the financing firms' core customers/dealer (C11) ^a

a: The financing firms are in the upstream of the core firms

b: The financing firms are in the downstream of the core firms

3. The Proposed Credit Risk Assessment Framework

However, many of them, including Ping An Bank, have not further improved their traditional credit rating system to anticipate the different supply chain risk scenarios and to evaluate the supply chain stability from a more global perspective. We suggest that the credit risk assessment for SCF should not only be focused on traditional and static financial indexes, but also include the analysis of different supply chain partners on a more ongoing basis (show in Fig. 2).

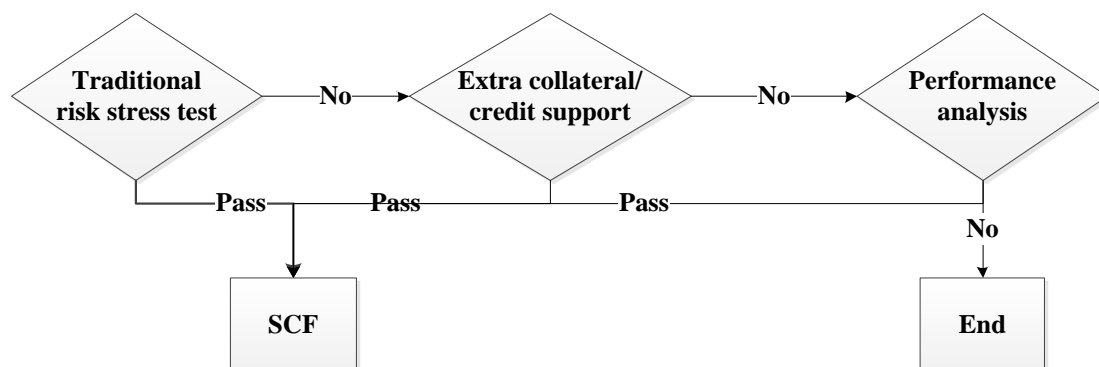


Fig 2. Proposed Credit Risk Assessment Framework

The bank is advised to the “risk stress test”, which refers to how likely the firms would default when they are in the situations of different SC risks. If the potential

financing firms pass the risk stress test, the bank may consider opening the SCF business with these firms. If the potential financing firms don't pass the risk stress test, the bank is advised to seek for additional collateral support or credit support. If the firms have further credit support, the bank may consider opening the SCF business with the firms.

If the firms don't have extra support, the bank subsequently develops the supply chain performance analysis. The supply chain performance analysis refers to performance analysis of individual performance and collaborative performance of SCF clients, and individual performance of their core firms (show in Fig. 3). If the firms pass the performance analysis, the bank opens SCF business with the firms. If the firms can't pass the performance analysis, it is better for the bank not to open the SCF business with these potential clients.

3.1 Risk Stress Test

"Risk stress test" is not new in supply chain management research (Jain and Leong, 2005; Schmitt & Singh, 2009), but has not been applied in the credit risk assessment of SCF.

Jain and Leong (2005) discuss the advantages of constructing supply chain simulations to "stress test" a system to see how it performs under extreme conditions. Schmitt & Singh (2009) present a model constructed for a large consumer products

company to assess their vulnerability to disruption risk and quantify its impact on customer service. In this paper, we use “risk stress test” to assess the probability that firms would default under different SC risks conditions and the impact on banks. As previously mentioned, supply chain risks in SCF fall into five categories: disruptions, delays, non-transparency, procurement and receivables.

Specifically, in the “disruption risks” stress test, the bank develops the what-if scenarios to see how likely the financing firms would default under the extreme situations of supply chain disruptions, and to evaluate how large the credit exposure is and how unlikely the credit will be recovered. Some wise assumptions should be developed and insightful estimations on clients’ cash flow disruptions, goodwill loss, ability to pay and willingness to pay should be made.

In the “receivable risks” stress test, the banks develop the what-if scenarios to see how likely the financing firms would default under extreme non-receivable conditions and quantify the negative consequences on the bank. If firms suffer unexpected losses caused by delinquent cardholders, (Chopra & Sodhi, 2004) it would affect the firms’ debt paying ability and repaying willingness. Since the source of repayment is the sales revenue of the transaction, the firms are more likely default if they cannot get the receivables on time. Here, construct these non-receivable simulations in the cash inflow of the transaction, “stress test” the firms’ vulnerability to the receivable risks and the probability that the firms would default.

3.2 Proposed Credit Risk Assessment Framework

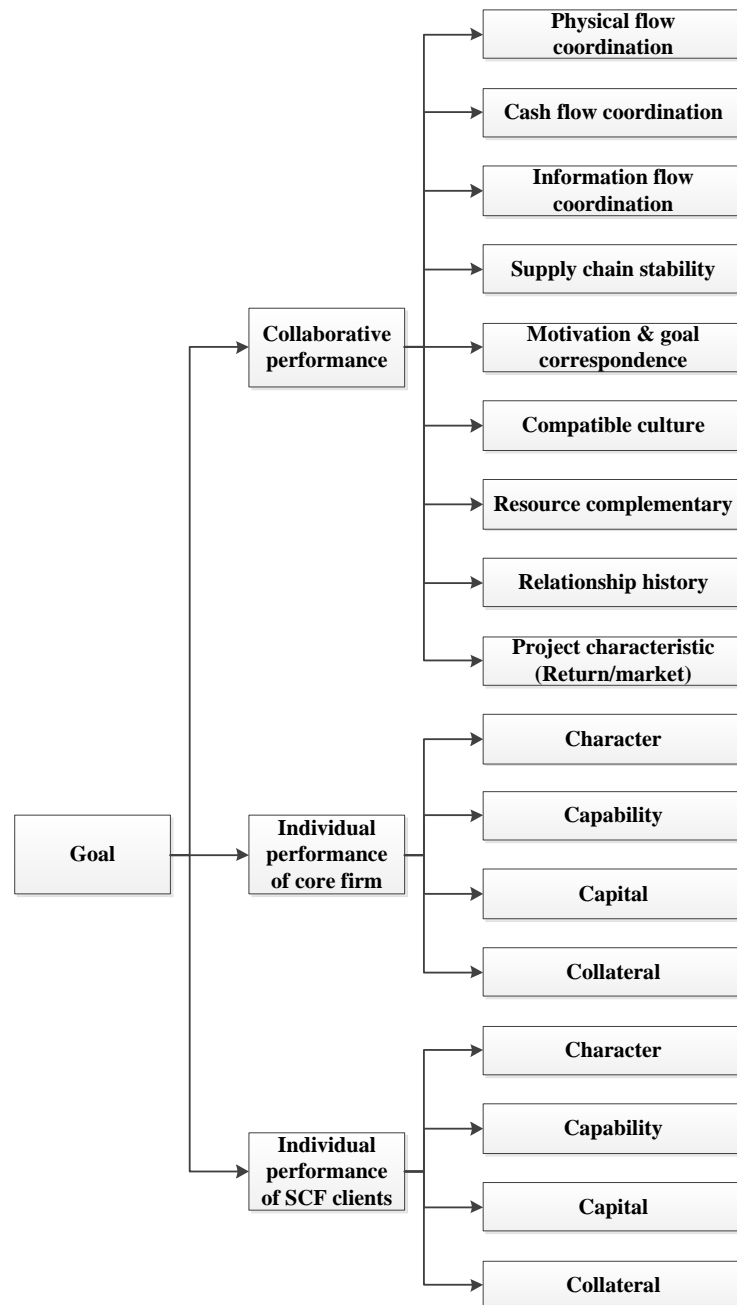


Fig. 3 The proposed credit risk assessment framework

After conducting the supply chain risk stress test, the banks are advised to analyze the collaborative performance and individual performance of bank clients, as well as the individual performance of core firms to better understand the risks inherent in the financial arrangement (shown in Fig. 3). Collaborative performance of bank clients is highlighted so that the credit risks and supply chain risks are not overestimated. The SCF services, by nature, are to leverage the resources and facilities of core firms, so that the banks are willing to offer attractive SCF packages to their financing firms (or local firms), which are usually smaller and have insufficient collaterals, to improve their cash flow situations. By analyzing the collaborative performance of financing firms (or local firms), the banks can better assess the social capital, human capital and organizational capital accumulated in the financing firms and the core firms, thus reducing the detriment of credit exposure and increase the likelihood of credit recovery through better credit assessments and financial arrangements (or re-arrangements).

The bank, as being a risk manager in the supply chain, needs to understand the performances of every node in the supply chain to ensure the efficiency of the local firm's operations and its associated supply chain. The local firm, as being a node in the supply chain, is vulnerable to downgrading in its credit rating if the supply chain system is proved to be unstable and fragile. (Bai, S., 2009) Consideration of collaborative performance is important for both the bank and the local firms. Chen (2004) proposed a collaborative performance evaluation system based on physical

flow coordination, cash flow coordination, information flow coordination and supply chain stability. The bank should also consider the noncompeting goal, compatible cultures and resource complementarity (Emden et al., 2006), all of which avail to the future communication, knowledge sharing and reciprocal exchange of information between the local firm and the core firm. In addition, the bank should investigate the client relationship history of local firms and the project characteristics to ensure the good collaboration situation.

To better reduce the uncertainties of the financial deal, the bank should also evaluate the individual performance of the local firm and the core firm. By leveraging the traditional credit risk assessment, we suggest the bank to investigate the 4 “C”s – borrower character (reputation), capital (leverage), capacity (volatility of earnings) and collateral. (Altman and Saunders, 1998)

4 Conclusion

The banks have realized the importance of SC risk assessment in SCF. However, due to their lack of experience and professional knowledge about SCM and SC risks, the banks are forced to conduct a more conservative and less effective credit risk assessment, which results in making less effective pricing and approval decisions in the supply chain financing business.

This paper develop a credit risk assessment framework based on the supply chain risk stress test, individual performance and collaborative performance of SCF clients, and individual performance of their core partnering firms. It is pragmatic for the bank to follow the procedures as presented in the framework to reduce the uncertainties involved in the SCF.

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