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The Impacts of Supply Chain Finance Initiatives on Firm Risk: Evidence from Service Providers Listed in the US

Abstract

Purpose – This study empirically investigates how supply chain finance (SCF) initiatives together with different firm capabilities and resources (i.e., information technology (IT) capability, operational slack, and political connections) affect the financial risk of service providers.

Design/methodology/approach – This study collects secondary longitudinal data to test for a direct impact of SCF initiatives on service providers' financial risk. It further investigates the moderating effects of the service provider's IT capability, operational slack, and political connections. Additional tests and analytical strategies are performed to ensure the robustness of the results.

Findings – The findings indicate that SCF initiatives help service providers mitigate financial risk. The risk reduction is greater for service providers with higher IT capability, operational slack, and political connections, but the last factor applies only to multinational corporations, not domestic companies.

Research limitations/implications – The data used in this research is limited to SCF service providers publicly listed in the United States, which may restrict the generalisability of the findings. Nonetheless, the research urges scholars to focus more on the financial risk implications of SCF in different market contexts.

Practical implications – This study encourages service providers to embrace the power of SCF initiatives for mitigating financial risk and allows them to evaluate their SCF investments in light of different firm capabilities and resources.

Originality/value – This is the first study investigating the impacts of SCF initiatives and various firm capabilities and resources on service providers' financial risk. The empirical findings provide important implications for future research and practices.

Keywords: Supply chain finance, financial risk, IT capability, operational slack, political connection

Paper type: Research paper

1. Introduction

Supply chain finance (SCF) is an innovative practice that has attracted increasing attention from buyers and suppliers (McKinsey, 2015; Xu et al., 2018; Wuttke et al., 2019; Jia et al., 2020b). Studies show that SCF can create a "win-win-win" solution, rewarding all participants (i.e., suppliers, buyers, and service providers) (Gelsomino et al., 2016; Lam et al., 2019; Ma et al., 2020). For instance, buying companies like Amazon, Walmart, and Coca-Cola have implemented SCF initiatives to improve the reliability of their upstream supply chains, while enhancing their payment terms (Tate et al., 2018). Meanwhile, suppliers can benefit from access to lower-cost finance and the option to redeem their receivables for immediate payment (Wuttke et al., 2013; Moretto et al., 2019). The service providers can manage buyer-supplier relationships to reduce risk and enhance their involvement in global supply chains by offering solutions that address the evolving needs of supply chain participants (Martin and Hofmann, 2017; Song et al., 2018).

According to Pfohl and Gomm (2009), SCF refers to a set of information technology (IT)-enabled solutions that focus on enhancing business efficiency and reducing financing costs for buyers and suppliers involved in a payment transaction. Although there are different types of SCF such as supplier-initiated, buyer-initiated, and tech-based, they tend to follow a collaborative inter-organisational financing approach, with an independent third-party (as the SCF service provider) optimising the financial processes of different supply chain participants (e.g., buyers and suppliers) (Martin and Hofmann, 2017; HoMa et al., 2020). In this way, it generates novel financial flow innovations over the conventional supply chain financing initiatives that pay particular attention to an individual's financing process (Wuttke et al., 2016).

Thus, the service provider plays an essential role in all SCF programmes (Hofmann and Belin, 2011; Martin and Hofmann, 2017; Wuttke et al., 2019; Jia et al., 2020a). It provides a technology-based platform to enable information sharing, process automation, expeditious payment, and control discount rates, while bearing all the associated risks (Selviaridis and Norman, 2014; Moretto et al., 2019). For instance, retail companies such as Walmart and Amazon provide financial services for their supply chain participants or online partners based on their performance against the companies' SCF programmes. To tackle the impact of COVID-19, the Export-Import Bank of the United States (US Exim) moved to support Boeing with supply chain finance guarantee, enabling Citi – an American multinational investment bank – to finance payments due from Boeing to its US-based suppliers for 12 months (Exim.gov, 2020). Service providers need to lower the risk of supply chain participants that are unable to repay the loan (Field and Meile, 2008; Pellegrino et al., 2019). Therefore, they are known as the supply chain risk-takers, who make profits by offering loans to SCF participants (Ma et al., 2020). Studies show that SCF initiatives allow service providers to maintain a low exposure risk while offering attractive discount rates (Fellenz et al., 2009; Martin and Hofmann, 2017; Song et al., 2018). However, it is still unclear how SCF initiatives influence service providers' financial risk. Some scholars

suggest that stakeholders evaluate service providers based on their capabilities to mitigate financial risk by implementing SCF initiatives (Selviaridis and Norrman, 2014; Lam et al., 2019). However, there is limited empirical evidence on the impact of SCF initiatives on the financial risk of service providers. This is surprising, since financial risk, as a widely used market-based measure, is of interest to many company investors and shareholders (Jo and Na, 2012; Tian and Xu, 2015). Accordingly, this leads to the question of whether SCF initiatives can help service providers mitigate financial risk perceived by investors.

Moreover, even though SCF initiatives may help service providers mitigate financial risk, the risk reduction could differ for service providers with distinct firm capabilities and resources (Xu et al., 2018; Wuttke et al., 2019). Underpinned by a risk management perspective (Sitkin and Pablo, 1992; Tse et al., 2018), this study focuses on three types of firm capabilities and resources: IT capability, operational slack, and political connections. These factors have been highlighted in different studies as having a major impact on the successful implementation of SCF initiatives (Fellenz et al., 2009; Thornton et al., 2016; Wiengarten et al., 2017). For example, according to Fellenz et al. (2009), IT capability plays a critical part in SCF performance. Superior IT capability can not only facilitate collaboration among supply chain participants but also enhance the traceability and visibility of supply chain issues (Mishra et al., 2013). It is also important to consider the role of operational slack in SCF implementation because it can offer service providers opportunities to create innovative services, or it can be a financial constraint and indicator of operational inefficiency (Wood et al., 2017). In addition, managers use political connections as a strategic resource to implement and stimulate supply chain initiatives (Lee and Wang, 2017; Luo, 2019). Nonetheless, the impact of political connection on SCF remains empirically unexamined and poorly understood. As a result, apart from investigating the direct effect of SCF initiatives on service providers' financial risk, this study further examines the indirect moderating roles of these firm capabilities and resources. Thus, this study attempts to address the following questions:

Q1: How do SCF initiatives affect service providers' financial risk?

Q2: How do various firm capabilities and resources (i.e., IT capability, operational slack, and political connections) impact the relationship between SCF initiatives and service providers' financial risk?

This study collects and combines secondary longitudinal data from multiple sources. The results show that SCF initiatives reduce service providers' financial risk, and this risk reduction is greater for SCF service providers with higher IT capability and more operational slack. Interestingly, a risk reduction is also apparent for SCF service providers with stronger political connections, but only if they are multinational corporations rather than domestic companies. Additional tests with alternative measurements and analytical strategies are performed to ensure the robustness of the results.

This study makes some important contributions. First, while researchers have been paying increasing attention to SCF in recent years (Pfohl and Gomm, 2009; Wuttke et al., 2013; Tate et al., 2018; Jia et al., 2020b), there is little in the literature that connects SCF initiatives to service providers' financial risk. To the best of our knowledge, this study is the first to investigate the relationship between SCF initiatives and the financial risk of service providers. By identifying the role of SCF initiatives in mitigating financial risk, this study encourages scholars to further investigate the financial risk implications of SCF initiatives. Moreover, this study increases the understanding of SCF by investigating the impact of IT capability, operational slack, and political connections on the financial risk of service providers. Thus, the findings allow service providers to evaluate the urgency of their SCF investments based on different firm capabilities and resources.

2. Literature Review and Hypothesis Development

2.1 Literature review

There has been a significant increase in attempts to apply SCF to improve operations and supply chain management. The literature in this evolving field can be divided into three main streams based on the research objectives and methodologies applied, as summarised in Table 1.

Table 1. Studies on SCF in operations and supply chain management

Literature stream	Reference	Method	Content
Using analytical models to explore economic justifications for SCF and relevant initiatives	Van der Vliet et al., 2015	Periodic review inventory model	Investigating the relationship between financing and payment terms in a stochastic condition.
	Wuttke et al., 2016	Diffusion mathematical model	Exploring the optimal decisions to introduce SCF.
	Xu et al., 2018	Systematic literature review and bibliometric analysis	Offering insights not previously fully identified or assessed by other reviews on the topic.
	Gelsomino et al., 2019	Analytical modelling	Examining the tangible benefits generating from a multi-scheme SCF strategy.
	Wetzel and Hofmann, 2019	Explorative network analysis	Investigating how companies' adequate level of working capital can be affected by the limited financial resources along supply chains.
Using empirical research to explore the impacts of SCF on financial costs and supply chain values	Ali et al., 2020	Structural equation modelling	Investigating how SCF as a risk mitigation strategy can affect firm performance.
	Ali et al., 2018	Confirmatory factor analysis and regression analysis	Investigating how SCF helps SMEs to improve their operational performance based on the resource-based view.
	Pellegrino et al., 2019	Real option valuation model	Examining whether SCF can reduce commodity price volatility for a large multinational company in the fast-moving consumer goods industry.
	Wuttke et al., 2019	Cox proportional hazard rate model	Examining the critical drivers of supplier adoption speed in SCF.
	Zhang et al., 2019	Baseline regression model	Examining the impacts of SCF on firms' financial performance, inventory performance and bankruptcy risk.
	Hofmann and Sertori, 2020	Explorative research approach with abductive reasoning	Exploring whether customers and suppliers benefit or nor by participating in a supply chain leader network.
Exploring the impacts of SCF initiatives specifically on service providers	Gomm, 2010	Conceptual framework	Offering a basis for analysing financial issues and linking supply chain management to firm goals.
	Selviaridis and Norrman, 2014	Semi-structured interviews	Exploring how the introduction of performance-based contracting can help companies to identify potential risks in their supply chains.
	Martin and Hofmann, 2017	Survey, interviews and secondly grey press analysis	Exploring the benefits of involving financial service providers in the integrated supply chain flow by using SCF.
	Song et al., 2018	Multiple case studies	Comparing SCF initiatives offered by financial service providers and commercial banks in supporting SMEs to access financing.
	Jia et al., 2020a	Conceptual framework development	Illustrating how SCF providers deal with challenges to achieve whole financial supply chain integration.

The first stream of literature mainly applies analytical models to explore economic justifications for SCF and relevant initiatives in various settings (Van der Vliet et al., 2015; Wuttke et al., 2016; Xu et al., 2018; Gelsomino et al., 2019). For example, Van der Vliet et al. (2015) investigate the relationship between financing and payment terms in a stochastic condition. The findings show that the length of the extended payment terms that a supplier can obtain relies on the supplier's expenditure composition and demand uncertainty. Wetzel and Hofmann (2019) investigate how adequacy of companies' working capital can be affected by the limited financial resources along supply chains. The findings suggest there is an inverted U-shaped relationship between firm performance and working capital. Overall, this stream of literature concentrates on how SCF impacts the cost of financing, especially for small and medium enterprises (SMEs) that find it difficult to obtain financing.

The second stream of literature reports wide-ranging empirical research that, as with the analytical literature stream discussed above, explores the impacts of SCF on financing costs and supply chain value (Martin and Hofmann, 2017; Ali et al., 2018; Pellegrino et al., 2019; Wuttke et al., 2019). For instance, Pellegrino et al. (2019) develop a model and test whether SCF can reduce commodity price volatility for a large multinational company in the fast-moving consumer goods industry. The results offer a unique supply chain-oriented perspective to reduce price volatility and commodity risk through SCF initiatives. Ali et al. (2020) analyse data from 330 SMEs in the textile sector and illustrate that SCF mitigates supply chain risk and improves firm performance. In sum, research efforts have sought to create general infrastructures and frameworks of SCF, determine objectives and scope of applications, and reveal the techniques that can be utilised and the factors that lead to SCF values.

The final stream of SCF literature related to our study concerns the impacts of SCF initiatives specifically on service providers (Selviaridis and Norrman, 2014; Martin and Hofmann, 2017; Song et al., 2018; Ma et al., 2020). For instance, Gomm (2010) proposes a conceptual framework to offer a basis for analysing financial issues and linking supply chain management to company goals. Martin and Hofmann (2017) explore the benefits of involving financial service providers in the integrated supply chain flow using SCF. Their results show that company needs are aligned with available service offers of financial service providers. Song et al. (2018) apply in-depth multiple case studies to compare SCF services offered by financial service providers and commercial banks to help SMEs access financing. The results show that implementing SCF can reduce both *ex ante* and *ex post* information asymmetry among supply chain participants. Additionally, Jia et al. (2020a) further propose a conceptual framework based on information processing theory for SCF providers to achieve whole financial supply chain integration.

In short, the extant literature has mainly focused on the benefits and implications of SCF initiatives on supply chain participants. For instance, Ali et al. (2018) investigate how SCF helps SMEs improve their operational performance based on the resource-

based view. The findings indicate that SCF can significantly enhance SMEs' operational performance, and service providers' IT capabilities can further strengthen that relationship. Zhang et al. (2019) examine the impacts of SCF on firms' financial performance, inventory performance, and bankruptcy risk. The results show that SCF is effective in reducing the bankruptcy of the focal firm but not in improving inventory management and financial performance. Hofmann and Sertori (2020) explore whether customers and suppliers benefit from participating in a supply chain leader network. The study confirms the superior financial performance of supply chain leaders with better liquidity and activity ratios for suppliers and customers. Although various studies point out that service providers are a critical component of successful SCF (Tate et al., 2018; Zhang et al., 2019), limited research attention has been paid to service providers. The few studies that have been done so have mainly considered the uncertainties and supply chain risk implications of SCF initiatives. Specifically, Selviaridis and Norrman (2014) explore how introducing performance-based contracting can help companies identify potential risks in their supply chains. The analysis identifies four unique factors that affect a provider's willingness to bear performance-based risk across supply chains. Ma et al. (2020) further study the key factors for SCF service providers to mitigate supply chain risks and generate value. Nonetheless, all these studies concentrate on service providers' operational and supply chain risks, instead of their financial risk (as evaluated by markets and shareholders). Therefore, this study aims to fill this gap in the literature by exploring the effect of SCF initiatives on service providers' financial risk.

Both practitioners and researchers in different fields have used equity volatility to measure financial risk (Godfrey, 2005; Aggarwal et al., 2011; Hendrick and Singhal, 2014; Lam, 2018). A higher financial risk is typically reflected in greater volatility of or fluctuations in companies' stock prices, as there is a higher level of uncertainty regarding the companies' future cash flows. Studies show that financial risk can have a significant effect on a company, its internal operations, and external stakeholders (Godfred, 2005; Jo and Na, 2012; Zhu et al., 2019). In particular, greater financial risk raises the cost of capital because the markets find it more difficult to assess the company's future cash flows (Tian and Xu, 2015). As a result, financial risk can not only influence the company's market price but also make it more likely for the company to change its strategies regarding future investments (Lam et al., 2019). Moreover, suppliers and customers may be unwilling to do business with a company with high financial risk and may make greater demands of it (Hendricks and Singhal, 2014), which in turn increases the company's operational expenses. Furthermore, an increase in financial risk can reduce a company's access to loans and credit extension from financial institutions and other lenders, which may result in liquidity problems (Aggarwal et al., 2011; Song et al., 2018).

Given the significant economic implications of financial risk, it is necessary to investigate how SCF initiatives affect service providers' financial risk. In fact, studies in different business disciplines such as organisational behaviour, IT, and marketing have been paying increasing attention to the interactions between companies' financial

risk and their non-financial practices (Kale et al., 2002; Aggarwal et al., 2011; Jo and Na, 2012; Tian and Xu, 2015). Kale et al. (2002), for example, investigate how alliance capability can influence companies' financial risk and long-term success, while Jo and Na (2012) explore the interactions between corporate social responsibility and companies' financial risk in controversial sectors. Nonetheless, there is limited empirical evidence linking SCF initiatives to the financial risk of service providers. Thus, this study extends the financial risk literature by examining the direct effect of SCF initiatives on service providers' financial risk.

2.2 Hypothesis development

Our first hypothesis considers the direct impact of SCF initiatives on service providers' financial risk. Studies suggest that SCF can reduce information asymmetry, which is the root cause of supply chain uncertainty (Pfohl and Gomm, 2009; Shen et al., 2019). Unlike conventional financing solutions that merely use financial perspective and constantly fail to evaluate small businesses appropriately (Moretto et al., 2019), SCF involves substantial interactions with relevant businesses and allows the service provider to obtain detailed transaction history and credit information on every supply chain participant (Xu et al., 2018). It also applies multiple advanced financing solutions such as closed-loop systems, transfer of receivables, and integration of behavioural management and outcome control (Hofmann and Belin, 2011; Gelsomino et al., 2016; Wuttke et al., 2019). In this way, the information asymmetry among all SCF participants can be mitigated, enabling the service providers to gain a comprehensive view of logistic, resource, and financial flows across the supply chain. The improved visibility and control enable SCF service providers to better allocate their resources and hedge against uncertainties in the supply chain. The literature also shows that SCF has become a critical risk mitigation technique for service providers and offers reliable credit to supply chain participants (Selviaridis and Norrman, 2014; Zhu et al., 2019). For example, Zhang et al. (2019) suggest that adopting SCF can help stabilise a supply chain by reducing the bankruptcy risk of the focal company.

Moreover, like the implementation of corporate social responsibility (Godfrey, 2005; Godfrey et al., 2009), it is believed that the use of SCF can also provide insurance-like protection as it accrues moral capital among supply chain participants and can therefore mitigate their negative reactions to adverse events. For instance, compared to traditional financial services, implementing SCF allows service providers to pay attention to a single focal company that tends to be the dominant or leading company in a supply chain (Wuttke et al., 2013). As a result, the credit risk essentially becomes the default risk of the dominant or leading company instead of the default risk of the other, risky small businesses involved in the SCF. In contrast, without the use of SCF, it is more difficult for financial service providers to react to supply chain participants, respond to changes in market situations, and be competitive in offering various financial services. In such circumstances, lead times quoted to supply chain participants are likely to be longer, since added protection is required when the service providers do not have enough confidence in the supply chain (Christopher and Lee, 2004). Similarly, financial

agreements may be constructed in ways that do not offer much flexibility to customers. All these make the supply chain less competitive, and the financial service providers will thus be liable to higher risks.

Furthermore, signalling theory suggests that SCF initiatives give two interrelated signals to markets - a lower likelihood of harmful conduct in supply chains, and a lesser impact of the consequences of such conduct (Lam et al., 2019; Pellegrino et al., 2019). Particularly, SCF initiatives help service providers monitor the conduct of all participants (Martin and Hofmann, 2017). According to Templar et al. (2020), SCF is a practical approach to facilitate collaboration, enhance relationships, improve trust, and reduce misconduct among supply chain participants. Sung and Ho (2019) further illustrate how SCF could be used to mitigate the moral hazard problems between buyers and suppliers in supply chains. In this way, the probability of harmful conduct by supply chain participants can be lowered in SCF programmes. Besides, by building an analytical four-party supply chain model, Lin and Peng (2019) explore incentive mechanisms that prevent moral hazard in online SCF initiatives. The results indicate that the implementation of SCF can prevent moral hazard effectively in online supply chains. Therefore, the impacts of harmful conduct on service providers should be lower in SCF programmes. This is in line with a recent SCF study by Pellegrino et al. (2019), which indicates that SCF could be effectively used by service providers to manage supply chain uncertainties and potential risks.

Based on the above discussion, supply chain information asymmetry, credit risk, and harmful conduct can all disrupt a financial service provider's operations, harm its reputation, and damage its brand, thereby reducing its future cash flows (Godfrey, 2005; Zhang et al., 2019). A lower likelihood and impact of these issues due to SCF (as opposed to traditional financing) helps reduce the market perception of uncertainty, which in turn reduces financial risk, as represented in less equity volatility. Accordingly, the first hypothesis is:

H1: SCF initiatives enable service providers to mitigate their financial risk.

Our second hypothesis considers the moderating effect of IT capability. Studies show that SCF service providers can benefit from IT capability to enhance the visibility of business information across supply chain participants (Fellenz et al., 2009, Hofmann and Belin, 2011; Wuttke et al., 2016; 2019). This improved visibility allows service providers to make integrated SCF decisions, increase the veracity of the data, and identify social change and market shifts quickly (Tate et al., 2018). These enhancements result in better distribution of supply chain resources, lower the possibility of speculative behaviour, and reduce the credit risk across the entire supply chain (Cai et al., 2016; Moretto et al., 2019). Moreover, advanced IT capability allows service providers to facilitate coordination within and across their fields of business (Dehning et al., 2007). In turn, better coordination, empowered by effective implementation of SCF programmes, can give service providers a comprehensive understanding of supply

chain participants' requirements (Banker et al., 2006; Gelsomino et al., 2019). It allows service providers to deliver appropriate financing solutions that comply with the expectations of supply chain participants. Furthermore, advanced IT capability enables service providers to mitigate uncertainties in operational production processes and transaction costs, thus lowering the risks associated with the complexity of supply chains (Rabinovich et al., 2003; Pellegrino et al., 2019).

Mainly, technology-enabled customer orientation is an essential aspect of SCF capability (Fellenz et al., 2009; Wuttke et al., 2019). Superior IT capability allows service providers to identify and reach potential supply chain participants effectively through different distribution and marketing channels (Dehning et al., 2007; Wuttke et al., 2019). For example, a customer relationship management system can reduce SCF service providers' advertising expenditure by enabling targeted financing solutions and strategies (Mishara et al., 2013; Zhang et al., 2019). Moreover, service providers with advanced IT capability are more likely to effectively integrate their SCF programmes into their enterprise information systems (Adner and Kapoor, 2010). The integrated system can offer real-time information and alerts to service providers and enable them to take immediate action in case of supply chain disruptions. In this way, it allows SCF service providers to lessen the negative impacts of such disruptions on the share value of all SCF participants, thereby reducing their financial risk. This leads to the following hypothesis:

> H2: The risk reduction due to SCF initiatives is greater for service providers with higher IT capability.

Our third hypothesis considers the moderating effect of operational slack. The notion of operational slack arises in the context of lean manufacturing (although here we are considering the operational slack of the financial service provider). Given the prevalence of lean manufacturing, the literature has paid particular attention to the enhancement of efficiency and effectiveness of supply chain operations by reducing redundancy and slack (Beamon, 1999; Hines et al., 2004; Gligor et al., 2015). Nonetheless, it is now recognised that the emphasis on efficiency can make supply chains more vulnerable to threats and challenges (Kovach et al., 2015; Wood et al., 2017) and can have a negative impact on companies' ability to handle uncertainties and disruptions. For instance, Kovach et al. (2015) investigate the performance implications of operational slack under various market conditions. The findings suggest that while a lower degree of operational slack is associated with higher economic performance under typical conditions, in uncertain environments increased slack improves performance. In this context, the SCF industry features significant demand and supply uncertainty (McKinsey, 2015; Tate et al., 2018), exacerbated by cross-border complexities and short product life-cycles due to the evolution of technology (Wuttke et al., 2019). As a result, lean or agile strategies are commonly used by SCF service providers to address evolving demands from supply chain participants (Pfohl and Gomm, 2009). However, these operational strategies escalate uncertainties and lead to

weak supply reliability. While the direct economic impacts of SCF investments are one-off, the influence on operational processes can subsequently affect overall business (Hendricks et al., 2009). Therefore, SCF service providers with more operational slack are inclined to build higher operational flexibility and have higher ability to maintain continuity of business.

Additionally, studies find that in the trade-off between profitability and long-term business survival, many SCF service providers are likely to favour profitability (Selviaridis and Norrman, 2014; Van der Vliet et al., 2015). Service providers without slack resources will be forced to take resources from their operations to deal with unforeseen urgent issues. In contrast, service providers with sufficient operational slack will have more scope to innovate their way out of potential conflicts and manage resources to ensure both profitability and long-term business survival (Kovach et al., 2015). The above discussion indicates that SCF service providers need to build more operational slack to respond effectively to supply chain uncertainties and disruptions in mitigating the financial risk of the service providers. Thus, the study hypothesises that:

> H3: The risk reduction due to SCF initiatives is greater for service providers with higher operational slack.

Our fourth hypothesis considers the moderating effect of political connections. Studies show that political connections can improve companies' economic performance in different ways, such as preferential regulatory conditions, ease of access to capital markets, government subsidies, lower tax burdens, and favourable consideration for government contracts (Thornton et al., 2016; Liu et al., 2018; Luo, 2019). SCF service providers need resources to survive and thrive (McKinsey, 2015), and most rely on their ability to handle the "institutional void" – the shortage of power intermediaries assuring active connection between buyers and suppliers (Silvestre, 2015). For instance, Wuttke et al. (2019) highlight that one of the biggest challenges faced by SCF service providers leads to the onboarding of suppliers. Accordingly, a solution commonly used by service providers to solve the institutional void is to build secure connections with local government officials (Luo et al., 2017). This improves SCF service providers' credibility and access to government-controlled resources; it also helps them to persuade suppliers to implement SCF and develop more effective operational strategies (Lee and Wang, 2017).

Moreover, a secure political connection can enhance the SCF service providers' bargaining power and reduce the stress of regulation, especially the need to provide high-quality information exposures (Liu et al., 2018). This is in line with studies by Prasad and Tata (2003) and Thornton et al. (2016), which indicate that secure government connections provide companies with various political benefits in competing for important resources. It also reduces the incidence of enforcement action due to political uncertainty and increases companies' values (Luo, 2019). According to Liu et al. (2018), companies that have politicians on the board have better market-based

performance and lower strategic (and therefore financial) risk. Given the above discussion, the study hypothesises that:

H4: The risk reduction due to SCF initiatives is greater for service providers with stronger political connections.

A conceptual model summarising our four proposed hypotheses is shown in Figure 1.

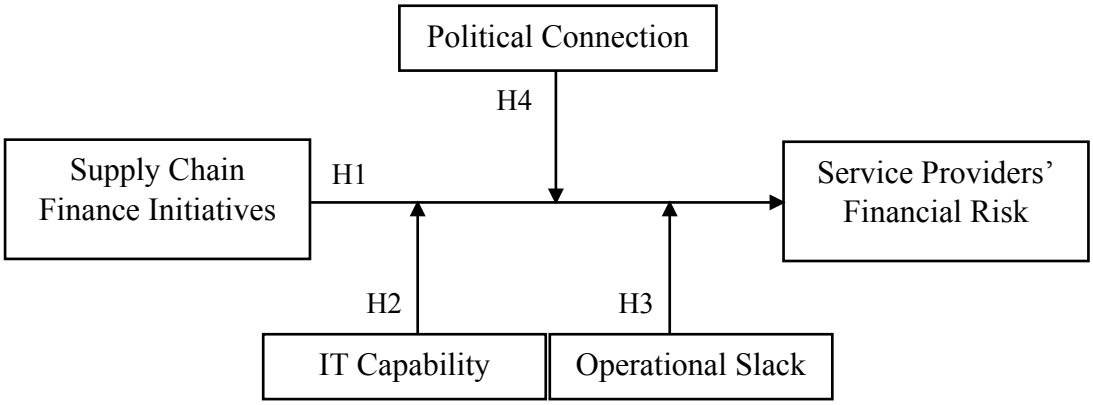

Figure 1: Conceptual model

3. Research Methods

3.1 Data collection

We collected secondary longitudinal data from multiple sources to measure the research variables investigated in our research. First, we searched firms' announcements of SCF initiatives via Nexis, a news and information database that has been widely used to identify corporate initiatives and events (Sorescu et al., 2017). We limited our search to firms publicly listed on the US stock markets (i.e., NYSE and NASDAQ) due to the availability of data to measure the research variables (e.g., financial risk and IT capability) for these firms as discussed below. As a result, we excluded private firms or firms listed in other countries. We also excluded those initiatives that were not related to the provision of SCF services such as the apportionments of new SCF executives or the acquisitions of SCF companies. For firms with multiple SCF initiatives over our investigation period, we focused on their first initiatives as this indicated when the firms started providing SCF services and enabled us to investigate the impact on the firms' financial risk over time. It should be noted that our analysis was at the firm level rather than at the individual SCF solution level. Therefore, we were interested in when a firm started providing SCF services rather than the specific types of SCF solutions such as reverse factoring and inventory financing. Our search via Nexis identified 74 publicly listed US firms that started their SCF services between 2006 and 2018. Some examples of these firms include traditional banks and financial service providers such as Bank of America, Citi, American Express, JPMorgan Chase, Wells Fargo, and BNY Mellon. The distribution of the 74 firms' first SCF initiatives across years is shown in Table 2, which suggests that 45 firms (or 61%) announced their first SCF initiatives in the recent

four years (2015-2018). The characteristics of these firms in terms of market value, total revenue, total assets, number of employees, cash dividends, total debt, capital expenditures, and cash holdings are shown in Table 3.

Next, we obtained longitudinal data on the 74 sample firms across years from multiple sources, including the Center for Research in Security Prices (CRSP), Kenneth French Data Library, *InformationWeek*, Compustat, and the Center for Responsive Politics (CRP), to measure different research variables. In particular, we obtained daily stock data from CRSP and Fama–French–Carhart's four factors from Kenneth French Data Library to compute financial risk, annual top IT user lists from *InformationWeek* magazine to measure IT capability, accounting data from Compustat to calculate operational slack, and lobbying spending data from CRP to measure political connections. The detailed measurement procedures are discussed below and summarised in Table 4.

Table 2. Distribution of sample firms' first SCF initiatives across years

Year	Frequency	Percentage
2006	1	1.4
2007	1	1.4
2008	3	4.1
2009	3	4.1
2010	5	6.8
2011	6	8.1
2012	4	5.4
2013	3	4.1
2014	3	4.1
2015	14	18.9
2016	7	9.5
2017	11	14.9
2018	13	17.6
Total	74	100

Table 3 Firm characteristics

Variable	Unit	Mean	Standard Deviation	Minimum	Maximum
Market Value	Millions of dollars	59536.9	83731.8	15.6	757029.0
Total Revenue	Millions of dollars	32289.8	43534.0	4.9	276644.0
Total Assets	Millions of dollars	387856.1	704550.4	3.9	3771200.0
Number of Employees	Thousands	84.5	106.4	0.02	647.5
Cash Dividends	Millions of dollars	1450.4	2224.6	0.0	12699.0
Total Debt	Millions of dollars	80747.4	152981.9	0.0	889300.0
Capital Expenditures	Millions of dollars	1440.7	3838.9	0.0	36108.0
Cash Holdings	Millions of dollars	16002.9	41275.7	0.1	449391.3

Table 4. Variable descriptions

Variables	Measurements	Data Sources
SCF Initiative	Search Nexis to identify the year in which a firm started providing SCF services and code all years from the identified year as 1 and all years before this year as 0	Nexis
Financial Risk	The annualised standard deviation of the residuals obtained from the Fama–French–Carhart's four-factor model	CRSP, Kenneth French Data Library
IT Capability	Code a firm to have high IT capability if it is included in *InformationWeek*'s top IT user lists at least twice over the past five years (inclusive) and to have low IT capability otherwise	*InformationWeek*
Operational Slack	Standardise a firm's cash-to-cash cycle within the same industry (two-digit SIC code) and year	Compustat
Political Connection	A firm's spending on lobbying divided by total revenue, measured in terms of percentage	CRP, Compustat
Firm Profitability	A firm's operating income divided by total revenue	Compustat
Firm Size	Natural logarithm of a firm's total assets	Compustat
Firm Leverage	A firm's total debt divided by total equity	Compustat
Dividend Payout	A firm's cash dividends divided by market value	Compustat, CRSP
Capital Intensity	A firm's capital expenditure divided by total assets	Compustat
Cash Intensity	A firm's cash holdings divided by total assets	Compustat

3.2 Variable measurements

SCF Initiative. After identifying the year in which a firm started providing SCF services, we coded the SCF Initiative as 1 for all years starting from the identified year and 0 for all years before this year. For example, if a firm announced its first SCF initiative in 2012, we coded 2012-2018 as 1 for this firm and 2006-2011 as 0. This coding approach enabled us to conduct a firm-level fixed-effect analysis (discussed below) to investigate the impact of a firm's SCF initiative on its financial risk over time.

Financial Risk. Consistent with prior studies (e.g., Hsu et al., 2016; Lam, 2018), we measured financial risk in terms of firm-specific, or idiosyncratic financial risk, rather than market-specific, or systematic financial risk. This is because firms' SCF initiatives are more likely to be related to their own idiosyncratic financial risk rather than to systematic financial risk that is often linked to broad economic and market events. To

compute idiosyncratic financial risk, we first constructed Fama–French–Carhart's four-factor model as shown in Equation (1) to regress a firm's daily stock returns (R_{it}) on four different factors representing overall market returns (RM_t), return difference between small and big market capitalisation stocks (SMB_t), return difference between high and low book-to-market ratio stocks (HML_t), and return difference between high and low prior-return stocks (UMD_t), respectively (Fama and French 1993, Carhart 1997). This model better accounts for stock market movements and has been widely used in prior studies to compute idiosyncratic financial risk (e.g., Han et al., 2017; Luo and Bhattacharya, 2009).

$$R_{it} = \alpha_i + \beta_i RM_t + \gamma_i SMB_t + \delta_i HML_t + \sigma_i UMD_t + \varepsilon_{it}\,. \quad (1)$$

As our sample firms are publicly listed on the US stock markets, we used the S&P 500 Index to indicate overall market returns (RM_t), while returns difference data concerning SMB_t, HML_t, and UMD_t were obtained from Kenneth French Data Library directly. After running the regression model for each firm-year over the investigation period (2006-2018), we computed a firm's idiosyncratic financial risk in each year as its annualised standard deviation of the residuals (ε_{it}). We also checked the robustness of our test results based on alternative measures of financial risk with different market index, regression model, and industry adjustment, as detailed in Section 4.1.

IT Capability. We relied on the annual top IT user lists published by *InformationWeek* magazine to measure a firm's IT capability. Since 1989, *InformationWeek* has published an annual list of US companies as top IT users that are considered "to be most effective and efficient in the use of IT" (Bharadwaj, 2000, p. 117). This ranking focused on how firms "used" IT rather than how they developed IT products. Therefore, non-IT firms such as Walmart and Pfizer were frequently included in the rankings. *InformationWeek*'s top IT user list has been widely accepted in the Information Systems research community as an appropriate proxy for firms' IT capabilities (Bharadwaj, 2000; Lim et al., 2013). Consistent with prior research, we viewed a sample firm to have high IT capability (coded 1) if it was included in *InformationWeek*'s top IT user lists at least twice over the past five years (inclusive), and to have low IT capability (coded 0) otherwise.

Operational Slack. Following prior research (e.g., Hendricks et al., 2009; Wiengarten et al., 2017), we measured a firm's operational slack in terms of cash-to-cash cycle (CCC), which is equal to the sum of days of inventory and accounts receivables minus the days of accounts payables. This measure indicates a firm's slack "across inbound material activities with suppliers, through manufacturing operations, and the outbound logistics and sales activities with customers" (Farris and Hutchison, 2002, p. 292) and better suits our research focused on SCF. To control significant inter-industry heterogeneity, we standardised a sample firm's CCC within the same industry (two-digit SIC code) to represent its operational slack. Besides CCC, which focuses on the supply chain dimension of operational slack, we adopted two alternative measures

based on the capacity and inventory dimensions of operational slack (Hendricks et al., 2009; Kovach et al., 2015) to check the robustness of our test results. This is discussed in Section 4.1.

Political Connection. We measured a firm's political connections based on its annual spending on lobbying for several reasons. First, lobbying has been viewed as the strategic transmission of politically relevant information in the US context (Correia, 2014). Lobbying decisions are usually made by a firm's top management team members (e.g., CEO) and involve various congress and federal agencies, thus better representing the firm's high-level political connections. Moreover, unlike contributions to political action committees that are subject to limits under the Federal Election Campaign Act, lobbying expenditures are not capped, and thus, better capture the variations in political connections across firms. Therefore, as Hill et al. (2014, p. 124) have pointed out, "lobbying may provide a better measure of political connectedness for US firms than previously used measures." As larger firms might spend more on lobbying, we divided a sample firm's annual lobbying expenditure by its total revenue to indicate its political connections in each year.

Control Variables. We controlled six firm-level variables, including firm profitability, firm size, firm leverage, dividend payout, capital intensity, and cash intensity, as they may be related to financial risk (Han et al., 2017; Hsu et al., 2016; Lam, 2018; Luo and Bhattacharya, 2009). We measured firm profitability as operating income divided by total revenue, firm size as the natural logarithm of total assets, firm leverage as total debt divided by total equity, dividend payout as cash dividends divided by market value, capital intensity as capital expenditure divided by total assets, and cash intensity as cash holdings divided by total assets.

3.3 Fixed-effect regression analysis

Our research objective was to analyse the direct impact of a firm's SCF initiative on financial risk (H1) and the moderating effects of several firm-level factors including IT capability (H2), operational slack (H3), and political connection (H4). There were several challenges in this analysis. First, although we included several control variables such as firm profitability, firm size, firm leverage, dividend payout, capital intensity, and cash intensity, we might have ignored some unobservable firm characteristics related to a firm's decision to provide SCF services and its financial risk simultaneously, raising possible endogeneity concerns (Lu et al., 2018). Second, as our investigation period covered 13 years from 2006 to 2018, some unobservable time-specific effects (e.g., the Great Recession) might also explain a firm's financial risk over time. Finally, although we have hypothesised the impact of a firm's SCF initiative on its financial risk, the firm's financial risk might also affect its decision to provide SCF services, leading to possible reverse causality issues (Wooldridge, 2010).

We addressed these challenges in several ways. First, all firms included in our study started providing SCF services between 2006 and 2018, making it possible for us to

perform a firm-level fixed-effect estimation (Bockstedt et al., 2015; Shan and Zhu, 2013). We were interested in how a firm's SCF initiative affects its own financial risk over time. Therefore, the firm-level fixed-effect approach helped remove any unobservable time-invariant firm characteristics such as corporate culture and managerial ability that may be related to the firm's SCF initiative and financial risk, reducing the endogeneity concerns and enabling a consistent within-firm estimation. Moreover, we also included a year-level fixed-effect estimation to remove any unobservable time-specific effects that may be caused by broad economic events or trends. In addition, to address the reverse causality concern, we maintained a one-year lag between the dependent variable (i.e., financial risk, measured in year $t+1$) and all independent variables such as SCF initiative, IT capability, operational slack, and political connections (measured in year t). The fixed-effect regression model is presented in Equation (2):

$$
\begin{aligned}
&Financial\ Risk_{i(t+1)} \\
&= \beta_0 + \beta_1 Firm\ Profitability_{it} + \beta_2 Firm\ Size_{it} + \beta_3 Firm\ Leverage_{it} \\
&+ \beta_4 Dividend\ Payout_{it} + \beta_5 Capital\ Intensity_{it} + \beta_6 Cash\ Intensity_{it} \\
&+ \beta_7 IT\ Capability_{it} + \beta_8 Operational\ Slack_{it} + \beta_9 Political\ Connection_{it} \\
&+ \beta_{10} SCF\ Initiative_{it} + \beta_{11} SCF\ Initiative_{it} \times IT\ Capability_{it} \\
&+ \beta_{12} SCF\ Initiative_{it} \times Operational\ Slack_{it} \\
&+ \beta_{13} SCF\ Initiative_{it} \times Political\ Connection_{it} + \alpha_i + \delta_t + \varepsilon_{it}\,, \qquad (2)
\end{aligned}
$$

where i and t are firm and year indices, respectively; α_i and δ_t represent firm- and year-level fixed effects, respectively; and ε_{it} is the error term. β_{10} indicates the impact of SCF initiative on financial risk (H1), while the moderating roles of IT capability (H2), operational slack (H3), and political connection (H4) are determined by β_{11}, β_{12}, and β_{13}, respectively. To address multicollinearity concern, we centred the related variables while computing their interaction terms. We also calculated the variance inflation factor (VIF) values for all independent variables to further check the seriousness of multicollinearity. The VIF values range from 1.09 to 2.61, with an average value of 1.75. These values are well below the threshold of 10 suggested in the literature (Neter et al., 1996), suggesting multicollinearity is not a serious concern in this research.

4. Test Results

The correlations, means, and standard deviations of all variables are shown in Table 5. Table 6 documents the test results based on the fixed-effect regression analysis. There are five regression models in Table 6: Model 1 includes all control variables as well as the firm- and year-level fixed effects; Model 2 adds the main effect of SCF initiative; and Models 3 to 5 add the moderating roles of IT capability, operational slack, and political connection, respectively. All five models are statistically significant ($p < 0.01$) based on F-statistics, with R-squared values ranging from 0.058 to 0.081. The number of firm-year observations across the five models is 821, which means there are approximately 11-year observations for each sample firm (unbalanced panel).

Table 5. Correlation matrix

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Financial Risk	1										
2. Firm Profitability	-0.183	1									
3. Firm Size	-0.135	0.448	1								
4. Firm Leverage	0.028	0.009	0.227	1							
5. Dividend Payout	-0.022	0.141	0.273	0.089	1						
6. Capital Intensity	0.037	-0.127	-0.269	0.084	-0.101	1					
7. Cash Intensity	0.075	-0.251	-0.550	-0.282	-0.226	0.284	1				
8. IT Capability	-0.009	0.089	0.229	0.105	0.022	0.113	-0.218	1			
9. Operational Slack	0.077	-0.097	-0.076	0.138	0.030	-0.080	0.032	-0.233	1		
10. Political Connection	-0.026	0.053	-0.106	0.031	0.021	0.017	0.026	0.167	-0.085	1.	
11. SCF Initiative	-0.099	0.060	0.200	0.124	-0.018	-0.136	-0.187	-0.034	-0.048	-0.038	1
Mean	0.394	0.185	10.185	0.189	0.023	0.022	0.125	0.276	-0.009	0.007	0.370
Standard deviation	0.815	0.305	3.107	0.152	0.046	0.030	0.137	0.448	0.858	0.019	0.483

Note: Correlations with an absolute value higher than 0.09 are significant at 0.01 level.

Table 6. Fixed effect test results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-0.726 (0.742)	-0.695 (0.739)	-0.641 (0.737)	-0.687 (0.736)	-0.717 (0.738)
Firm Profitability	-0.519*** (0.157)	-0.516*** (0.156)	-0.523*** (0.156)	-0.530*** (0.155)	-0.530*** (0.156)
Firm Size	0.136* (0.073)	0.133* (0.073)	0.125* (0.073)	0.129* (0.073)	0.132* (0.073)
Firm Leverage	-0.309 (0.348)	-0.295 (0.347)	-0.271 (0.346)	-0.289 (0.345)	-0.278 (0.346)
Dividend Payout	-0.854 (0.659)	-1.049 (0.661)	-0.891 (0.661)	-0.882 (0.660)	-0.880 (0.660)
Capital Intensity	1.804 (1.581)	1.655 (1.576)	1.976 (1.575)	1.913 (1.572)	1.963 (1.575)
Cash Intensity	0.373 (0.419)	0.334 (0.417)	0.369 (0.416)	0.383 (0.415)	0.400 (0.416)
IT Capability	0.054 (0.098)	0.061 (0.098)	0.038 (0.098)	0.032 (0.098)	0.032 (0.098)
Operational Slack	0.001 (0.059)	-0.011 (0.059)	-0.015 (0.059)	0.000 (0.059)	0.001 (0.059)
Political Connection	1.392 (1.959)	1.359 (1.952)	1.166 (1.945)	1.459 (1.947)	2.425 (2.566)
SCF Initiative		-0.230** (0.091)	-0.198** (0.091)	-0.186** (0.091)	-0.185** (0.091)
SCF Initiative × IT Capability			-0.378*** (0.143)	-0.441*** (0.146)	-0.427*** (0.149)
SCF Initiative × Operational Slack				-0.137** (0.069)	-0.142** (0.069)
SCF Initiative × Political Connection					-2.183 (3.774)
Firm-level fixed effects	Included	Included	Included	Included	Included
Year-level fixed effects	Included	Included	Included	Included	Included
Number of observations	821	821	821	821	821
F-statistic	2.02***	2.22***	2.44***	2.51***	2.42***
R-squared (within)	0.058	0.066	0.075	0.080	0.081

Notes: *p<0.1, **p<0.05, and ***p<0.01 (two-tailed tests); Standard errors are in parentheses; One-year lag between the dependent variable (financial risk) and all independent variables.

Two control variables, firm profitability and firm size, are significant ($p < 0.1$) across the five models. Specifically, while firm profitability is negatively related to financial risk, firm size has a positive relationship with it. This suggests that less profitable and larger firms receive higher financial risk.

The coefficient of SCF initiative remains significantly negative ($p < 0.05$) across Models 2 to 5, showing that a firm's SCF initiative reduces its financial risk. Thus, H1 is supported. Regarding the moderating effects, the interaction between SCF initiative and IT capability is significantly negative ($p < 0.01$), as shown in Models 3 to 5. As the coefficients of both the main effect and the interaction term are negative, the resulting moderating effect is reinforcement rather than interference. This suggests that a firm's SCF initiative reduces its financial risk to a greater extent if it has higher IT capability, supporting H2. Similarly, there is a significantly negative interaction between SCF initiative and operational slack ($p < 0.05$) in Models 4 and 5, indicating that the reduction in financial risk due to SCF initiative is greater if a firm has higher operational slack. Thus, H3 is supported. However, Model 5 shows that although the interaction between SCF initiative and political connections is negative, as hypothesised, it is not statistically significant ($p > 0.1$). Therefore, the impact of SCF initiative on financial risk is independent of a firm's political connections, rejecting H4.

We also conducted simple slope tests to further check the interaction effects. Consistent with prior studies (e.g., Han et al., 2017; Josephson et al., 2016), for each of the three moderating variables, we viewed one standard deviation above and below its mean as high and low levels, respectively, and computed the slope of the relationship between SCF initiatives and financial risk for each level. As shown in Figure 2, the slope is -0.40 (-0.02) when IT capability is high (low). This suggests that the relationship between SCF initiatives and financial risk is more negative for high IT capability. Importantly, the difference between these two slopes, which is -0.38 (i.e., -0.40 - (-0.02)), is statistically significant ($t = -2.87$, $p < 0.01$), showing a significant interaction effect and supporting H2. Similarly, Figure 3 shows that the slope is more negative when operational slack is high (-0.33) rather than low (-0.09). A significant difference between these two slopes ($\Delta = -0.24$, $t = -2.05$, $p < 0.05$) is also observed, indicating a significant interaction effect and supporting H3. Finally, although Figure 4 suggests that the slope is more negative when political connection is high (-0.25) rather than low (-0.17), the difference between these two slopes is not statistically significant ($\Delta = -0.08$, $t = -0.58$, $p > 0.1$). Therefore, the interaction effect is not significant and H4 is rejected.

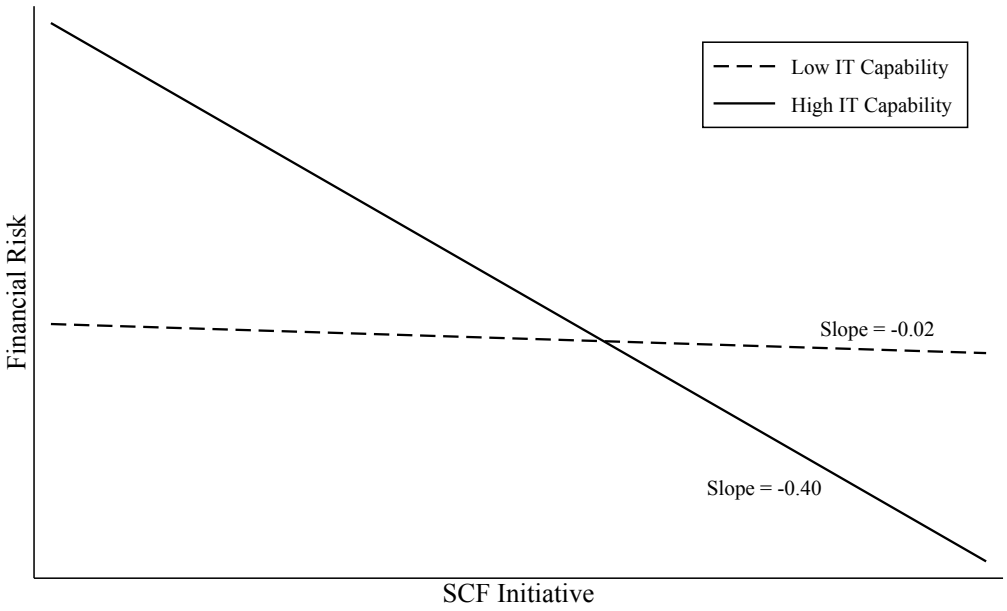

Figure 2. Simple slopes at different levels of IT capability

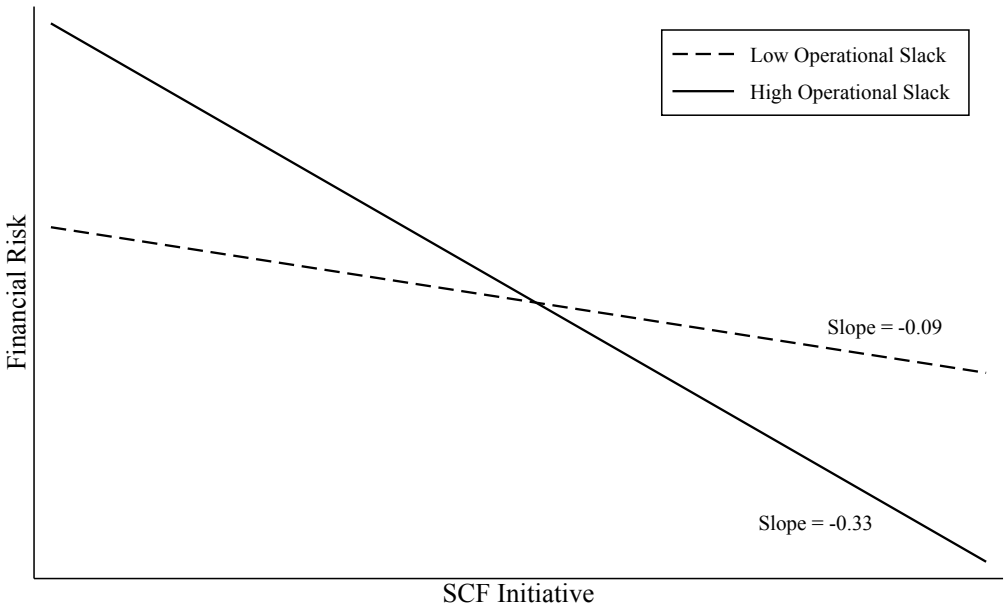

Figure 3. Simple slopes at different levels of operational slack

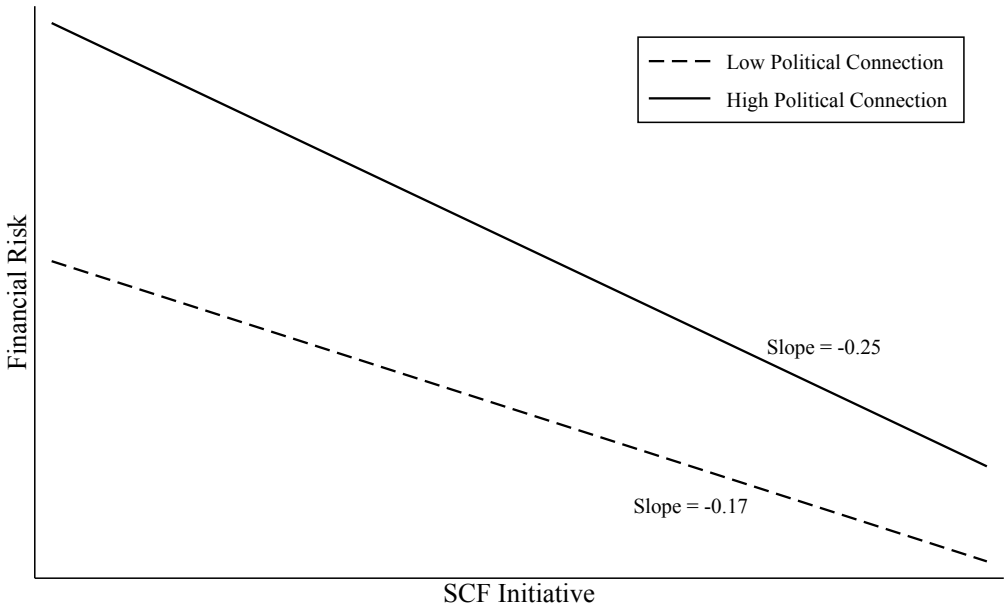

Figure 4. Simple slopes at different levels of political connection

4.1 Additional tests

We also performed several additional tests to check the robustness of our findings and account for alternative explanations, as documented in Table 7. A more detailed discussion of the testing procedures is provided below.

Table 7. Robustness test results

Variables	**Model 1** Measure financial risk based on the CRSP index	**Model 2** Measure financial risk based on the Market model	**Model 3** Measure industry-adjusted financial risk	**Model 4** Measure financial risk based on the standard deviation of daily returns	**Model 5** Measure IT capability based on whether a firm is included in *InformationWeek*'s top IT user lists	**Model 6** Measure operational slack based on PPE divided by revenue	**Model 7** Measure operational slack based on inventory divided by cost of goods sold	**Model 8** Measure political connections based on the number of lobbyists	**Model 9** Include multinational corporation in a three-way interaction
SCF Initiative	-0.184**	-0.193**	-0.233**	-0.192**	-0.192**	-0.387**	-0.181*	-0.194**	-0.208**
	(0.091)	(0.092)	(0.096)	(0.092)	(0.091)	(0.157)	(0.094)	(0.092)	(0.092)
SCF Initiative × IT Capability	-0.429***	-0.434***	-0.398**	-0.447***	-0.343**	-0.428**	-0.354**	-0.454***	-0.361**
	(0.148)	(0.150)	(0.159)	(0.150)	(0.134)	(0.182)	(0.149)	(0.149)	(0.152)
SCF Initiative × Operational Slack	-0.141**	-0.145**	-0.146*	-0.149**	-0.134*	-0.362*	-0.173**	-0.134*	-0.145**
	(0.069)	(0.070)	(0.075)	(0.070)	(0.069)	(0.207)	(0.068)	(0.071)	(0.069)
SCF Initiative × Political Connection	-2.201	-2.129	-1.853	-2.382	-2.612	-1.662	-2.143	0.152	0.770
	(3.772)	(3.798)	(4.945)	(3.801)	(3.767)	(4.057)	(3.843)	(0.693)	(4.031)
SCF Initiative × Political Connection × Multinational Corporation									-25.547**
									(12.455)
Control Variables	Included	Included	Included	Included	Included	Included	Included	Included	Included
Firm-level fixed effects	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year-level fixed effects	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	821	821	795	821	821	586	798	819	821
F-statistic	2.44***	2.53***	2.00***	3.19***	2.35***	2.29***	2.48***	2.44***	2.50***
R-squared (within)	0.081	0.084	0.070	0.103	0.078	0.105	0.084	0.081	0.086

Notes: $^{*}p<0.1$, $^{**}p<0.05$, and $^{***}p<0.01$ (two-tailed tests); Standard errors are in parentheses; One-year lag between the dependent variable (financial risk) and all independent variables.

First, we adopted four alternative financial risk measures. For the first alternative measure, we used the CRSP index that covers all publicly-listed firms in the US (Yang et al., 2012) rather than the S&P 500 index that focuses on 500 selected firms to represent the overall market return in Fama–French–Carhart's four-factor model. Our second alternative measure was based on the classic Market model that has been widely used in the literature (Lam, 2018) rather than the more recently proposed four-factor model. For the third alternative measure, we computed the industry-adjusted financial risk, which is the difference between a sample firm's financial risk and the average financial risk of all firms in the same industry (two-digit SIC codes). The final alternative measure was calculated based on a firm's overall or total financial risk, equal to the annualised standard deviation of the firm's daily stock returns in each year (Hendricks and Singhal, 2014). The regression results with these four alternative measures are shown in Models 1 to 4, respectively. All four models suggest that while SCF initiatives reduce financial risk, such reductions are more significant for firms with higher IT capability and operational slack. This is consistent with the results shown in Table 6.

We also employed alternative measures of the three moderating variables. As an alternative measure of IT capability, we required that firms should be included in *InformationWeek*'s top IT user lists at least once (rather than twice) over past five years (inclusive) (Kashmiri et al., 2017). For operational slack, we used two alternative measures focused on its capacity and inventory dimensions, respectively. Following prior research (e.g., Hendricks et al., 2009; Kovach et al., 2015), we captured the capacity dimension based on property, plant, and equipment (PPE) divided by revenue, and the inventory dimension based on inventory divided by the cost of goods sold. Finally, we measured political connections alternatively based on the number of lobbyists working for a firm rather than the firm's lobbying expenditure (Ridge et al., 2017). We divided a firm's number of lobbyists by its number of employees to control for the firm size effect. The corresponding test results with these alternative measures, as shown in Models 5 to 8, remain qualitatively similar. The interaction between SCF initiative and political connection is still not significant ($p > 0.1$) across different alternative measures.

As we could not find a significant interaction between SCF initiative and political connections, we further explored whether the role of political connection varies across different types of firms. Prior research suggests that the values of political connections could be different for domestic and multinational firms (Fisman, 2001; Schweizer et al., 2019). We thus investigated the interaction between SCF initiative and political connections across domestic and multinational firms. Specifically, we first created a dummy variable to represent whether an SCF service provider is a domestic firm (coded 0) or a multinational corporation (coded 1) based on data obtained from Compustat (Balsam et al., 2016), Then, we included this dummy variable in the regression model to perform a three-way interaction among SCF initiative, political connection, and multinational corporation. The test results, as shown in Model 9, demonstrate that

although the interaction between SCF initiative and political connection is still not significant ($p > 0.1$), the three-way interaction is significantly negative ($p < 0.05$). This suggests that political connections benefit only multinational SCF service providers in reducing financial risk. We further discuss this insight in the following section.

5. Summary, Discussion, and Future Research

This study reveals the effects of SCF initiatives from the viewpoint of service providers. First, it demonstrates that SCF initiatives reduce service providers' financial risk. Moreover, this risk reduction is greater for SCF service providers with higher IT capability and operational slack. Political connection plays a significant role in moderating the relationship between SCF initiatives and financial risk but for multinational service providers rather than for domestic ones. The results are robust to alternative analytical strategies and variable measurements. The practical and research implications of these findings are discussed below.

5.1 Practical implications

According to Hofmann and Belin (2011), SCF represents a capital strategy that can relax the financing terms and reduce financial risk for all participants. Consistent with the literature, this study demonstrates that service providers can mitigate their financial risk by implementing SCF initiatives. Financial risk can substantially impact service providers and their stakeholders (Aggarwal et al., 2011), therefore, service providers need to consider these in the development and implementation of SCF initiatives. Notably, SCF initiatives tend to be more effective in mitigating company-specific (i.e., idiosyncratic) financial risk, instead of market-specific (i.e., systematic) financial risk. However, company-specific financial risk accounts for more than 80% of the overall financial risk (Goyal and Santa-Clara, 2003; Lam, 2018). Therefore, the findings indicate that service providers can use SCF initiatives as a strategic move to mitigate their idiosyncratic financial risk, which in turn lowers overall financial risk, as shown in Table 7 (Model 4).

SCF service providers invest substantial resources (e.g., skilled workers, finance, and IT-related intangibles) in developing and managing their IT infrastructures (Fellenz et al., 2009; Wuttke et al., 2016). Studies have found mixed results regarding the impacts of IT capability on operations and supply chain management. For instance, while some scholars have identified a decisive role of IT capability in operations management (Banker et al., 2006; Dehning et al., 2007), others have reported a null effect (Rabinovich et al., 2003). In addition, most of the literature assumes that SCF service providers offer the processing and sharing of high-quality information both internally and with companies in supply chains (Gelsomino et al., 2016; Moretto et al., 2019). However, empirical evidence shows that IT is a major challenge for service providers in delivering SCF solutions (Hofmann and Belin, 2011; Wuttke et al., 2019). Therefore, it is vital to investigate the role of IT capability in empowering SCF and moderating the relationship between SCF initiatives and service providers' financial risk. This research shows that service providers with higher IT capability benefit more from SCF

initiatives in terms of risk reduction. Thus, SCF service providers should enhance their IT capabilities as they are important for financial risk mitigation. Nonetheless, given that IT resources can be imitated and generalised across different contexts (Adner and Kapoor, 2010), service providers should pay attention to develop IT-related intangibles and human resources in fully leveraging their IT capabilities.

Scholars in operations and supply chain management have long debated the optimal level of operational slack in running productions and operations (Hendricks et al., 2009; Wood et al., 2017). On the one hand, operational slack can be costly and represents a lower utilisation of companies' routine business processes (Wiengarten et al., 2017). On the other hand, it can offer a buffer against risks and enhance a firm's economic performance under considerable market uncertainty or disruptions (Kovach et al., 2015). SCF implementation is a disruptive operational process that tends to be complicated and requires considerable adjustments from the service providers (Wuttke et al., 2013). Therefore, it is important to investigate how operational slack might enhance the effect of SCF initiatives on service providers' financial risk. The findings indicate that building operational slack is a viable option for service providers to boost the effect of SCF initiatives in mitigating financial risk. This suggests that SCF service providers should consider balancing financial risk during typical daily operations and the uncertainty when they face significant changes, such as the implementation of novel SCF initiatives. For instance, in an efficiency-driven economy, the service providers that tend to be rewarded are those with little operational slack (Wiengarten et al., 2017). However, the lack of slack resources may be damaging when service providers seek to implement innovative SCF initiatives. Hence, in this respect, service providers need to achieve a balance. This is a critical point, as cost-effectiveness continues to be the first competitive priority for most companies, which therefore prioritise reductions in slack and operating expenses (Kovach et al., 2015).

Resource dependence theory highlights the significance of connecting companies with external contingencies to tackle contextual interdependence and uncertainty (Hillman et al., 2009). In line with this theory, companies are seeking to establish political connections as a strategic resource to increase their economic performance (Thornton et al., 2016; Liu et al., 2018). As political uncertainty can generate significant impacts on firm risks (Luo et al., 2017), it is critical to investigate how political connections can affect the relationship between SCF initiatives and service providers' financial risk. The results suggest that the risk reduction due to SCF initiatives is greater only for multinational, but not domestic, SCF service providers with stronger political connections. This might be explained by the broad variation in the degree of economic development across different countries (Prasad and Tata, 2003; Thornton et al., 2016; Park and Paiva, 2018). For instance, compared with their domestic counterparts, multinational service providers are more often concerned about weaker legal protection and market institutions in different market environments; both concerns are forms of political uncertainty that international businesses face (Lee and Wang, 2017). Thus, multinational companies tend to use political connections more strategically to mitigate

financial risk. Thus, multinational service providers might need to establish political connections to reduce the financial risk of developing SCF initiatives.

5.2 Research implications

This study has some implications for future research. First, while some studies have highlighted that SCF can achieve a "win-win-win" solution (Gelsomino et al., 2016; Lam et al., 2019; Ma et al., 2020), the financial risk implications of SCF initiatives are not clear. This study is one of the first to offer empirical evidence on how SCF initiatives affect service providers' financial risk. Scholars in operations and supply chain management need to explore the effect of SCF initiatives on operational or supply chain risks. Furthermore, investigating financial risk allows scholars to extend the boundaries of the finance literature beyond the horizon of operations and supply chain management. In particular, research in many non-finance disciplines has urged investigation into how different non-financial strategies are associated with financial risk (Godfrey et al., 2009; Aggarwal et al., 2011; Hendricks and Singhal, 2014; Lam, 2018). Therefore, it is expected that this study will stimulate future research on the financial risk implications of SCF initiatives.

Moreover, this study complements SCF research by paying particular attention to service providers. The literature has highlighted the tremendous potential value of SCF (Pfohl and Gomm, 2009; McKinsey, 2015; Moretto et al., 2019). However, it is unclear how value can be generated for service providers. Conventionally, financial service providers receive much less attention in the operations and supply chain management literature compared with other disciplines such as finance (Martin and Hofmann, 2017). Given that service providers play a critical role in all SCF programmes, this study positions service providers at the centre of SCF and presents the significance of various firm capabilities and resources (i.e., IT capability, operational slack, and political connections) in studying the role of service providers in diverse SCF market conditions. This study thus encourages SCF researchers to shift their focus to the less researched but important actors like service providers, and further explore the crucial and complex roles they play in SCF.

Furthermore, our research offers important theoretical implications for future studies on firm resources and capabilities. Following the well-established resource-based view, prior studies have examined how firms' resources and capabilities such as operational slack and IT capability are related to their performance including financial returns and risk (Bharadwaj, 2000; Modi and Mishra, 2011; Mishra et al., 2013; Kovach et al., 2015). For instance, Modi and Mishra (2011) demonstrate the non-linear relationship between operational slack and financial return. Mishra et al. (2013) show that a firm's IT capability is negatively related to its financial risk. Different from the studies that have focused on the direct performance impacts of firm resources and capabilities, our research reveals their role in moderating the performance impacts of corporate initiatives. In particular, our research shows that the extent to which a firm's SCF initiative reduces financial risk depends on its *ex ante* operational slack and IT

capability. Moreover, our research suggests that not all firm resources and capabilities are equal. Specifically, political connections benefit multinational corporations rather than domestic firms in terms of risk reduction due to SCF initiatives. This finding is in line with the "double-edged sword" view of political connections formulated in the literature (Lee and Wang, 2017; Luo, 2019) and further stresses the contingent role of firm resources and capabilities. Overall, our research complements the extant resource-based literature that has been dominated by firm resources' direct performance impacts and encourages future studies to investigate their less explored yet crucial roles in moderating the performance impacts of corporate initiatives or strategies. Such a contingent view can also serve as a useful theoretical foundation for future SCF research to make sense of the variation in firm performance due to SCF implementations.

5.3 Limitations and future directions

This study has some limitations. First, it relies on firm-level secondary data. Although this increases the objectivity of the research, it constrains an abstract or high level of analysis (Wood et al., 2017). Such a firm-level analysis also implies that it is challenging for us to investigate and distinguish the risk mitigation effects of different SCF solutions provided by the same firm. We encourage future research to conduct a solution-level analysis to explore the risk implications of different types of SCF solutions such as reverse factoring and inventory financing. Moreover, the data used in this research are limited to publicly listed SCF service providers in the US. This may reduce the generalisability of the findings to private companies and those listed elsewhere (Chen et al., 2021). Future studies should investigate the role of SCF initiatives in various market conditions and for unlisted service providers. Furthermore, since the role of SCF may differ in emerging markets (McKinsey, 2015; Lam et al., 2019), testing our hypotheses in these contexts could be insightful. Finally, the study only investigates SCF initiatives from the perspective of service providers. It could be interesting and instructive to explore these initiatives from the perspective of other supply chain participants. Specifically, the impacts of SCF on the financial risks of suppliers and buyers are worth further investigation.

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