Governance requirements in supply chain finance: The need for a dual-layered semipermeable boundary

Abstract

Purpose: To define and investigate the governance requirements of supply chain finance (SCF).

Design/methodology/approach: A qualitative analysis of 849 news articles published in UK newspapers (2000-2022) using the Gioia method.

Findings: SCF governance relies on developing capacities for reflexive scrutiny at two stages: 1) prior to entering into a SCF relationship; and, 2) during its operation. Based on the notion of SCF as a complex adaptive system, we theorise SCF governance requirements as a dual-layered semipermeable boundary. The semi-permeability of the two layers allows for a dynamic exchange between the SCF system and its environment. The first layer is a capacity to selectively enable or control the entry and access of certain actors and practices into the SCF system. The second layer is a capacity for ongoing scrutiny of the SCF operation and its development. Further, we identify five aspects of governance to be enabled, i.e. enhancing adaptability, building confidence, improving efficiency, advancing technology, and promoting transparency; and four aspects to be controlled, i.e. preventing abuse of power, curbing fraud risk, constraining operational risk, and restricting risky extensions to SCF practices.

Practical implications: Our dynamic framework can guide supply chain members in making decisions about whether to participate, or continue to operate in, a SCF relationship. Moreover, the findings have implications for policymakers and authorities who oversee entry/access and the involvement of SCF providers, particularly fintech firms.

Originality/value: The study contributes to both the supply chain and governance literatures by providing a systematic analysis of what SCF governance has to accomplish. Our novel contribution lies in its analysis of SCF governance based on a complex adaptive system approach, which expands the existing literature where SCF is described in rather static terms. More specifically, it suggests the need for a dynamic duality of SCF governance through the semi-permeable boundary that selectively enables and controls certain SCF actors and practices.

Keywords: Supply chain governance, Supply chain finance, Fintech, Reverse factoring, Dynamic discounting

Paper type: Research paper

1. Introduction

The normal functioning of supply chains depends on the reliable flow of financing. Yet, recent global developments – including the US-China trade dispute, Brexit, the Covid-19 pandemic, and the war in Ukraine – have placed increasing strain on the ability of firms to fund the operations that take place within supply chains and to manage the working capital gap (Hofmann *et al*., 2021; Sodhi and Tang, 2021). Global concern about the financing of supply chain operations has also been heightened by a number of specific events. This includes the collapse of three US banks in March 2023 (i.e. Silicon Valley Bank, Silvergate, and Signature Bank) that had concentrated their operations on technology start-ups and cryptocurrency clients. Meanwhile, Credit Suisse was taken over by UBS following a crisis of confidence (Thompson, 2023) that can be traced back to Credit Suisse's involvement with one of the UK Government's supply chain finance (SCF) providers, Greensill Capital, which collapsed in 2021. Such events have focused more attention on SCF – a relatively new solution that supports the financial management of supply chains – where banks, and increasingly fintech firms (e.g., Greensill), play a key role (Gelsomino *et al*., 2022; Hofmann and Johnson, 2016) as funders.

SCF is becoming an increasingly prominent topic within supply chain management research (Babich and Kouvelis, 2018; Caniato *et al*., 2019; Choi and Ivanov, 2019), reflecting a growing recognition that understanding the monetary exchanges that take place within supply chains is as important as understanding the exchanges of goods and information (Blackman *et al*., 2013; Silvestro and Lustrato, 2014). Although the different forms that SCF can take has created interest in its technical aspects, particularly the interest rate arbitrage potential (Iacono *et al*.,2015; Liebl *et al*., 2016), there has also been growing interest in the implications of financing arrangements for the organisation of supply chains. This includes considering the broader benefits and outcomes (e.g. Caniato *et al*., 2016; van der Vliet *et al*., 2015) and both the adoption decisions and implementation processes of SCF users (e.g. Iacono *et al*., 2015; Martin and Hofmann, 2019; Wuttke *et al*., 2016).

SCF has come to greater prominence in the world at large – both through fundamental changes in the supply chain environment (Moretto and Caniato, 2021) and through scandals involving the abuse of SCF, such as the cases of Carillion (Business Energy and Industrial Strategy and Work and Pensions Committees, 2018) and NMC Healthcare, plus the failures at Abengoa and Greensill (see Appendix A) (Jafari and

Kalousova, 2018; Moody, 2015; Wass, 2021). The Carillion collapse, for example, involved a large corporate firm exploiting SCF to claim it was supporting its extensive supply chains whilst extending its own payment terms to suppliers and obscuring its liabilities. A governmental position paper by the Australian Small Business and Family Enterprise Ombudsman (2020) suggested that SCF mechanisms are a useful and effective solution for unlocking cash in supply chains, but that they are being abused to exploit smaller suppliers and manipulate larger firms' accounts.

Furthermore, the increased involvement of less regulated fintech lenders, compared with traditional banks, in SCF relationships has prompted a pressing need to analyse the governance requirements of SCF. That is, the requirements for institutions and practices to ensure SCF is properly understood and practised in a way that does not cause detriment to supply chain members or other stakeholders. This also points to a need to understand the regulatory and operational risks that threaten SCF adoption and operations. In particular, the Greensill case raises fundamental questions about the governance of SCF since it involved not only businesses but also authorities and policy-makers. Thus, our research question is as follows:

RQ: *What governance practices are necessary to ensure supply chain finance is understood properly and executed responsibly?*

To answer the research question, an inductive, exploratory approach was employed to investigate the governance requirements of SCF. More specifically, the Gioia method was used to analyse reports of events involving SCF over the past two decades. We do this by, first, formulating a view of SCF governance from a synthesis of the three governance literatures before identifying SCF governance needs from articles about SCF in UK broadsheet newspapers. We find that SCF governance involves: (1) the need for a capacity to enable or control the entry and access of SCF actors and practices into SCF relationships; and, (2) the need for a capacity to continuously scrutinise the SCF operation, where five aspects need to be enabled and four aspects need to be controlled. We further develop a SCF governance model – based on the notion of a dual-layered semipermeable boundary – in which the layers represent the two phases of governance requirements, and the semipermeable boundary represents the paradoxical receptiveness of a SCF system that needs to selectively allow in or keep out certain actors and practices. The model is derived from the data on the basis of complex adaptive system (CAS) theory and boundary permeability.

The study makes three key contributions to the literature. First, it provides a systemic analysis of what we mean by SCF governance from three distinct governance literatures. Second, it identifies extensive aspects of governance that are required for successful SCF relationships. This extends the SCF literature that has thus far mainly focused on facilitating two aspects of governance, i.e. transparency and disclosure, by identifying a further four aspects of SCF governance that need to be enabled and four aspects of SCF governance that need to be controlled. Third, our proposed SCF governance model – based on the need to enact a dual-layered semipermeable boundary – provides a systematic analysis of what SCF governance has to accomplish. The model further extends the SCF ecosystem proposed by Bals (2019), supplementing it with complex adaptive systems thinking to reflect the complexity and dynamic nature of SCF relationships.

Our framework, consisting of both enabling and controlling aspects of SCF governance, can help guide SCF actors, particularly supply chain members, when making decisions about their participation in SCF relationships. Furthermore, the framework is useful for actors already involved in SCF as they endeavour to continuously monitor and assess their SCF practices and requirements. Other stakeholders, such as governments, authorities, and policymakers, can use the framework to oversee the entry, access and ongoing operations of SCF actors, including fintech firms, in a SCF programme.

The remainder of this paper is organised as follows. Section 2 reviews relevant literature on SCF and on the meaning of governance from three streams of literature (corporate, supply chain, and risk governance). Section 3 then lays out the inductive, qualitative Gioia method before Section 4 summarises the findings of our analysis. Section 5 presents a discussion and our proposed model of SCF governance requirements before we conclude in Section 6, identifying the contribution of the work and acknowledging its limitations.

2. Literature Review

To define and investigate the governance requirements of SCF, this study reviews both SCF literature and governance literature.

2.1 SCF Literature

2.1.1 Definition, Categorisation and Mechanisms

Definitions of SCF vary widely in detail but generally share the notion of financing that is somehow joint or collaborative within a supply chain (SC). For instance, Hofmann (2005) defined SCF in terms of multiple (i.e. two or more) SC members jointly managing the flow of finance, and More and Basu (2013) referred to the management of cash flows between 'SC stakeholders'. Generally, SCF is concerned with the funds needed to support short-term operations and bridge the working capital gap between when a company pays its suppliers and when it is paid by its customers, i.e. the cash-to-cash cycle (Lekkakos and Serrano, 2016; Randall and Theodore Farris, 2009). The longer the gap, the costlier the finance needed to fund operations (Randall and Theodore Farris, 2009). Finance mainly comes from external sources, typically banks and more recently also fintech firms, with the cost of finance being primarily dependent on a firm's creditworthiness (Liebl *et al*., 2016; Silvestro and Lustrato, 2014). It is important to note that we follow the convention adopted by several other authors that have used SCF in a broad sense of the term (e.g. Caniato *et al*., 2019; Chakuu *et al*., 2019; Chen *et al*., 2021). In other literature, the term *supply chain financing* is sometimes used as the broad concept (Caniato *et al*., 2016; Hofmann *et al*., 2021) and SCF is reserved for referring to a specific SCF mechanism, particularly reverse factoring (Wuttke et al., 2013; Lekkakos and Serrano, 2016).

With regards to categorisations and mechanisms of SCF, it is generally acknowledged that there is inconsistency, if not confusion. Wang *et al.* (2020), despite acknowledging a broader category, limited their study of SCF adoption drivers to three types of SCF, namely account receivables (e.g. factoring), account payables (e.g. reverse factoring), and inventory finance. Gelsomino *et al*. (2022) distinguished between the most frequently adopted SCF mechanism, i.e. reverse factoring, and alternative, sophisticated triadic and tetradic SCF relationships involving both financial institutions and fintech firms, e.g. purchase order finance and inventory finance. Lin and Peng (2021) modelled a tetradic SCF comprised of a third-party logistics provider, a bank, a B2B platform provider, and small and medium-sized enterprises (SMEs) in an effort to prevent collusion in SCF relationships. Meanwhile, instead of focusing on the number of parties involved, Phraknoi *et al.* (2022) proposed dyadic SCF and triadic SCF on the basis of independence *versus* entanglement of the SCF relationships – arguing that a triadic SCF arrangement

can be more than three parties, e.g. tetradic or pentadic relationships — where three is the minimum number of actors required in a contractual relationship. The key characteristic of triadic SCF is that the supply of finance becomes coupled to a supply chain relationship when a supplier/distributor obtains finance from its supply chain partner's bank instead of from its own bank (Phraknoi *et al*., 2022).

Among common SCF mechanisms, as described in Appendix B, two SCF mechanisms – reverse factoring and dynamic discounting – have received the most attention from scholars and practitioners due to their benefits, particularly for SME suppliers with limited access to finance (de Goeij *et al*., 2021; Gelsomino *et al*., 2018; Hua *et a*l., 2022; Liebl *et al*., 2016). But they have also been heavily criticised for being open to abuse or manipulation (Australian Small Business and Family Enterprise Ombudsman, 2020). Reverse factoring is purportedly offered in exchange for an extended payment term. Carillion and Abengoa S.A are examples of notorious cases of corporate firms using reverse factoring to exploit their SME suppliers by allegedly forcing standard supplier payment terms of 120 and 219 days, respectively (Gelsomino, 2022).

Likewise, dynamic discounting is defined by The Global SCF Forum (2016) as a variant of reverse factoring, where the money comes from the corporate buyer instead of the funder (Gelsomino *et al*., 2018; Hua *et al*., 2022). In this relationship, a fintech platform provider, apart from facilitating transactions and information flows between supply chain partners, can also play an important role in helping the corporate firm improve its profits by obtaining a discount rate using artificial intelligence or other disruptive technologies (Australian Small Business and Family Enterprise Ombudsman, 2020). Dynamic discounting, which is frequently offered with or instead of reverse factoring by corporate buyers, was questioned by the Australian Small Business and Family Enterprise Ombudsman regarding its use of *"artificial intelligence (AI) and algorithms to target small businesses by dynamically setting SCF fees* [discount rate] *to extract the greatest possible return from small businesses, including those that are already in distress"* (2020, p.4).

2.1.2 Actors and Governance Concerns

As mentioned earlier, the minimal unit in triadic SCF arrangements such as reverse factoring and distributor finance is three actors ─ a corporate firm, a supplier or distributor, and the funder (Phraknoi *et al.*, 2022). Among the three actors, the funder (i.e.

a bank or a fintech lender) can complicate the SCF relationship further depending on the underlying funding model being used (see Appendix C) (Global Business Intelligence Corp, 2012; PwC, 2018). Conventionally, a funding model is straightforward, involving a bank as the funder using its own platform (i.e. single bank, single platform). Similarly, a corporate firm may also develop its own platform using one or multiple banks. However, banks often partner with fintech firms, either fintech platform providers or fintech lenders, resulting in more complex funding models (Gelsomino *et al*., 2022). For instance, a bank may partner with a fintech platform provider instead of using its own in-house developed platform, e.g. Barclays using PrimeRevenue's platform (PwC, 2018). To mitigate risk, a bank as a lead funder may partner with fintech lenders or other banks to form a syndicate that co-funds a SCF programme. A fintech lender may also take on the role of a bank by acting as the lead funder, e.g. Greensill, and partner with a fintech platform provider, e.g. Taulia, to provide SCF. To further complicate SCF relationships, the funder often adds an insurer that provides credit risk mitigation in SCF relationships (Global SCF Forum, 2016). This SCF actor is generally overlooked in the literature but evidently played a part in the collapse of Greensill (Wilson, 2021). Lastly, logistics service providers can add another layer of complexity to SCF relationships (Chakuu *et al*., 2020; Lin and Peng, 2021).

The involvement of fintech firms has brought about several advantages to SCF relationships. Fintech lenders offer early payment, finance, and cash flow solutions via disruptive technology, e.g. via an online SCF platform and by using artificial intelligence (Nicoletti *et al*., 2017). By utilising alternative data sources as well as artificial intelligence to assess risk, fintech firms enable lending to small-sized businesses that would otherwise have limited or no access to finance under the traditional credit-scoring methods generally used by banks (Nicoletti *et al*., 2017). This has increased financial inclusivity towards underserved SME suppliers (Tsai and Peng, 2017). The advancement of technology also helps accelerate the flow of information and mitigate issues of information asymmetry and transparency among SCF actors (Gelsomino *et al*., 2022; Song *et al*., 2022). Moreover, fintech involvement has been highlighted as an alternative, sophisticated SCF mechanism that requires supply chain transparency (Gelsomino *et al*., 2022).

Fintech involvement has, however, posed unprecedented risks. In addition to increased complexity in terms of the parties involved (Li *et al*., 2022), fintech lenders

face far less regulatory constraints when compared to traditional banks (Tsai and Peng, 2017). Prior research has identified a particular need for better regulation of fintech lenders (Tsai and Peng, 2017). In the context of SCF, while traditional banks gain a small margin from SCF programmes, essentially from a discount paid in exchange for an early payment, a fintech lender may repackage the financing arrangement into a bond-like investment and sell it on to investors (Wilson, 2021). Although insurance can make the bond-like investment almost risk-free to investors, failing to find an insurer proved to be a factor in the collapse of Greensill in 2021 (Wilson, 2021). The collapse raised increasing concerns regarding the regulatory and operational risks of fintech lenders and regarding reverse factoring. Thus, despite their positive contributions, the risks posed by fintech lenders should not be neglected. There is a clear need to better understand how to mitigate the risks introduced by fintech lenders to SCF relationships as well as to supply chains as a whole. It is an imperative to identify a SCF governance approach that strikes a balance between maximising the benefits that fintech firms and sophisticated SCF offers and protecting supply chains from the potential underlying risks.

2.2 Governance Literature

In this section, we reach a particular understanding of what should constitute governance in our analysis of SCF governance requirements by referring to the three, mostly quite separate, literatures on corporate, SC and risk governance.

From the corporate governance literature, we take the notion of monitoring or oversight of an institution being kept separate from its management. This includes structures and processes of oversight (Hambrick *et al*., 2008), orderliness of organisations (Williamson, 1996), and provisioning and monitoring of resources (Bloomfield, 2013; Schiehll *et al.*, 2017). Governance specifically concerns the coordination of potential agency problems or conflicting interests, and it is something other than the use of normal mechanisms such as contracts (Dixit, 2009; Hart, 1995). In terms of actors involved, there is a need for a more comprehensive stakeholder approach rather than a narrow focus on investors and management (Shleifer and Vishny, 1997; Werder, 2011).

The supply chain governance literature has a somewhat different emphasis, although with clear links to corporate governance. For instance, the three aspects of supply chain governance – contractual, relational and transactional – are somehow embedded in a company's structures and processes, not separate (Dolci *et al*., 2017). Although it is a way of governing a network of organisations, supply chain governance

tends to be seen as something that belongs to each firm individually. Several studies view trust as a governance mechanism or a system for dealing with uncertainty – particularly the possibility of opportunism (Carson *et al.*,2003; Ghosh and Fedorowicz, 2008; Gulati and Nickerson, 2008; Williamson, 1991). Types of governance can range from markets through to hierarchical organisations (Gereffi *et al*., 2005; Nyaga *et al.,* 2010), while the choice of governance is contingent on factors such as transaction complexity, the susceptibility of transactions to codification, and the capabilities of the supplier community (Albers *et al*., 2003; Gereffi *et al*., 2005). Therefore, literature has shown that the main challenge in governing is to coordinate the multiple interests that come together in supply chains in a way that is contingent on the nature of the relationships between actors. In contrast, the central challenge associated with corporate governance is how to maintain a satisfactory order that preserves a collective interest. This may extend to broader societal interests; for example, Mueller *et al*. (2009) argued for the incorporation of sustainability in supply chain governance.

Finally, in the risk governance literature, governance is defined as a network of mutually-dependent actors rather than a hierarchy or a market (Palm and Törnqvist, 2008). There is an emphasis, similar to supply chain governance, on employing governance to handle uncertainty and on organising uncertainties in governable ways (De Vries *et al*., 2011; Lidskog and Sunqvist, 2012). There is also an acknowledgement that governance involves resources; thus, Cook *et al.* (2010) suggested that the job of risk governance is to achieve 'collective goals' in the coordination of a society's risk-managing resources. Despite this variety, definitions generally preserve the overall sense of governance as organising our ways of dealing with risk to reflect both uncertainty and collectivity. It is therefore a type of governance that operates above the basic management of risks and is about ensuring that this management respects a collective interest.

What ties the three literatures on governance together are two fundamental qualities. The first is the capacity for reflexive oversight, in which some collective entity has a capacity not only to perform substantive functions like production and precaution but also to reflexively scrutinise and bring order to the performance of these functions. The second is the coordination of interests within this collectivity. The collectivity may be a group of individuals or organisations, but there are necessarily multiple interests to reconcile. The literatures suggest that it is also important to take a fluid view of what the relevant collectivity is for any particular issue. In the case of SCF, it will include supply

chain members between whom there are financial flows, but it may also include banks and fintech firms or extend to standards bodies, market regulators and other stakeholders.

2.3 SCF Research on Governance

2.3.1 Governance in the Context Of SCF

The SCF literature is primarily technical, typically using analytical and simulation methods. In addition, there is also a line of work consisting of empirical studies on SCF adoption that are relevant to governance, where the focus is mainly on facilitating a few related aspects of governance, i.e. transparency, disclosure, and information technology. For example, Chen *et al*. (2019) proposed that network governance, based on banks' e-commerce platforms, can facilitate SCF through the mitigation of asymmetric information and the credit-rationing of farmers in agricultural supply chains. Gelsomino *et al*. (2022) highlighted the role of technology in facilitating supply chain transparency in sophisticated SCF mechanisms. In addition, voluntarily disclosing the use of reverse factoring to investors is encouraged (Gelsomino, 2022).

Technology plays an increasingly prominent role in providing transparency to supply chains and SCF. Advanced technology, such as artificial intelligence and digitalisation, can support the provision of credit facilities (Gelsomino *et al*., 2022) while blockchain technology can help to enable visibility (Dong *et al*., 2022). Many fintech firms use blockchain to ensure privacy, prevent information leakage, and to verify transactions among SCF actors (Dong *et a*l., 2022). Visibility gained through blockchain also enables manufacturers to make informed decisions in offering SCF to their deep-tier suppliers (Dong *et al*., 2022). Nonetheless, by examining web-based big data about blockchain, Kucukaltan *et al*. (2022) revealed a rather surprising finding, that interest in blockchain technology is in fact focused on its advantages in enhancing digitalisation and efficiency rather than being focused on its finance-related security or data privacy potential.

Studies that focus on identifying preventive mechanisms include Liu *et al*. (2021), who explored the role of information governance in mitigating opportunistic behaviour in SCF relationships. In addition, Lin and Peng (2021) modelled the use of incentive mechanisms to prevent collusion between B2B platforms and SMEs in online SCF relationships. Lastly, despite not explicitly focusing on governance, a systematic review by Bals (2019) provided useful insights into SCF as an ecosystem comprised of seven dimensions and one perspective in which the market and regulation dimension underlines

the importance of governance in SCF relationships. However, the author's discussion of these dimensions does not consider the interactions between, for example, specific products (SCF mechanisms) and stakeholders (SCF actors).

2.3.2 Theoretical Frameworks in the Context of SCF Governance

Theory development in the SCF literature is still at a nascent stage of development. Among limited studies on SCF governance, the theoretical lenses of agency theory and transaction cost theory are mainly used. For example, Lin and Peng's (2021) model of tetradic SCF was based on agency theory while Liu *et al*. (2021) used two factors from transaction cost theory, i.e. opportunism and uncertainty, to investigate opportunistic behaviour in SCF. Gelsomino *et al*. (2022) employed both theories as well as dynamic capability theory to analyse transparency. Chen *et al*. (2019) used network theory while the notion of a business ecosystem was introduced in Bals's (2019) systematic literature review. The author recommended that future research studies the dynamic among the author's proposed dimensions, including products (SCF mechanisms), stakeholders (SCF actors) and market and regulations.

This leads us to another concept that can be useful in understanding the dynamics and complexity of SCF relationships: complex adaptive system (CAS) theory (Choi et al., 2001; Wycisk *et al*., 2008). CAS has three components: 1) internal mechanisms, involving agents and self-organisation; 2) the environment; and, 3) co-evolution between the internal mechanism and the environment (Choi *et al*., 2001). A network of agents (entities) is the basic building block of a CAS (Dooley, 1997). CAS is a self-organised system (a network of agents) that adapts and organises itself without being controlled by any individual agent in the network (Choi *et al*., 2001; Wycisk *et al*,. 2008).

The environment can be divided into internal, i.e. other actors and their interconnections within the system, and external, i.e. other actors and their interconnections outside the system (Choi *et al*., 2001). CAS focuses on interactions and dynamic change for the purpose of 'goodness or fitness' between a system and its environment (Choi *et al*., 2001; Surana *et al*., 2005). Agents continually scan their immediate environment in order to develop a set of rules that enable them to interact with other agents, both within a CAS (internal environment) and outside (external environment) the system boundaries (Choi *et al*., 2001; Dooley, 1997).

An agent is semi-autonomous, co-evolving with its environment by adding or eliminating their connections with other agents based on the permeability of the system boundary (Dooley, 1997). Co-evolution means the environment can force changes in the system, which in turn causes changes in the environment (Choi *et al*., 2001). Boundary permeability refers to the degree of receptiveness and serves as a dual function, i.e. to allow or regulate exchanges between the inside and outside (Aldrich and Herker, 1977; Leifer and Delbecq, 1978; Roberts, 2019). There are three types of boundary permeability (Huang *et al*., 2017). A permeable boundary allows for a free flow across the boundary whereas an impermeable boundary blocks all exchanges (Gander *et al*., 2007). In between is a semi-permeable boundary that allows some exchanges to cross the boundary, but not others (Gander *et al*., 2007).

Boundary permeability has been used in organisational studies to analyse and manage organisational boundaries at the firm level, e.g. highlighting the protectionist function of the firm boundary (Kastl, 2014), and pointing to the imitation or contamination of resources when there is increased boundary permeability in alliances (Gander *et al*., 2007; Tsang, 1998). Meanwhile, at the network level, scholars have examined the boundary-spanning role of first-tier suppliers in multi-tier sustainability initiatives (Jia *et al*., 2021).

3. Research Method

3.1 Research Design

This study analyses the governance needs of SCF through a qualitative, inductive approach based on known events involving SCF. The data consists of news articles published in the UK broadsheet press, exploiting the access that journalists can obtain. The essential design was to analyse articles in the authoritative UK press, qualitatively and inductively, on the basis that each article in some way describes an event involving or implicating SCF. Such analysis was intended primarily to determine a structure for SCF governance requirements. Our basic assumption was that journalists working for the broadsheet press could gain a type of access that was particularly suited to revealing how SCF had affected, often adversely, the interests of stakeholders. The role of scholarly analysis was then to explore the reported events as a whole body of experience, to abstract away from idiosyncratic details and develop a more theoretical understanding than is provided in journalistic accounts.

Considering that we aim to broaden the view of SCF governance, and given the under-researched state of the literature on SCF governance, we opted for an exploratory approach and employed the Gioia method to construct all data-to-theory connections and enhance a grounded-theorising process (Gelsomino *et al*., 2022; Gioia *et al*., 2013). Although utilising secondary data seems uncommon among grounded-theorising approaches, it is actually recommended when handling a large data set (Dufour and Richard, 2019; Timonen *et al*., 2018; Whiteside *et al*., 2012).

The Gioia method builds a basis for a systematic data structure via three steps: 1) identify first-order concepts from the data using data-centric terms and codes; 2) develop second-order themes using researcher-centric themes; and, 3) aggregate the themes into aggregate dimensions to construct the theory (Gioia *et al*., 2013). As a general concept of governance does not predict the specific governance needs of SCF, we derive our first-order codes from the data using terms from the news articles. More specifically, when we search for governance requirements in the data we look for concerns about: (1) the proper and orderly functioning of SCF; (2) the activities and motives of participants; and, (3) how the interests of participants and stakeholders are being affected. Following the Gioia method, first-order concepts, second-order themes and the aggregated dimensions of governance requirements were derived from a reading of the data through a process of constant comparison carried out by two researchers who independently examined the new articles, either sentence-by-sentence or paragraph-by-paragraph (Charmaz, 2014).

3.2 Sampling Structure

The sample consisted of 849 articles (1,457 articles before removing duplicates and irrelevant articles) from the UK broadsheet press (Financial Times (FT), Times, Sunday Times, Guardian, Daily Telegraph, and Independent), retrieved by searching the Nexis database using "supply chain financ*" as a broad search term (see **Supplementary Material A**). The numerous duplicates are a result of news having various editions. For example, a news article by the Financial Times (FT) "*Credit Suisse banker loses role over use of message apps; Kontoleon leaves top syndicate post? Sector crackdown on record keeping*" had four editions, namely the Asian, European, USA, and National editions. A numerical profiling over time revealed very little use of the term before the year 2000 so the sample extends from the start of 2000 to December 2022. Given the relatively specialised nature of SCF, it is unsurprising that the Financial Times was the most represented source by a wide margin. Although the data were centred around 2021, due

to the significant press coverage of major events at that time, our findings cover most years, as illustrated by the sample of quotes [1] to [58] in **Supplementary Material C**. Types of events within the sample included corporate failures, fraud, immoral acts, reputational losses, the entry of new players (i.e. fintech firms), weak rules and regulations, and disruptions to activities. Event types do not partition the set of articles into mutually exclusive groups as some reports involved more than one type of event.

3.3 Analysis Procedure

No theory was committed to in the data analysis. We adopted the Gioia method (Gioia *et al.*, 2013; Gelsomino *et al.* 2022) and derived our first-order concepts, second-order themes and aggregated dimensions by reading the data, isolating fragments of text that suggested governance requirements, and then finding successively more abstract ways of categorising such requirements.

Generally, it was straightforward to infer some governance requirements from the text, where it described concerns about the proper and orderly functioning of SCF, concerns about the activities and motives of the actors engaged in SCF, or concerns about how the interests of actors and other stakeholders in SCF were being affected. This process conceptualised "the underlying pattern of a set of empirical indicators within the data" (Glaser and Holton, 2004, p. 12) and subsequently produced a code or label that best captured the meaning of the pattern that inductively emerged from the data (Birks and Mills, 2015). There was a process of constant comparison (Glaser, 2002) in which fragments of text were assessed under existing concepts before new concepts were generated, and concepts were continually reviewed and refined to make overall sense of the analysed data set as it expanded. The analysis was led by two researchers, and regularly discussed and revised in discussion with the other. The first step resulted in a final list of 29 first-order concepts.

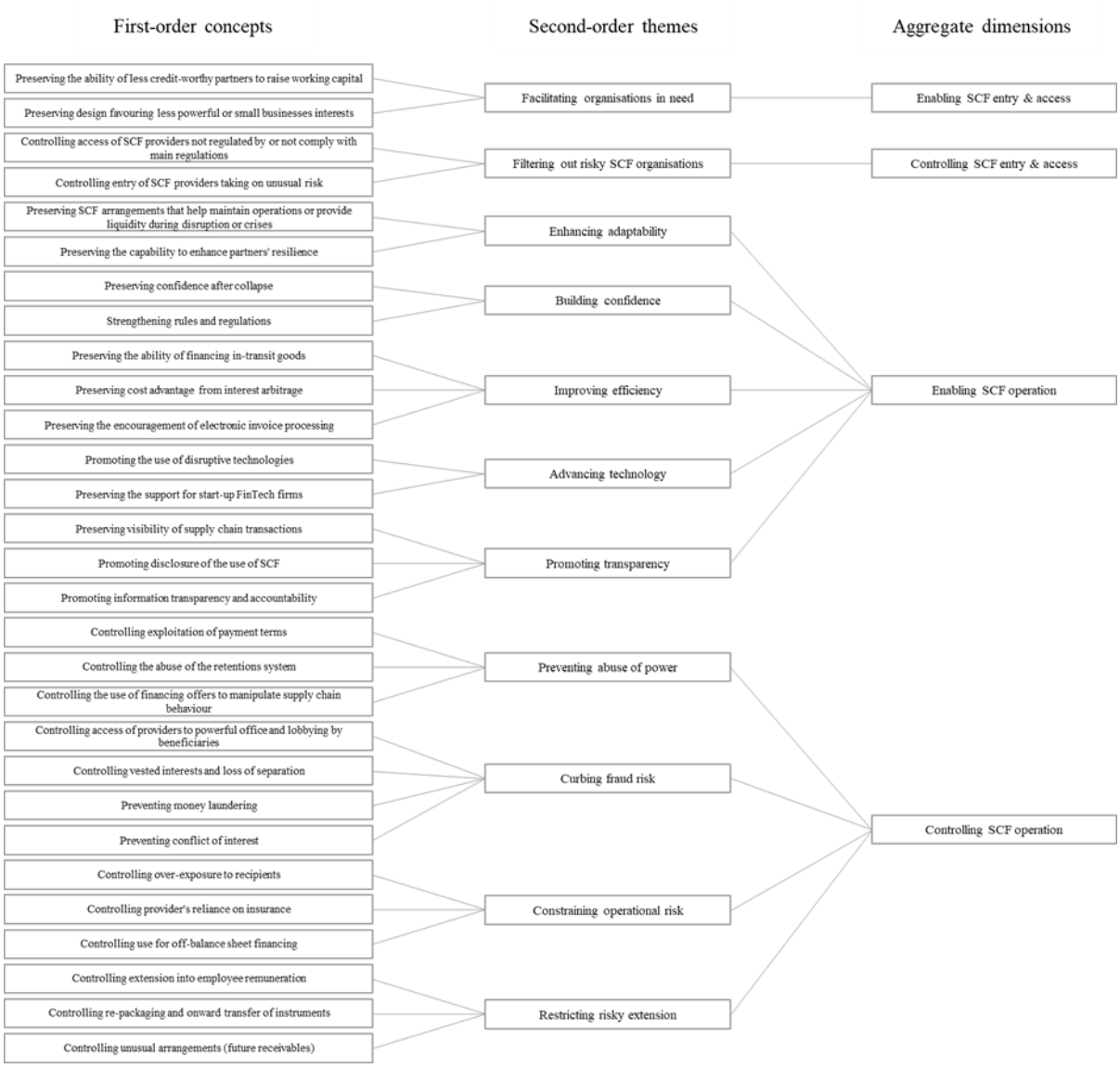
The first-order concepts were then grouped by emerging themes in a second-order level analysis. These themes were discussed and refined among the three researchers, with themes that were considered too technical being clarified or simplified. For example, an initial first-order concept, 'Controlling over-exposure to recipients', was labelled a temporary theme named 'Scale' before being later merged into the 'Curbing operational risk' theme after a meeting to discuss and clarify the codes. Constant comparison involved two researchers reviewing and comparing excerpts to verify the appropriateness of the existing concepts and themes or to identify new ones. The themes were then further

developed into abstract aggregate dimensions. In addition, after the initial data structure was established, the authors went back and forth to refine the interrelationships between the concepts, themes, and dimensions. During this process, the distinction between the governance requirements for the initiation and operation stages of SCF, as well as the enabling and controlling needs, became clearer.

During the data analysis we observed that there is a lot of repetition in the press coverage, especially around the Greensill case. This means the coverage may well miss much smaller but equally instructive events, but it also enables us to argue for 'saturation' in many accounts. It is also evident that there is a change in the tone and narrative around SCF in the reports. Before the collapses of Carillion and Greensill, news regarding SCF appeared to be positive. Since many of the events deal with issues that are really issues of pure financial institutions, our analysis purposely maintained a focus on SCF. In other words, it is only where supply chains are somehow implicated that we have an interest. Again, this is clear in the Greensill case, most notably.

It is also important to emphasise that the data is not being used to assert factual claims about SCF governance – for example, that there is satisfactory adaptation in SCF mechanisms to supply chain disruption, or that there are unsatisfactory levels of opacity in such mechanisms. Instead, it is being used to assert that there are categories of concern in the governance of SCF. Our assumption is that informed journalism indicates a normative category in the world, not that it is a correct or an unbiased account of events. The final data structure can be seen in Figure 1.

Figure 1. Data structure



3.4 Research Quality

Grounded theorising presents particular issues for traditional validation procedures; therefore, we followed Charmaz's (2014) framework, which is based on four overarching criteria (credibility, originality, resonance, and usefulness), where each is based on a series of sub-criteria. These four criteria essentially cover similar ground to other notable schemes that have been proposed by Glaser (1978) and Yin (2014). The essential outcome of applying Charmaz's framework is a series of 18 statements substantiating how the criteria are met, as outlined in **Supplementary Material B**.

4. Findings

Data analysis revealed that governance requirements for SCF expressed in the newspaper articles can be divided into four dimensions concerning either enabling and controlling certain SCF actors or practices. Each dimension is made up of one to five aspects (themes) of SCF governance and, under each aspect, more specific concepts form the basis of each aspect (see Figure 1). In addition, the four dimensions can be further aggregated into two phases of SCF governance, which are SCF governance requirements for the *Entry and Access* phase and SCF governance requirements for the *Operation* phase. The following sub-sections elaborate the findings organised around the two phases and the four dimensions. More specifically, Section 4.1 summarises both the actors or practices that need to be enabled or controlled at the *Entry and Access* phase of SCF. Section 4.2 then presents the practices that need to be enabled or controlled to ensure the proper operation of SCF. Illustrative quotes for each concept are given in **Supplementary Material C,** where each quote was allocated a reference number from [1] to [58]. The reference numbers are used in Section 4.1 and Section 4.2 to support the presentation of the findings.

4.1 SCF Governance Requirements for Entry and Access Phase

To properly govern the entry and access of actors and practices into SCF, appropriate gatekeeping needs to be in place. Therefore, the governance for this phase focuses on the need to screen SCF actors and practices in order to either allow in or keep out certain actors and practices. The dual implication is evident, as outlined below.

On the one hand, in this phase, it is found that SCF governance needs to be able to ***facilitate organisations in need*** to enter SCF programmes. More specifically, it is important to enable less credit-worthy actors, e.g. SME suppliers, so they can gain access to less expensive finance through SCF programmes, such as reverse factoring. For example, Santander was reported to have rolled out measures to boost working capital for SME suppliers to improve their cash flow in 2012 [2]. In addition, it is also crucial to preserve SCF solutions that favour the interests of small businesses, as cited by a think tank, the Procurement Intelligence Unit, and for government to actively promote SCF models to small suppliers [4]. Furthermore, SCF governance needs to promote the use of technologies that allow SCF platforms to take on more SMEs. For example, technologies developed by a technology company called OneConnect are able to extract a wide range

of company data at a low cost to evaluate potential new clients, which reduces the costs of due diligence required [3].

On the other hand, the findings show that governance that can ***filter out risky SCF organisations*** needs to be in place as there are particular concerns centred around the need to control the entry and access of certain SCF providers. More specifically, although SCF providers such as fintech firms help reduce high fees from incumbent SCF providers, fintech firms can easily evade important norms, standards and rules that could moderate or control their behaviour. For example, it is reported that market disruptor fintech firms, such as Greensill, are not subject to capital adequacy and stress tests and often take on risks that banks would be uncomfortable with [8], such as by funding predicted future receivables instead of approved invoices or using investors' money rather than banks' balance sheets to fund SCF [5]. A stricter entry control for the current financial system is thus needed to prevent risky SCF providers from being allowed into the market. Meanwhile, Members of Parliament (MPs) have highlighted that reforms are needed for the financial system to avoid inappropriate people from taking control of banks and to avoid the outsourcing of regulation to third parties [6]. Therefore, SCF governance at this phase needs the capacity to simultaneously enable and control new entrants.

4.2 SCF Governance Requirements for Operation Phase

Similar to the *Entry and Access* phase, governance requirements in the *Operation* phase concern both the enablement of five aspects (Section 4.2.1) and the control of four aspects (Section 4.2.2), as discussed in the following subsections.

4.2.1 Governance Requirements to Enable SCF Operation

Once within the SCF Operation stage, it is necessary to make sure that actors are well supported and good practices are promoted. More specifically, the following aspects need to be enabled.

Enhancing adaptability. One of the key advantages of SCF is adaptability, and thus it is imperative to enhance this. SCF has gained attention due to its ability to provide working capital that maintains operations during disruptions. For instance, reverse factoring was offered by some corporate firms to help their suppliers during Covid-19 [9]. Adaptability is closely related to the resilience of supply chains, especially the recovery period after disruptions or crises. For example, an uptake of SCF was seen to

ease the pressure on the construction supply chain after the 2008 recession by providing construction companies, especially SMEs, with better access to finance [10]. Besides, SCF provides suppliers with the ability to raise working capital on their buyer's superior credit rating, which helps to improve suppliers' cash flow, thus making the supply chain more resilient [12]. The above examples reflect the two key elements of Adaptability, which are able to *provide liquidity during disruption or crisis* and *preserve the potential to enhance partners' resilience.*

Building confidence is crucial after a series of high-profile bankruptcies in relation to SCF. Continued collapses of businesses and financial providers, both fintech firms and banks, in recent years have caused a crisis of confidence. This implies the need to restore the confidence of the financial market in general and SCF in particular, as well as solidifying existing rules and regulations. Thus, this aspect involves both *preserving confidence after collapse* and *strengthening rules and regulations*. For example, the traditional financial institution Mastercard has joined up with the UK fintech firm Demica to offer SCF to business clients, showing the robustness of demand for the lending product even after the Greensill collapse [13]. Such initiatives are necessary for relevant stakeholders to regain confidence. A need to solidify existing rules and regulations was evident from the report by the UK's Treasury Select Committee, which revealed that Greensill was able to take advantage of considerable regulatory underlap between key financial regulators, i.e. the Bank of England, Prudential Regulation Authority (PRA), and the Financial Conduct Authority (FCA) [15].

Improving efficiency is comprised of three concepts: *preserving cost advantage from interest arbitrage*, *preserving the encouragement of electronic invoice processing*, and *preserving the ability of financing in-transit goods*. This aspect concerns a need to maintain the key benefits of SCF, which are the lower cost of finance for less credit-worthy supply chain partners, digitalised invoice processing, and the provision of working capital for goods in transit (e.g. inventory financing). The two benefits of interest arbitrage and digitalisation are rather well recognised [19]. Nonetheless, the ability to provide finance for in-transit stocks appeared to be less acknowledged. The ability to finance goods in transit can be significant in supply chains where outsourcing and offshoring are dominant strategies, particularly during disruptions. For example, it is acknowledged from the news that goods transported by sea often require more than a month to be delivered meaning SCF could come in to assist with the cashflow of

manufacturers [17]. Therefore, the financial side of the supply chain remains an area where further efficiencies can be realised [20].

Advancing technology. This concept involves a need to promote the use of disruptive technologies, in particular blockchain and artificial intelligence. The use of technologies can help reduce the amount of documentation, time and labour required to process transactions. More specifically, blockchain is reported to be able to help reduce fraud and excess fund requests. For example, by logging a trade onto the blockchain, all parties involved in the trade can view the level of financing requested and thus reduce the possibility of certain parties requesting more financing than they actually need [23]. Moreover, fintech start-ups that possess technologies need to be well supported and funded as they often bring technological capabilities that could help small businesses gain more access to funding. This support includes free legal consultation, networking opportunities with established firms, and access to early-stage funds [25]. An increase in funding for and interest in start-up fintech firms leads to more SCF solutions being tailored to the needs of SMEs [26].

Promoting transparency. Although the concept of transparency is not new to supply chain management or governance, we find transparency for SCF governance needs to extend beyond merely transparent and visible transactions among supply chain members to cover broader stakeholders' needs for disclosure and accountability for the use of SCF. SCF often brings in fintech firms that specialise in technology-based finance solutions. It thus poses challenges for regulatory bodies to monitor their behaviour and the transactions that they are involved in. Therefore, transparency over transactions between all involved parties needs to be enhanced. Blockchain technology is proposed as a potential tool to enable a high level of transparency as it enables all SCF actors to have sight of actual financing needs and helps to abstain firms from taking advantage of SCF [27]. Meanwhile, it is reported that, since there are no accounting disclosure rules regarding the use of reverse factoring, Carillion was able to conceal its debt from investors prior to its collapse [30]. Therefore, promoting disclosure of how SCF is being used is necessary to prevent SCF from being used as a way to mask a firm's perilous financial state. Furthermore, transparency and accountability have been advocated by the Shadow Cabinet Office Minister as being crucial to establishing the full facts behind any SCF scandal [31]. Therefore, to promote transparency in SCF, *preserving the visibility of*

supply chain transactions, promoting disclosure of the use of SCF, together with promoting information transparency and accountability are all necessary.

4.2.2 Governance Requirements to Control SCF Operation

The findings at the same time also indicate the need to control certain actors and practices so that SCF can remain properly functioning to support those in need of it.

Preventing abuse of power concerns the need to control supply chain actors from opportunistically exercising their supremacy to manipulate payment extensions, retention systems (construction sector), and sustainability compliance. This illustrates the three concepts of *controlling exploitation of payment terms, controlling the abuse of the retentions system, and controlling the use of financing offers to manipulate supply chain behaviour*. If not carefully controlled, SCF may become a 'payment bullying' tool for big players to exploit payment terms. For example, Carillion used the government's SCF programme to extend its supplier payment terms from 65 to 120 days [34]. Main construction contractors may have smoothed their problematic cashflows using retentions – money withheld from SME sub-contractors to ensure they rectify defects [35, 36]. When those main contractors went into insolvency, SMEs lost the money they were owed and some even went bust [36]. Besides, the use of SCF for sustainability has recently gained popularity. For example, corporate buyers offer SCF to incentivise ESG (environmental, social and governance) performance [37]. Although such a facility appears attractive, enabling SCF to influence supply chain behaviour towards sustainability, it is also susceptible to abuse and relies on compliance genuinely denoting substantive performance. For example, Tesco has been accused of trying to legitimise a late payment culture via the SCF scheme it launched. Tesco said that suppliers joining this SCF scheme can get paid quicker by paying a fee, which can be partly waived by disclosing their carbon emission data and by reducing carbon emissions. However, as opponents advocated, hitting the net zero carbon targets may be better served simply by paying suppliers quicker rather than introducing a complicated scheme that SME suppliers end up paying for [38]. Therefore, effective governance is essential to prevent potential abuse of power by powerful supply chain actors, ensuring responsible and ethical practices in SCF.

Curbing fraud risk concerns the need to prevent the use of SCF in and for fraudulent practice. To prevent fraud, there is a need to control actors with alleged questionable relations/organisations, such as in the case of the GFG Alliance, the Liberty

Steel Group (i.e. *controlling vested interests and loss of separation*) [39]. Meanwhile, it is important to revise lobbying rules and regulations regarding who can obtain access to authorities and policy makers to influence legislation about controversial issues such as the approval and adoption of the SCF model developed by Greensill [43] (i.e. *controlling the access of providers to powerful office and lobbying by beneficiaries*). This is also in relation to the need to *prevent conflict of interest.* An obvious conflict of interest was seen when the founder of Greensill was appointed as an advisor on SCF to the UK Prime Minister government [45]. Upon his appointment, he was granted access to the Cabinet Office and 10 Downing Street, which allegedly allowed him to leverage the position to gain clients for his private company but this did not provide material benefits to the government [46]. Finally, there is a need to establish concrete investigation procedures to *prevent money laundering*, particularly for fintech and non-bank providers, such as Greensill [41], as these SCF providers are not regulated by the two main regulators PRA and FCA, nor are they required to report to the money laundering regulators (Parliament UK, 2021).

Constraining operational risk concerns the need to ensure risk diversification in two dimensions. First, the need to restrain the amount of exposure of SCF providers to a few key clients (e.g. Greensill had about $5bn of exposure to the GFG Alliance group), known as concentration risk – as in the concept of *controlling over-exposure to recipient* [48]. Moreover, consideration and careful investigation should be given to red-flagging risks when financial providers rely heavily on insurance, as in the case of Greensill where Greensill's heavy reliance on Tokio Marine led to its collapse when the Japanese insurer refused to renew the policies– as in the concept of *controlling provider's reliance on insurance* [49]. SCF experts called for diversification of insurance coverage and income sources to prevent the organisation from being a victim of insurance concentration [48]. Moreover, carrying out systematic analysis about funding arrangements against a set of metrics, such as exposure, concentration, and type of industry is necessary, as suggested by risk management experts [48]. Another dimension involves how SCF appears in a firm's financial reports– concerning the need to restrain off-balance sheet financing techniques (i.e. *controlling use for off-balance sheet financing*). These issues have gained much attention recently as SCF has been used to conceal the true level of debt in the form of assets (accounts payable), e.g. in the Carillion case.

Restricting risky extension concerns the need to restrain the extent to which SCF practices may be unethically or irresponsibility extended or additional risky actors added. Firstly, there is a need to *control extension into employee remuneration* as such extensions heavily rely on the financial situation of the fintech firms that provide such an extension. For example, some fintech firms extended SCF mechanisms using questionable practices to provide options to NHS staff and other public sector employees to take their salaries early [54]. This early access is usually via the platform or app provided by fintech firms [53]. Once the fintech firms collapse, the SCF mechanism will be left unfinanced. Meanwhile, Greensill mainly funded its SCF mechanisms using money obtained from selling re-packaged debts to investors, and this tactic was one of the reasons that the financial crisis of 2008 occurred [56]. Therefore, there is a need to *control re-packaging and the onward transfer of instruments*). Moreover, lending against "prospective receivables" or future (non-existent) invoices can be too aggressive and risky [58], and thus there is a need to *control unusual arrangements (future receivables*). For example, selling future steel that, at the time it is sold, is still iron ore and coal in the ground instead of an approved invoice or existing accounts receivable can be risky because there is no guarantee that payment will be received for products that have not yet been produced or delivered [57].

5. Discussion

Following the data analysis, we conducted grounded theorising from the data based on CAS and boundary permeability, leading to three propositions and our proposed model of SCF governance requirements.

5.1 Defining SCF Governance

Since SCF governance is ill-defined, reviewing the three literatures on governance helped frame the concept of governance for this study. It is clear that each stream of the governance literature has a particular emphasis relevant to SCF: the concern in corporate governance is with agency and stewardship, the concern in supply chain governance is with the economic coordination of multiple organisations, and the concern in risk governance is with wider societal interests. Our conclusion is that governance should mean the reflexive regulation of multiple interests within some collectivity, i.e. the capacity of some coherent grouping to scrutinise and moderate its own operations. This

reflexivity distinguishes between governance and external regulation, which becomes important when controlling bodies that appear to be external are being influenced by an operation just as much as they are influencing it. We argue that this is true of SCF at present, where regulatory controls, such as standards, are in need of better adaptation to practice in order to balance the interests of SCF actors and the wider community.

In SCF relationships, the interests involve not only primary supply chain members, i.e. buyers and suppliers, but also secondary supply chain members, e.g. banks and fintech firms as well as other stakeholders such as insurers, investors, governments, and other authorities (Caniato *et al*., 2019; Chakuu *et al*., 2019). This coordination of interests should be conducted in such a way that it is contingent on the nature of the relationships between different collectivities of SCF actors (Martin and Hofmann, 2019).

5.2 What SCF Governance Needs to Accomplish

It is natural to think of governance in terms of regulation, and regulation – by mechanical analogy – as being to control by negative or corrective feedback. It is also perhaps natural to think of it as a restraining function, guarding against an entity stretching legal or moral boundaries, and the events at Carillion, and particularly Greensill, mentioned earlier reinforce this in the context of SCF specifically. But the findings clearly point to the way that SCF governance has a dual function of enabling as well as controlling in order to balance interests within the relevant SCF actors and stakeholders, particularly interests between supply chain members.

SCF mechanisms, like reverse factoring, can either amplify or attenuate power asymmetry, for example, depending on the practices of their deployment (Caniato *et al*., 2016; Wuttke *et al*., 2016). Such mechanisms may have been promoted on the basis that they attenuate supply chain asymmetries and criticised on the basis that they amplify these; but as mechanisms, they are capable of both and it is a central requirement of governance that it can distinguish between SCF practices in these terms. This also supports our definition of governance in terms of collectivities, within which interests are balanced. A view of governance constituted by the protection of certain parties does not have this sense of balance, and would be more likely to see governance only in terms of control, not enablement.

SCF governance must embrace both requirements to enable (or maintain, facilitate, or even promote) and control (or constrain, limit, or even curtail). There are two distinct

phases of governance requirements. The first phase, focusing on entry and access, involves the need to first either selectively allow in or prohibit SCF actors and practices from entering or gaining access to SCF relationships. Our first proposition is thus:

Proposition 1. *SCF governance involves a dynamic capacity to simultaneously: (a) maintain barriers to entry and access for problematic SCF actors and practices; and, (b) enable entry and access for the SCF actors and practices that are needed to ensure supply chains can continuously and efficiently finance their working capital gaps.*

In the second phase, governance needs to be able to continuously monitor and scrutinise the evolution of the SCF actors and practices to ensure their appropriate development. It is necessary to restrain or control the abuse of power, fraud risk, operational risk, and risky extensions to SCF practices while maintaining or enabling adaptability, confidence, efficiency, technology, and transparency. This leads to our second proposition:

Proposition 2. *SCF governance involves a dynamic capacity to selectively: (a) restrain or control the development of SCF practices or the introduction of new SCF actors that create problematic SCF relationships; and, (b) maintain or enable the development of SCF practices, or the introduction of new SCF actors, that create more effective SCF relationships.*

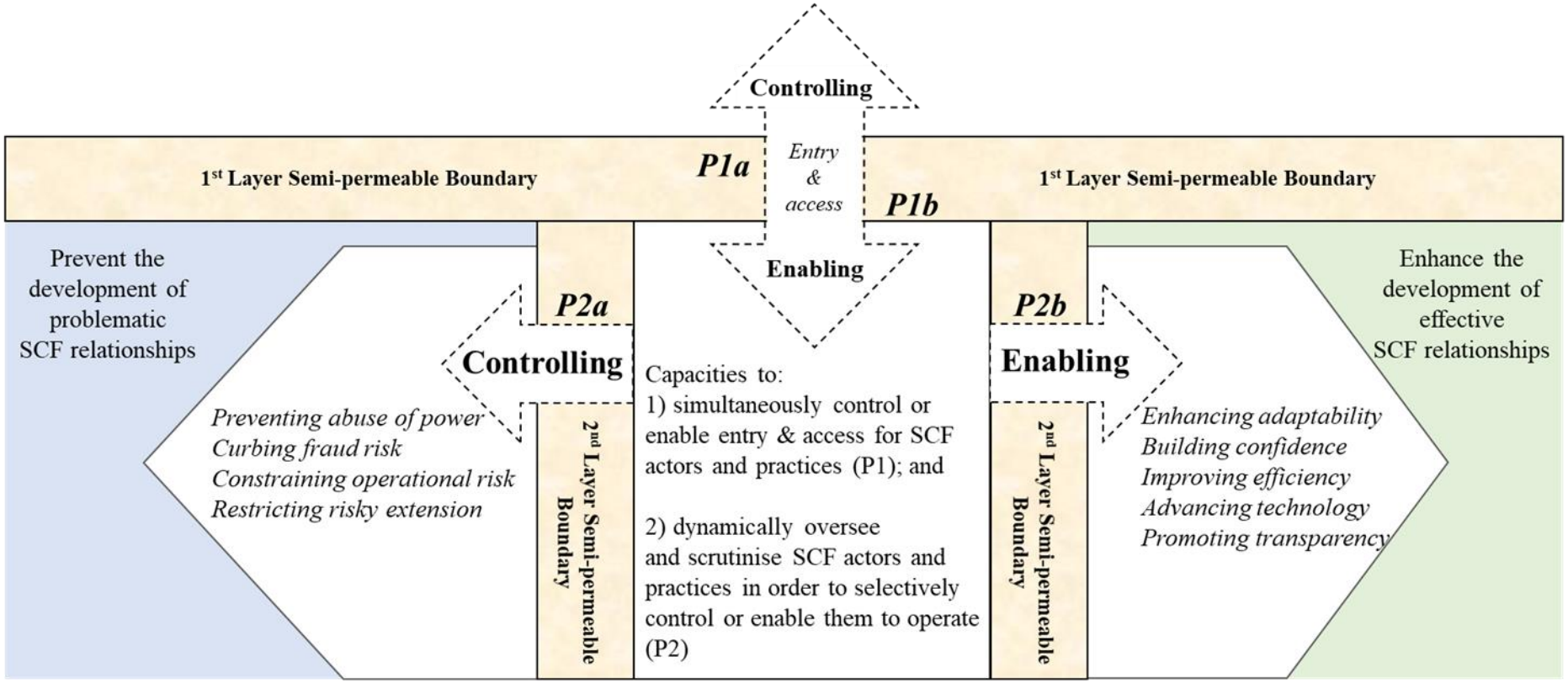
5.3 A Model of SCF Governance Requirements

The four dimensions and the two propositions (P1 and P2) above lead to our proposed model of SCF governance requirements. Drawing on CAS and the notion of boundary permeability, we theorise SCF governance requirements as a need to enact a dual-layered semipermeable boundary. The two layers reflect the two phases needed for SCF governance. The first, outer layer focuses on monitoring and scrutinising the entry and access of SCF practices and actors. This layer has the capacity to allow certain sets of SCF actors and practices to pass through it while prohibiting other sets. The admission and preclusion capacity of the first layer acts as a gatekeeper for robust and effective SCF relations. The semi-permeability of the boundaries allows the SCF system to selectively

add or eliminate SCF actors and practices from the external environment in the first phase and enable and oversee SCF actors within the internal environment in the second phase.

Due to a fluid construct of the collectivity of SCF organisation, SCF actors and practices that have passed through the outer layer may later evolve in terms of either changes in practices or actors involved. It is therefore essential that SCF governance incorporates another layer — the inner layer — that has the capacity to dynamically control certain practices (i.e. abuse of power, fraud risk, operational risk, and risky extension) while enabling other practices (adaptability, confidence, efficiency, technology, and transparency) in order to prevent the development of malpractices while promoting the development of effective SCF relationships. To summarise, Figure 2 depicts the dual-layered semipermeable boundary model of SCF governance requirements. Dashed lines on the arrows are used to illustrate the semi-permeability of the system boundary. The first layer boundary separates the SCF system from its external environment, i.e. other actors and their interconnections outside the system, while the second layer boundary separates the SCF system from its internal environment, i.e. other actors and their interconnections within the system.

Figure 2. SCF Governance requirements: The need for a dual-layered semipermeable boundary



Finally, we use CAS and the notion of boundary permeability to develop our third proposition. SCF exhibits properties of a CAS, where individual SCF actors (agents) organise into a SCF system (a collective/network of actors) that can evolve without being orchestrated by any single actor (i.e. self-organisation). More specifically, the environment of the SCF system can be divided into two parts, internal and external to the SCF system. SCF actors need to continuously scan their environment and dynamically adapt for the purpose of creating 'goodness or fitness' between the SCF system and its environment. A SCF system co-evolves with its environment by adding or eliminating connections and exchanges with other actors based on the permeability of the system boundary, as depicted in Figure 2. The semi-permeability of the SCF system boundary serves as a dual function, i.e. to allow certain actors and practices to cross the system boundary while prohibiting other actors and practices. Our third and final proposition is thus:

Proposition 3 *SCF exhibits properties of a complex adaptive system that self-organises into a network and co-evolves as SCF actors and practices are added or removed through the system's dual-layered semi-permeable boundary.*

6. Conclusions

This study has examined the governance requirements of SCF, incorporating the institutions and practices needed to ensure the proper understanding and execution of SCF. We have utilised data from news articles and employed the Gioia method in our data analysis. Our proposed model of SCF governance requirements entails a need to enact a dual-layered semipermeable boundary which has capacities to: simultaneously and dynamically enable and control certain SCF actors and practices in terms of entry and access; as well as the subsequent evolution of SCF actors and practices in order to enhance the development of effective SCF relationships while preventing the development of problematic SCF relationships. This is essentially needed to coordinate the interests of SCF stakeholders, including both supply chain members and other involved actors. The following subsections summarise our academic and practical contributions.

6.1 Research Implications

Our study makes three key contributions. First, we synthesise what we mean by SCF governance from three distinct governance literatures. We define SCF governance as a capacity for reflexive scrutiny within different collectivities – ranging from a basic triad made up of two supply chain partners and a funder up to more complex collectivities involving *inter alia* standards bodies and market authorities (Chakuu *et al*., 2019; Hofmann and Johnson, 2016). We also argue, following our definition, that, for SCF, a fluid construct of collectivity is needed. SCF governance has to meet this need over different collectivities. Some governance needs can simply be met between the partners involved in a SCF mechanism (for example, in the contracts made between them), but other needs can only be met by a larger collectivity (for example, through accounting standards and trade body rules).

Second, this study has identified extensive aspects of governance required for successful SCF relationships. Our findings extend the SCF literature that has given only limited attention to a few aspects of SCF governance, i.e. transparency and technology (Gelsomino, 2022; Gelsomino *et al*., 2022) and preventive mechanisms (Lin and Peng, 2021; Liu *et al*., 2021). Our study identifies a wider set of aspects that need to be enabled, which are adaptability, confidence, efficiency, technology, and transparency and aspects that need to be controlled, including the abuse of power, fraud risk, operational risk, and risky extensions to SCF practices. Although the abuse of power, or power asymmetry, has been rather well-researched (e.g. Moretto and Caniato, 2021; Wuttke *et al*., 2016), other aspects have not yet been explored in the SCF literature.

Third, our proposed model of SCF governance requirements, as the need to enact a dual-layered semipermeable boundary, provides a systematic analysis of what SCF governance has to accomplish. The novelty of our model lies in its analysis of SCF governance on the basis of a CAS approach, thus enhancing and reflecting on the existing literature that illustrates SCF as an ecosystem. More specifically, it suggests a need for a duality of SCF governance both enabling and controlling through a two-layer system boundary. The first, or outer layer, acts as a gatekeeper to either enable or control the entry and access of certain SCF actors/practices. The second, or inner layer, dynamically monitors and scrutinises the evolvement of the SCF actors and practices that have passed through the first or outer layer in order to either enable or control SCF actors/practices to ensure their effective progression while preventing fraudulent developments. The dual

layers are imperative to ensuring SCF relationships encompass the actors and practices needed to ensure supply chains can continuously and efficiently finance their working capital gaps and that problematic actors and practices are regulated or removed. This can be achieved through the semi-permeability of the system boundary that requires dynamic adaptation.

6.2 Managerial Implications

Our findings offer two key implications for practice. First, our work offers a systematic taxonomy of SCF governance requirements. The coding tree structure (Figure 1) provides a checklist for a systematic SCF governance process, and the specific texts (and associated news articles) linked to these themes provide specific instances to guide the process in practice. Our framework allows for dynamic adjustments/adaptations to be made by supply chain partners when deciding whether to participate in SCF programmes, and it supports the monitoring and evolution of SCF operations by actors that have already chosen to participate. Other stakeholders, including governments, authorities, and policymakers, can use the framework to oversee the entry, access and ongoing operations of SCF actors. In particular, authorities need to dynamically assess whether the existing regulations needs to be altered in order to mitigate the potential risks brought by fintech lenders. At the same time, authorities need to ensure that appropriate fintech lenders feel encouraged to enter the market so that it can benefit from their ability to foster financial inclusion, reaching more SMEs and offering alternative, more affordable finance to small supply chain partners.

Second, although our data source focuses primarily on events in the UK, the insights from this research are also relevant to other countries. Key SCF actors, such as Greensill, Tokio Marine (an insurer), and Taulia (a fintech platform provider) are internationally represented and have either international or global partnerships, including investors (e.g. Credit Suisse and Softbank), clients (e.g. GFG Alliance), and other stakeholders, such as regulators, auditors, and ratings agencies that are headquartered worldwide. Moreover, due to the nature of supply chain networks, SME suppliers often extend beyond one country boundary. Thus, our findings provide insights from the UK that can help inform regulations in other countries.

6.3 Limitations and Future Research

This paper is based on a secondary data analysis of journalistic accounts. It is therefore important to be aware of the potential limitations of this data source when interpreting the findings, e.g. missing information, the potential for sensationalising a story, or a leaning towards a particular political agenda. Future studies could involve interviews with key actors to corroborate the findings and establish appropriate governance modes, including the appropriate levels of collectivity at which they operate. Our study started with a 'blank page', i.e. no commitment was made to any prior theory. Future work may be in a position to adopt categories suggested by theory for less subjective analysis or to build on the propositions outlined in this paper. Finally, since technology, in particular blockchain, can have a significant impact on SCF governance yet has received only limited coverage in our news data sources, future research on SCF governance should investigate the effects of blockchain on SCF governance.

References

Albers, S., Gehring, M. and Heuermann, C. (2003), *A Configurational Approach to Supply Chain Governance*, pp. 99–114.

Aldrich, H. and Herker, D.(1977), "Boundary spanning roles and organization structure", *The Academy of Management Review*, Vol.2, pp.217–230.

Australian Small Business and Family Enterprise Ombudsman. (2020), *Supply chain finance review – position paper*.

Babich, V. and Kouvelis, P. (2018), "Introduction to the Special Issue on research at the Interface of Finance, Operations, and Risk Management (IFORM): Recent contributions and future directions", *Manufacturing and Service Operations Management,* Vol.20 No.1, pp.1-18.

Bals, C. (2019), "Toward a supply chain finance (SCF) ecosystem – Proposing a framework and agenda for future research", *Journal of Purchasing and Supply Management,* Vol. 25, pp.105–117.

Birks, M. and Mills, J. (2015), *Grounded Theory: A Practical Guide*, Sage Publications, London.

Blackman, I. D., Holland, C. P. and Westcott, T. (2013), "Motorola's global financial supply chain strategy", *Supply Chain Management: An International Journal,* Vol.18 No.2, pp.132-147.

Bloomfield, S. (2013), *Theory and Practice of Corporate Governance*, Cambridge University Press, Cambridge.

Business Energy and Industrial Strategy and Work and Pensions Committees (2018), "Carillion", available at: https://publications.parliament.uk/pa/cm201719/cmselect/cmworpen/769/76902.htm (accessed 11 April, 2023).

Caniato, F., Gelsomino, L.M., Perego, A. and Ronchi, S. (2016), "Does finance solve the supply chain financing problem?", *Supply Chain Management*: *An International Journal*, Vol. 21 No. 5, pp. 534-549.

Caniato, F., Henke, M. and Zsidisin, G. A. (2019), "Supply chain finance: Historical foundations, current research, future developments", *Journal of Purchasing and Supply Management*, Vol. 25 No. 2, pp. 99-104.

Carson, S.J., Madhok, A., Varman, R. and John, G. (2003), "Information processing moderators of the effectiveness of trust-based governance in interfirm R&D collaboration", *Organization Science*, Vol. 14 No.1, pp. 45-56.

Chakuu, S., Masi, D. and Godsell, J. (2019), "Exploring the relationship between mechanisms, actors and instruments in supply chain finance: A systematic literature review", *International Journal of Production Economics*, Vol. 216, pp. 35–53.

Chakuu, S., Masi, D. and Godsell, J. (2020), "Towards a framework on the factors conditioning the role of logistics service providers in the provision of inventory financing", *International Journal of Operations & Production Management*, Vol. 40 No.7/8, pp.1225-1241.

Charmaz, K. (2014), *Constructing Grounded Theory*, 2nd edition, Sage Publications, London.

Chen, L., Moretto, A., Jia, F., Caniato, F., and Xiong, Y. (2021), "The role of digital transformation to empower supply chain finance: Current research status and future research directions (Guest editorial)", *International Journal of Operations & Production Management*, Vol.41 No.4, pp.277-288.

Chen, Z., Chen, J., Zhang, Z. and Zhi, X. (2019), "Does network governance based on banks' e-commerce platform facilitate supply chain financing?", *China Agricultural Economic Review*, Vol.11, pp.688–703.

Choi, T. M. and Ivanov, D. (2019), Special Issue on "Operations research models for supply chain finance", *International Transactions in Operational Research*, Vol.26 No.1, pp. 381-382.

Choi, T.Y., Dooley, K.J. and Rungtusanatham, M. (2001), "Supply networks and complex adaptive systems: Control versus emergence", *Journal of Operations Management* Vol.19, pp.351–366.

Cook, D.C., Liu, S., Murphy, B. and Lonsdale, W.M. (2010), Adaptive approaches to biosecurity governance", *Risk Analysis: An International Journal*, Vol.30 No.9, pp.1303-1314.

De Goeij, C., Gelsomino, L. M., Caniato, F., Moretto, A. M. and Steeman, M. (2021), "Understanding SME suppliers' response to supply chain finance: A transaction cost economics perspective", *International Journal of Physical Distribution & Logistics Management*, Vol. 51 No. 8, pp. 813-836.

De Vries, G., Verhoeven, I. and Boeckhout, M. (2011). "Taming uncertainty: The WRR approach to risk governance", *Journal of Risk Research*, Vol. 14 No.4, pp.485-499.

Dixit, A. (2009), "Governance institutions and economic activity", *American Economic Review*, Vol.99, pp. 3-24.

Dufour, I.F. and Richard, M. C. (2019), “Theorizing from secondary qualitative data: A comparison of two data analysis methods”, *Cogent Education,* Vol. 6 No. 1, 1690265.

Dolci, P.C., Maçada, A.C.G. and Paiva, E.L. (2017), "Models for understanding the influence of supply chain governance on supply chain performance", *Supply Chain Management*, Vol. 22 No. 5, pp.424-441.

Dong, L., Qiu, Y.and Xu, F. (2022),” Blockchain-enabled deep-tier supply chain finance” *Manufacturing & Service Operations Management*, msom.2022.1123.

Dooley, K. (1997), “A complex adaptive systems model of organization change”, *Nonlinear Dynamics Psychology and Life Sciences*, Vol.1, pp. 69–97.

Frances, C. (2018) *How Carillion used a UK government scheme to rip off its suppliers*. [Online]. Available at: https://www.forbes.com/sites/francescoppola/2018/01/30/how-carillion-used-a-u-k-government-scheme-to-rip-off-its-suppliers/#401958e652dc (Accessed 08 Oct 2023).

Gander, J., Haberberg, A. and Rieple, A. (2007), “A paradox of alliance management: Resource contamination in the recorded music industry”, *Journal of Organizational Behavior,* Vol. 28, pp. 607–624.

Gelsomino, L. (2022), *Reclassification, transparency, and disclosure: On the road to SCF governance*.

Gelsomino, L. M., Moretto, A., Caniato, F. and Steeman, M. (2018), “Innovative supply chain finance schemes: An exploratory study of dynamic discounting”, *Academy of Management Proceedings*, Vol. 2018 No. 1, p. 18089.

Gelsomino, L.M., Sardesai, S., Pirttilä, M. and Henke, M. (2022), “Addressing the relation between transparency and supply chain finance schemes”, *International Journal of Production Research*, pp. 1–16. https://doi.org/10.1080/00207543.2022.2115575

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005), “The governance of global value chains”, *Review of International Political Economy*, Vol.12 No, 1, pp.78-104.

Ghosh, A. and Fedorowicz, J. (2008), "The role of trust in supply chain governance", *Business Process Management Journal*, Vol. 14 No. 4, pp. 453-470. https://doi.org/10.1108/14637150810888019

Glaser, B.G. (1978), *Theoretical sensitivity*, University of California.

Gioia, D.A., Corley, K.G. and Hamilton, A.L. (2013), “Seeking Qualitative rigor in inductive research: notes on the Gioia methodology”, *Organizational Research Methods,* Vol. 16, pp.15–31.

Glaser, B. G. (2002), “Conceptualization: on theory and theorizing using grounded theory”, *International Journal of Qualitative Methods*, Vol.1 No.2, pp.23-38.

Glaser, B. G. and Holton, J. (2004), “Remodeling grounded theory”, *Forum: Qualitative Social Research,* Vol.5 No. 2.

Global Business Intelligence Corp (2012), “Supply chain finance payable and receivable solutions guide”, available at: https://www.slideshare.net/ahmadjaeni/gbi-scf-guide-2012final (accessed 9 August 2023).

Global SCF Forum (2016), "Standard Definitions for Techniques of Supply Chain Finance", available at: http://supplychainfinanceforum.org/ICC-Standard-Definitions-for-Techniques-of-Supply-Chain-Finance-Global-SCF-Forum-2016.pdf (accessed 11 April 2023)

Gulati, R. and Nickerson, J.A. (2008), " Interorganizational trust, governance choice, and exchange performance', *Organization Science*, Vol. 19 No. 5, pp.688-708.

Hambrick, D.C., Werder, A.V. and Zajac, E.J. (2008), "New directions in corporate governance research", *Organization Science*, Vol.19 No, 3, pp.381-385.

Hart, O. (1995), "Corporate governance: some theory and implications", *The economic journal*, Vol. 105 No. 430, pp. 678-689.

Hofmann, E. (2005), "Supply Chain Finance: Some Conceptual Insights", Lasch, R. J. and Christian, G. (Ed.). *Logistik Management - Innovative Logistikkonzepte*, Wiesbaden, Deutscher Universitätsverlag.

Hofmann, E. and Johnson, M. (2016), "Supply Chain Finance–some conceptual thoughts reloaded", *International Journal of Physical Distribution & Logistics Management*, Vol.46 No.4, pp.1–8.

Hofmann, E., Templar, S., Rogers, D., Choi, T. Y., Leuschner, R. and Korde, R. Y. (2021), "Supply chain financing and pandemic: Managing cash flows to keep firms and their value networks healthy", *Rutgers Business Review*, Vol.6 No,1, pp.1-23.

Hua, S., Xiaoye, Y. and Yuanfang, S. (2022), "Dynamic discounting program of supply chain finance based on a financial information matching platform", *Annals of Operations Research*, pp.1-30.

Huang, J.-S., Pan, S.L.and Liu, J. (2017), "Boundary permeability and online–offline hybrid organization: A case study of Suning, China", *Information & Management*, Vol. 54, pp. 304–316.

Iacono, D. U., Reindorp, M. and Dellaert, N. (2015), "Market adoption of reverse factoring", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 No.3, pp. 286-308.

Jafari, P. and Kalousova, J. (2018), "Payables Finance: what can we learn from the Abengoa and Carillion experiences?", available at: http://logixtest.com/wp-content/uploads/2014/09/Supply-Chain-Finance-Paper_Pouya-Jafari_-Jana-Kalousova_October-2018.pdf?highlight=%7Bsearch_term_string%7D (accessed 11 April 2023).

Jia, M., Stevenson, M. and Hendry, L.C. (2021), "The boundary-spanning role of first-tier suppliers in sustainability-oriented supplier development initiatives', *International Journal of Operations & Production Management*, Vol.41, pp.1633–1659.

Jones, H. & Onstad, E. (2021) *UK targets Gupta's GFG Alliance in fraud probe linked to Greensill* [Online]. Available at: https://www.reuters.com/business/finance/uk-fraud-watchdog-investigating-gfg-alliance-2021-05-14/ (accessed 08 Oct 2023).

Kastl, E. R. (2014), "The firm boundary as semi-permeable membrane", Academy of Management Proceedings, Vol. 2014 No. 1, 13530.

Kerr, S. & O'Murchu, C. (2020) *False invoices at centre of new NMC probe*. [Online]. Available at: https://www.ft.com/content/a22b75df-f37f-4e4f-a024-3dc1c1df82ee (Accessed 08 Oct 2023).

Kucukaltan, B., Kamasak, R., Yalcinkaya, B. and Irani, Z. (2022), "Investigating the themes in supply chain finance: The emergence of blockchain as a disruptive technology", *International Journal of Production Research*, 2118886.

Leifer, R. and Delbecq, A. (1978), "Organizational/Environmental interchange: A model of boundary spanning activity", *Academy of Management Review,* Vol.3, pp.40–50.

Lekkakos, S. D. and Serrano, A. (2016), "Supply chain finance for small and medium sized enterprises: The case of reverse factoring", *International Journal of Physical Distribution and Logistics Management,* Vol. 46 No. 4, pp. 367-392.

Li, J., He, Z. and Wang, S. (2022), "A survey of supply chain operation and finance with Fintech: Research framework and managerial insights", *International Journal of Production Economics,* Vol. 247, 108431.

Lidskog, R. and Sundqvist, G.R. (2012), *Sociology of risk*. In Essentials of risk theory (pp. 75-105). Dordrecht: Springer Netherlands.

Liebl, J., Hofmann, Mark Johnson, E., Hartmann, E. and Feisel, E. (2016), "Reverse factoring in the supply chain: Objectives, antecedents and implementation barriers", *International Journal of Physical Distribution & Logistics Management,* Vol.46 No.4, pp. 393-413.

Lin, Q. and Peng, Y. (2021), "Incentive mechanism to prevent moral hazard in online supply chain finance", *Electronic Commerce Research,* Vol. 21, pp.1–28.

Liu, X., Wang, S., Yao, K. and Sun, R. (2021), "Opportunistic behaviour in supply chain finance: A social media perspective on the 'Noah event'", *Enterprise Information Systems,* Vol.15, pp.1607–1634.

Martin, J. and Hofmann, E. (2019), "Towards a framework for supply chain finance for the supply side", *Journal of Purchasing and Supply Management,* Vol. 25 No. 2, pp. 157-171.

Matt, O. (2020) *NMC health probed for issuing 'fake' invoices: hospitals provider 'used sham documents to borrow money*. [Online]. Available at: https://www.thisismoney.co.uk/money/markets/article-8612775/Hospitals-provider-Health-probed-issuing-fake-invoices.html [accessed 12 April 2023].

Moody (2015), "Moody's: Abengoa's Reverse Factoring Programme has debt-like features", available at: https://www.moodys.com/research/Moodys-Abengoas-Reverse-Factoring-Programme-has-debt-like-features--PR_341393 (accessed 11 April 2023)

Moody's (2018) *Announcement: Moody's: Carillion's collapse exposes flaws in the accounting for supply-chain finance arrangements*. [Online]. Available at: https://www.moodys.com/research/Moodys-Carillions-collapse-exposes-flaws-in-the-accounting-for-supply--PR_380769 (Accessed 2 October 2023).

More, D. and Basu, P. (2013), "Challenges of supply chain finance: A detailed study and a hierarchical model based on the experiences of an Indian firm", *Business Process Management Journal*, Vol.19 No.4, pp.624-647.

Moretto, A. and Caniato, F. (2021), "Can Supply Chain Finance help mitigate the financial disruption brought by Covid-19?", *Journal of Purchasing and Supply Management*, Vol. 27 No4, 100713.

Mueller, M., Dos Santos, V.G. and Seuring, S. (2009), "The contribution of environmental and social standards towards ensuring legitimacy in supply chain governance", *Journal of Business ethics*, Vol, 89, pp.509-523.

Nicoletti, B. (2017), *The Future of FinTech*, Springer Nature, Switzerland.

Nyaga, G.N., Whipple, J.M. and Lynch, D.F.(2010), "Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ?". *Journal of operations management*, Vol.28 No.2, pp.101-114.

Palm, J. and Törnqvist, E.(2008), "Governing the sea rescue service in Sweden: Communicating in networks", *Journal of Risk Research*, Vol.11 No.1-2, pp.269-280.

Parliament UK. (2021). Lessons from Greensill Capital—Treasury Committee—House of Commons, available at: https://publications.parliament.uk/pa/cm5802/cmselect/cmtreasy/151/15105.htm (accessed 4 April 2023)

Partridge, J. (2020) *Watchdog opens NMC Health inquiry amid accounting scandal.* [Online]. Available at: https://www.theguardian.com/business/2020/feb/27/fca-opens-inquiry-into-nmc-health (Accessed 03 October 2023).

Phraknoi, N., Busby, J. and Stevenson, M. (2022), "The relational focus of small and medium sized actors' understandings of supply chain finance (SCF)", *International Journal of Operations & Production Management*, Vol. 42 No. 9, pp. 1435-1466.

PwC (2018), "Understanding supply chain finance (SCF)", available at: https://www.pwc.com/vn/en/deals/assets/supply-chain-finance-jul17.pdf (accessed 9 August 2023).

Ramnarayan, A. (2021) *Explainer: supply chain finance: Greensill's business model*. [Online]. Available at: https://www.reuters.com/world/europe/supply-chain-finance-greensills-business-model-2021-03-03/ (accessed 11 August 2023).

Randall, W.S. and Theodore Farris, M. (2009), "Supply chain financing: using cash-to-cash variables to strengthen the supply chain", *International Journal of Physical Distribution & Logistics Management,* Vol. 39 No. 8, pp. 669–689.

Roberts, V.Z. (2019), "The organization of work: Contributions from open systems theory", *The Unconscious at Work*, Routledge, pp. 37–48.

Schiehll, E., Lewellyn, K. B. and Muller-Kahle, M. I. (2017), "Pilot, pivot and advisory boards: The role of governance configurations in innovation commitment", *Organization Studies*, Vol. 39, No.10, pp. 1449– 1472. https://doi.org/10.1177/0170840617717092

Shleifer, A. and Vishny, R.W.(1997), "A survey of corporate governance", *The journal of finance*, Vol. 52 No.2, pp.737-783.

Silvestro, R. and Lustrato, P. (2014), "Integrating financial and physical supply chains: The role of banks in enabling supply chain integration", *International Journal of Operations & Production Management,* Vol. 34 No.3, pp. 298-324.

Sodhi, M.S. and Tang, C.S. (2021), "Supply Chain Management for Extreme Conditions: Research Opportunities", *Journal of Supply Chain Management,* Vol. 57 No. 1, pp. 7–16.

Song, H., Han, S., Liu, W. and Ganguly, A. (2022), "What role do FinTech companies play in supply chain finance? A signaling intermediary perspective", *Journal of Business & Industrial Marketing,* Vol. 38, No.6, pp.1279-1294 .

Surana, A., Kumara, S., Greaves, M. and Raghavan, N. (2005). "Supply-chain networks: A complex adaptive systems perspective", *International Journal of Production Research,* Vol.43, pp.4235–4265.

Thompson, M. (2023), "UBS is buying Credit Suisse in bid to halt banking crisis", CNN Business, available at: https://www.cnn.com/2023/03/19/business/credit-suisse-ubs-rescue/index.html (accessed 20 March 2023).

Timonen, V., Foley, G. and Conlon, C. (2018), "Challenges When Using Grounded Theory: A Pragmatic Introduction to Doing GT Research", *International Journal of Qualitative Methods*, Vol. 17, pp. 1-10.

Tsai, C. H. and Peng, K.J. (2017), "The FinTech Revolution and Financial Regulation: The Case of Online Supply-Chain Financing", *Asian Journal of Law and Society,* Vol. 4 No. 1, pp. 109-132.

Tsang, E. W. (1998), "Motives for strategic alliance: A resource-based perspective", Scandinavian Journal of Management, Vol.14 No.3, pp. 207-221.

Van Der Vliet, K., Reindorp, M. J. and Fransoo, J. C. (2015), "The price of reverse factoring: Financing rates vs. payment delays", *European Journal of Operational Research,* Vol. 242 No. 3, pp. 842-853.

Wang, Z., Wang, Q., Lai, Y. and Liang, C. (2020), "Drivers and outcomes of supply chain finance adoption: An empirical investigation in China", *International Journal of Production Economics* Vol.220, 107453.

Wass, S. (2021), "Greensill case could trigger loss of confidence in supply chain finance market", S&P Global Market Intelligence, available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/greensill-case-could-trigger-loss-of-confidence-in-supply-chain-finance-market-62983186 (accessed 11 April 2023) .

Werder, A. (2011), "Corporate governance and stakeholder opportunism", *Organization Science*, Vol. 22 No. 5, pp.1345-1358.

Whiteside, M., Mills, J. and McCalman, J. (2012), "Using secondary data for grounded theory analysis", *Australian Social Work,* Vol. 65 No. 4, pp. 504–516.

Williamson, O. E. (1991), "Strategizing, economizing, and economic organization", *Strategic Management Journal,* Vol, 12 No.2, pp. 75-94.

Williamson, O. E. (1996), “Economic organization: The case for candor”, *Academy of Management Review*, Vol. 21 No.1, pp. 48-57.

Wilson, S. (2021), “What's behind the collapse of Greensill Capital, and why does it matter?”, available at: https://moneyweek.com/investments/stockmarkets/uk-stockmarkets/602920/whats-behind-the-collapse-of-greensill-capital-and (accessed 8 August 2023).

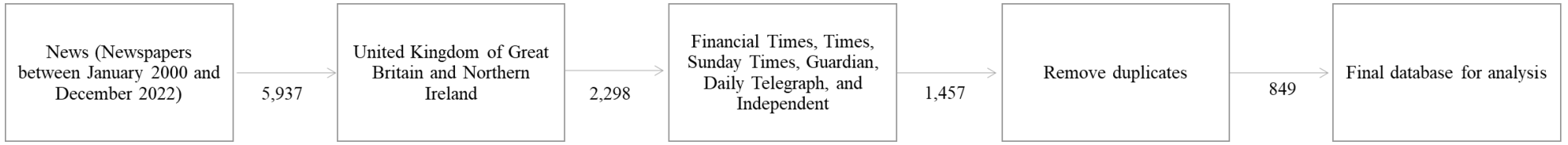
Wuttke, D. A., Blome, C., Foerstl, K. and Henke, M. (2013), “Managing the innovation adoption of supply chain finance empirical evidence from six European case studies”, *Journal of Business Logistics*, Vol. 34 No.2, pp. 148-166.

Wuttke, D. A., Blome, C., Heese, H. S. and Protopappa-Sieke, M. (2016), “Supply chain finance: Optimal introduction and adoption decisions”, *International Journal of Production Economics*, Vol.178, pp.72-81.

Wycisk, C., McKelvey, B. and Hülsmann, M. (2008), “Smart parts” supply networks as complex adaptive systems: Analysis and implications, *International Journal of Physical Distribution & Logistics Management*, Vol.38, pp. 108–125.

Yin, R. K. (2014), *Case Study Research Design and Methods* (5th ed.,). Thousand Oaks, CA Sage.

Supplementary Material A. News search and selection procedure



Supplementary Material B. Rigour in this study according to criteria proposed by Charmaz (2014, p. 338)

Creditability (Charmaz, 2014, p. 338)	**Ways we addressed credibility**
1. Has your research achieved intimate familiarity with the setting or topic?	The first author has been investigating SCF relationships in general and the high-profile collapses, especially Carillion and Greensill Capital, since 2016. Two of the authors work in the UK and are familiar with issues in relation to SCF in the UK.
2. Are the data sufficient to merit your claims? Consider the range, number, and depth of observations contained in the data.	The study includes all the 1,457 articles from the search result. We examined all of them resulting in 849 articles after removing duplicates and irrelevant articles from six key UK broadsheet press (Financial Times, Times, Sunday Times, Guardian, Daily Telegraph, and Independent).
3. Have you made systematic comparisons between observations and between categories?	Constant comparison was an intrinsic aspect of our analysis involving two researchers performing the coding process. After coding the first few articles, the researchers involved in coding met to compare the codes and agree on a set of codes to use. There were also subsequent meetings to discuss and clarify the codes and concepts among the three researchers to ensure the codes and concepts were constantly and systematically compared. Using multiple coders also helped reduce subjectivity and bias (Church *et al*., 2019).
4. Do the categories cover a wide range of empirical observations?	The intention of the coding process was to ensure that every interesting and potentially significant observation that emerged from the data was coded and categorised.
5. Are there strong logical links between the gathered data and your argument and analysis?	Figure 3 demonstrates the logical links between concepts, themes, and the four aggregate dimensions. This coding structure also echoes the three governance literatures including, for example: 1) the need to coordinate conflicts of interest (Hart, 1995) (i.e. corporate governance literature); 2) the need to deal with uncertainty, e.g. opportunist behaviour (Williamson, 1991) (i.e. supply chain governance literature); and 3) the need for rules or practices to regulate risk, including transparency (Van Asselt and Renn, 2011) (i.e. risk governance literature)
6. Has your research provided enough evidence for your claims to allow the reader to form an independent assessment – and agree with your claims?	Table 2 provides example quotations from the data for each concept and theme to explain how we arrived at the findings. Nonetheless, different readers may reach different interpretations.
Originality (Charmaz, 2014, p. 338)	**Ways we addressed originality**
1. Are your categories fresh? Do they offer new insights?	The aim of using grounded theorising was to avoid pre-defined themes based on existing theory. The inductive reasoning means that the themes emerged from the data. SCF governance is relatively new and evidently under-researched.

2. Does your analysis provide a new conceptual rendering of the data?	What our themes do that is new is to show the need for SCF governance to selectively and dynamically enable or control a certain set of practices and actors both at the initial state of entry and access and the subsequent evolving state.
3. What is the social and theoretical significance of this work?	The contribution of this study, both academically and practically, is summarised in Section 6.1 and 6.2. For instance, the coding structure emerged from the analysis will help SCF actors make systematic decisions regarding governing and monitoring SCF relationships.
4. How does your grounded theory challenge, extend, or refine current ideas, concepts, and practices?	Governance requirements in SCF is a relatively new and evidently under researched topic. Recent collapses and crises of confidence assert the need for governance. We illustrate how this work adds to the existing literature in the discussion/conclusions section.
Resonance (Charmaz, 2014, p. 338)	**Ways we addressed resonance**
1. Do the categories portray the fullness of the studied experience?	This is not applicable since this study uses secondary data. However, we believe our examination of all 849 articles portrays the fullness of the news in relation to SCF and governance requirements.
2. Have you revealed both liminal and unstable taken-for-granted meanings?	SCF mechanisms, such as reverse factoring, as well as SCF actors, such as fintech firms, are relatively new. SCF governance is in a liminal state in deciding whether to enable or control certain practices/actors.
3. Have you drawn links between larger collectivities or institutions and individual lives, when the data so indicate?	This emerged in the findings in terms of the significance of context.
4. Does your grounded theory make sense to your informants or people who share their circumstances? Does your analysis offer them deeper insights about their lives and worlds?	This is not applicable since this study uses secondary data. Future research can carry out empirical studies based on the analysis of this paper. We will share the findings with potential participants including businesses, banks, and other SCF actors to evaluate our propositions and the proposed model of SCF governance
Usefulness (Charmaz, 2014, p. 338)	**Ways we addressed usefulness**
1. Does your analysis offer interpretations that people can use in their everyday worlds?	Since the collectivity in SCF relationships is a fluid construct, ranging from a pair of supply chain members with a bank up to a much larger grouping incorporating multiple actors, our coding structure provides a systematic way of helping different SCF actors to think about SCF in relation to their unique collectivity.
2. Do your analytic categories suggest any generic processes? If so, have you examined these generic processes for tacit implications?	One of our main conclusions is that the key concern is the need for a dual-layered semipermeable boundary that can selectively and dynamically enable or control SCF entry and access as well as the evolvement of SCF practices and actors, which has general implications for relationships.
3. Can the analysis spark further research in other substantive areas?	Future research can involve an empirical investigation using focus groups and in-depth interviews.
4. How does your work contribute to knowledge? How does it contribute to making a better world	The key contribution is that government requirements in SCF need a dual-layered semipermeable boundary. It is crucial to be able to make appropriate decisions regarding enablement and control.

Supplementary Material C. Governance needs/concerns in relation to SCF from the sample

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
1) Enabling SCF entry & access			
Facilitating organisations in need	Preserving the ability of less credit-worthy supply chain partners to raise working capital	The benefits of supply chain finance for suppliers include the ability to raise working capital on the strength of their customer's credit rating rather than their own, and improved cash flow management (*Green money: financing scheme rewards suppliers who champion sustainability; Although supply chain financing schemes have been around for a while, ING is now using the tool to enable buyers to reward suppliers who prioritise sustainability.* The Guardian (London) November 6, 2017 Monday).	[1]
		SANTANDER is launching a £500m funding package for small and medium-sized businesses in an attempt to improve their cash flow. The UK arm of the Spanish lender is also rolling out measures to boost working capital for its supply chain. These include a scheme which allows its suppliers to have invoices paid in advance. (*Santander has £500m funds for small firms.* The Daily Telegraph (London) November 16, 2012 Friday)	[2]
	Preserving design favouring less powerful or small businesses interests	OneConnect, Ping An Group's financial technology company, designed the Hong Kong trade finance platform using technologies it has already deployed in China. One key feature, according to Ms Tan, is that it will allow small companies greater access to trade and supply-chain finance. Small companies around the world are regularly denied access to banking services due to the increasing costs of due diligence required to sign up new clients. OneConnect's technologies are able to extract a wide range of company data at a low cost to evaluate potential customers. This will allow the trade finance platform to take on more small businesses. (*Blockchain-backed platform to shake up trading; Financials; System will bring lenders together to speed up transactions and cut fraud*. Financial Times (London) July 16, 2018 Monday)	[3]
		The Government should give this model serious consideration and with its partial ownership of many major financial institutions, should actively encourage SCF as a way to start oiling the cogs of commerce. Furthermore, it is also the perfect way for banks to meet the Government directive of supporting small and medium-sized enterprises from a supplier perspective." (*Underused payment plan could save firms billions.* The Daily Telegraph (London) June 16, 2009 Tuesday)	[4]
Filtering out risky SCF organisations	Controlling access of SCF providers not regulated by or not compliant with main regulators	In a letter to auditor general Gareth Davies, Ms Dodds said that Greensill was the only financial technology firm approved to administer the scheme last June, enabling it to lend government-backed loans of up to £50m at a time. "It was not regulated by the Financial Conduct Authority or	[5]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		the Bank of England," wrote Ms Dodds. "The Treasury has admitted that it was aware Greensill was not subject to the capital adequacy and stress tests that applied to other lenders on the scheme to protect public money. (*Cameron also lobbied Hancock and No 10.* The Independent - Daily Edition April 11, 2021 Sunday)	
		Urgent reforms of the financial system are needed in the wake of the Greensill Capital scandal to stamp out abuses that risk allowing inappropriate people to take control of banks and the outsourcing of regulation to third parties, MPs have warned. (*Reform call after failure of Greensill; MPs demand urgent changes following scandal Call for Greensill reforms.* The Times (London) July 20, 2021 Tuesday)	[6]
	Controlling entry of providers taking on unusual risk	Matt Wreford, Demica chief executive, said the collapse of Greensill had "no impact" on the wider market because the company's problems stemmed from esoteric forms of supply chain finance that no other financial institution offered (Mastercard takes bet on supply chain finance deal despite Greensill collapse; Fixed income. Financial Times (London) October 22, 2021 Friday).	[7]
		[Kevin] Day warned that, as with Greensill, those attempting to disrupt the industry have often taken on risk that banks and other more traditional rivals would be uncomfortable with. (*Supply chain finance pushes risky boundaries; Invoicing. Cash flow Greensill collapse highlights perils of striking deals that disrupt traditional models.* Financial Times (London) April 6, 2021 Tuesday)	[8]
2) Enabling SCF operation			
Enhancing adaptability	Preserving SCF arrangements that help maintain operations or provide liquidity during disruption or crises	Lloyds is redesignating the funds for coronavirus from an £18 billion commitment to support British business that it made in January. It has spoken to 10,000 small business customers to discuss the impact of Covid-19. RBS said that it had "proactively contacted over 5,000 businesses to offer support" in working capital, supply chain finance, short-term inventory finance and letters of credit to reassure its customers' suppliers. (*Banks pitch in with mortgage holidays and business loans.* The Times (London) March 11, 2020 Wednesday)	[9]
		Big construction groups are turning to banks to help ease the pressure on their supply chains as companies in the sector fall victim to the dual strains of weak demand and constricted lending. Lenders have seen an uptake of so-called supply chain finance, where the creditworthiness of the lead contractor is used to bridge the invoicing gap and allow quick payments to smaller companies that provide it with goods and services. (*Banks used to ease supply chain pressure.* Financial Times (London) June 22, 2010 Tuesday)	[10]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
	Preserving the capability to enhance partners' resilience	For customers, it can make the supply chain more resilient while streamlining the processing of payments. (*Green money: financing scheme rewards suppliers who champion sustainability; Although supply chain financing schemes have been around for a while, ING is now using the tool to enable buyers to reward suppliers who prioritise sustainability.* The Guardian (London) November 6, 2017 Monday)	[11]
		Companies are increasingly using their own unpaid invoices - known as receivables - to secure financing and achieve lower funding costs as their usual lenders have become more reluctant to provide conventional lending facilities in the wake of the credit squeeze. So-called supply chain financing was already a growing business before the credit crisis struck, but its use has spread rapidly as financial conditions have worsened. (*Groups embrace supply chain financing.* Financial Times (London), May 27, 2008 Tuesday)	[12]
Building confidence	Preserving confidence after collapse	Mastercard has joined up with UK fintech Demica to offer supply chain finance to business clients, showing the robust demand for the lending product even after the Greensill collapse. (*Mastercard takes bet on supply chain finance deal despite Greensill collapse; Fixed income.* Financial Times (London) October 22, 2021 Friday)	[13]
		But despite the collapse of Greensill and the increased focus on this particular financing model, banks are unlikely to move out of the market. "It fulfils a need and the banks are all very comfortable with what they are doing," said Kevin Day, chief executive of HPD Lendscape, a financing technology provider. "It's all run within quite safe parameters and there is lots of experience in terms of the levels of funding to offer and risk diversification." (*Supply chain finance pushes risky boundaries; Invoicing. Cash flow Greensill collapse highlights perils of striking deals that disrupt traditional models.* Financial Times (London) April 6, 2021 Tuesday)	[14]
	Strengthening rules and regulations	The most damning comments in the report of the UK's Treasury select committee on the lessons from the failure of the supply chain finance outfit Greensill are focused, with admirable clarity, on David Cameron. The former prime minister's actions on behalf of the company and its founder Lex Greensill displayed a significant lack of judgment, according to the committee, which is responsible for holding the finance ministry to account. That his behaviour was within the rules merely demonstrates that the rules need tightening, the report concludes. (*Greensill scandal is about more than sleaze; The Treasury and regulators need to consider their responsibilities.* Financial Times (London) July 21, 2021 Wednesday)	[15]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		"We need to have a mindset and a regulatory and legislative regime which at least allows us to get information," he told the MPs. "At the very least we need to know what's going on in these areas which are not formally regulated." Asked whether Greensill had been "offlimits" because of its connection to Cameron, Rathi said he had seen "no evidence" to suggest this. He said he "wouldn't jump to regulating all supply chain finance" but added: "I do think we need to be looking closely at when there is a nexus between these activities and capital markets and other systemic regulated activities." (*Watchdog had eye on Greensill Capital two months before collapse; Greensill investigation.* The Times (London) May 13, 2021 Thursday)	[16]
Improving efficiency	Preserving the ability of financing in-transit goods	The company also offers supply chain finance, a service it claims is unique among freight forwarding businesses. Suppliers often require payment up front, leaving manufacturers with cash demands, while goods transported by sea are often not delivered for more than a month for longer routes. (*Bezos invests in UK start-up set to disrupt global logistics; Support services.* Financial Times (London) June 1, 2020 Monday)	[17]
		"This is in contrast to invoice discounting, in which you'd have to have done the deal and have the goods sold before you can get the funds. But what if you can't get to that point?" Tower Trade is one of the few that will provide such finance on a standalone basis. "For us, if a company is strong enough, we will get into the trade with them," said Power. "We will partner with them to buy and hold the goods on their behalf, holding title to them all the way through." (*Reach for the crowds, entrepreneurs; Crowdfunding has become a key resource for small firms that want to grow. By Sandra O'Connell.* The Sunday Times (London) June 21, 2015 Sunday)	[18]
	Preserving cost advantage from interest arbitrage	This is described as invoice discounting on steroids, providing a short-term advance on an outstanding receivable in return for a percentage fee but with additional features that can reduce the cost of borrowing. The most important of these is that in a supply chain finance transaction the invoice has already been approved for payment by the customer at a fixed future date. There are thought to be a few hundred supply chain finance programmes running in the UK. (*Altrernatives to the banks; Funding sources.* Financial Times (London) July 14, 2012 Saturday)	[19]
		However, with continued market pressure for further improvements, the financial side of the supply chain is increasingly coming under the spotlight as an area for further efficiencies. As a result, supply chain finance has been recognised by corporates and their banks as the next focus point in supply chain management. It takes the form of financial techniques that are based on the arbitrage between the supplier's and the buyer's credit cost. (*Supply chain finance utilised to save money FINANCIAL SERVICES.* Financial Times (London) January 30, 2007 Tuesday)	[20]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
	Preserving the encouragement of electronic invoice processing	For banks, SCF can be a more efficient use of balance sheet capital. It also gives an opportunity to develop a relationship with corporate clients and offer more technology-led services, such as electronic invoicing. (*Groups embrace supply chain financing.* Financial Times (London) May 27, 2008 Tuesday)	[21]
		He said that Tungsten aimed to create "the world's largest cloud-based global trading network" by combining invoice financing with electronic services. OB10 has a network of more than 140,000 suppliers, operates in 42 countries and processed more than £100bn worth of invoice transaction value last year. (*Investors plot shake-up of invoice finance sector*. Financial Times (London) September 4, 2013 Wednesday)	[22]
Advancing technology	Promoting the use of disruptive technologies	Blockchain is the decentralised ledger technology underlying cryptocurrencies such as bitcoin. Instead of using a central clearing process, blockchain employs thousands of individual computing nodes to verify transactions, making it nearly unhackable. The technology is expected to shake up trade finance by reducing the amount of documentation and manpower needed to process transactions. It will also reduce the amount of time needed for some transactions from a fortnight to a day. Fraud will also be easier to detect on the new platform. Companies often request more financing from banks than needed to fund the trade. Once trades are logged in the blockchain, all parties will be able to view the level of financing requested and reduce the ability to acquire excess funds. (*Blockchain-backed platform to shake up trading; Financials; System will bring lenders together to speed up transactions and cut fraud*. Financial Times (London) July 16, 2018 Monday)	[23]
		At the heart of Stenn's competitive offering is its technology. "What we're selling investors is risk management," says Karpovsky. "We can onboard customers, credit assess, manage client risks - that is what our technology is designed to do. (*Bridging the financial gap; In the wake of Covid, and amid a global supply chain crisis, invoice finance platform Stenn is on a quest to 'democratise access' to capital for SMEs internationally.* Financial Times (London) November 21, 2022 Monday)	[24]
	Preserving the support for start-up Fintech firms	Fintech funders Law firms in the UK are seeking to nurture small clients that have the potential to grow into large companies by backing the financial technology (fintech) sector with their own start-up funds. Addleshaw Goddard and Simmons & Simmons, for instance, have both set up programmes to provide free legal advice to start-ups or early-stage fintech funds. (*Joined-up thinking; A project-based service is seen as a more effective and cheaper option in complex deals. By Lindsay Fortado.* Financial Times (London), October 5, 2017 Thursday)	[25]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		From 2013 to 2014, funding for fintech companies quadrupled to more than $12bn, the WEF report said, and it could be as much as $30bn this year. That means new products "tailored to the needs of small businesses", says the report. "These include marketplace [peer-to-peer] lending, merchant and e-commerce finance, invoice finance, online supply-chain finance and online trade finance." (*Flurry of innovation prompts easier access to funding.* Financial Times (London), February 9, 2016 Tuesday)	[26]
Promoting transparency	Preserving visibility of supply chain transactions	Fraud will also be easier to detect on the new platform. Companies often request more financing from banks than needed to fund the trade. Once trades are logged in the blockchain, all parties will be able to view the level of financing requested and reduce the ability to acquire excess funds. (*Blockchain-backed platform to shake up trading; Financials ;System will bring lenders together to speed up transactions and cut fraud.* Financial Times (London) July 16, 2018 Monday)	[27]
		Klein's preferred solution to the problem is project bank accounts, or PBAs, whereby suppliers' cash is ringfenced and held by trustees, protected from insolvency and abuse by main contractors that want to smooth their own cashflow issues, removing the incentive for late payment. Payments are made directly and simultaneously to suppliers no matter where they are in the supply chain. That can improve efficiency and transparency and reduce the reliance on third-party finance. Highways England is the most prolific user of PBAs and contractors and consultants all along the supply chain generally are being paid within 18 days of their work being assessed. (*Builders pay a high price for payment delays; construction after Grenfell The construction sector is mired in a damaging culture of withholding cash from suppliers, reports James Hurley.* The Times (London) May 5, 2021 Wednesday)	[28]
		Plenty of struggling companies are attracted to supply-chain finance because the accounting disclosure rules make it easier to mask this type of debt. (*Supply chain finance pushes risky boundaries; Invoicing. Cash flow Greensill collapse highlights perils of striking deals that disrupt traditional models.* Financial Times (London) April 6, 2021 Tuesday)	[29]
	Promoting disclosure of the use of SCF	There was no disclosure in the accounts of Carillion plc before its collapse" of the use of reverse factoring, Moody's said. It said "altruistic messaging" depicted reverse financing as a way big companies could meet government directives to pay suppliers in a timely way - a topic about which the Morrison government has also raised concerns. (*Wages upfront: the financier who wants to change how Australians are paid; Lex Greensill says public servants could benefit from his supply-chain financing scheme, but others warn it already poses risks in the commercial world*. The Guardian (London) November 30, 2019 Saturday)	[30]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
	Promoting information transparency and accountability	After his statement was published on Sunday evening, the shadow Cabinet Office minister Rachel Reeves said: "Many serious questions remain unanswered, and it is crucial that the former prime minister appears before parliament so that all the information is brought to light". She added: "Transparency and accountability are crucial and that requires the utmost openness from government to establish the full facts behind this scandal". (*Brown insists former PMs 'must never' lobby government for commercial purposes amid Cameron row*. The Independent (United Kingdom) April 12, 2021 Monday)	[31]
		"The Bank is relying on the work of Greensill's administrators to identify where the loans have gone and, by extension, where the taxpayers' exposure potentially lies… Without knowing where the money has gone it will be impossible to say whether the objectives of the schemes to support UK businesses has been fully met, or whether taxpayers may be exposed to risks in the future." (*'Woeful' checks by state-owned bank on Greensill loans 'risked millions of taxpayers' money'.* The Independent (United Kingdom) November 20, 2021 Saturday)	[32]
3) Controlling SCF operation			
Preventing abuse of Power	Controlling exploitation of payment terms	As Mr Breedon's report makes clear, the "biggest barrier to increased use is the suspicion that the buyer is merely using it as a method of extending payment terms". (*Auction site could slice invoices.* The Daily Telegraph (London) March 20, 2012 Tuesday)	[33]
		They manipulate their supply chain payments and ensure that their contracts are drafted with all risk transferred to these firms. Carillion extended its payment periods to 120 days from 65. Currently almost £25bn is outstanding to construction SMEs because of delayed payments. With the supply chain finance initiative, introduced by David Cameron's government, companies in the supply chain can access their monies earlier from a bank on payment of a fee. An unforeseen consequence of the initiative is that large construction companies, like Carillion, can make more money on the back of it. (*Construction industry is heading for disaster; Letters.* Financial Times (London) July 22, 2017 Saturday)	[34]
	Controlling the abuse of the retentions system	Mr Klein's group also wants protection for "retention" money, the cash withheld from suppliers by main construction contractors in case a firm doesn't return to rectify any noncomplying work. "Carillion has to be a game-changer for improving payment security," Mr Klein said. (*The 'late payment epidemic' exposed by crash of Carillion; AT THE COALFACE Lobby groups argue that the plight of small businesses left waiting to be paid for work is a growing problem*, The Times (London) January 24, 2018 Wednesday)	[35]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		Contractors don't invoice as a supplier in other sectors would; they apply to be paid. A portion of what they are owed is held back in so-called retentions, a pot of money withheld from businesses until work is completed. This money is held ostensibly as security in case a firm does not return to rectify defects, but it is also used by main contractors, which operate on notoriously thin margins, to smooth their own cashflow woes. When there is an insolvency in the supply chain, those downstream lose the money they are owed and often go bust themselves as a result. (*Builders pay a high price for payment delays; construction after grenfell The construction sector is mired in a damaging culture of withholding cash from suppliers, reports James Hurley.* The Times (London) May 5, 2021 Wednesday)	[36]
	Controlling the use of financing offers to manipulate supply chain behaviour	Today there is a "carrot" to encourage suppliers to become greener - supply chain finance... The ING initiative allows buyers to reward suppliers with an enhanced focus on environmental, social and governance (ESG) issues, by reducing the discount on invoices paid through supply chain finance schemes. (*Green money: financing scheme rewards suppliers who champion sustainability; Although supply chain financing schemes have been around for a while, ING is now using the tool to enable buyers to reward suppliers who prioritise sustainability.* The Guardian (London) November 6, 2017 Monday)	[37]
		Tesco said that from September, suppliers can apply to reduce the cost of using the scheme [supply chain finance scheme] when they share "carbon data disclosures, emissions reduction targets and progress against sustainability goals". (*Tesco attacked for linking early payments to suppliers' green targets*. The Times (London) May 10, 2021 Monday)	[38]
Curbing fraud risk	Controlling vested interests and loss of separation	The BBB ultimately suspended Greensill's government guarantees in October 2020, just four months after its application was approved. It launched an investigation into how it had been distributing loans to one of its largest customers, GFG Alliance, the loose umbrella of companies owned by the metals magnate and Liberty Steel owner Sanjeev Gupta. That investigation is ongoing. (*BEIS asked for multiple updates on Greensill Covid loan requests, MPs told.* The Guardian (London) June 29, 2021 Tuesday)	[39]
		The Sunday Times has reported how Greensill lent big sums to Liberty against invoices from companies that owed money to Gupta's steel businesses but had directors with close links to his firms, and in some cases had shared the same office address. (*Gupta's house of cards on brink as Greensill caves; The steel tycoon's tight relationship with the supply chain finance firm has turned toxic. One is about to go down, the other is in peril, writes John Collingridge.* The Sunday Times (London) March 7, 2021 Sunday)	[40]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
	Preventing money laundering	The SFO revealed this month that it had opened an investigation into Gupta's GFG Alliance group of businesses, which include Liberty Steel, Britain's third largest steel maker that employs 3,000 people. The SFO is "investigating suspected fraud, fraudulent trading and money laundering in relation to the financing and conduct of the business of companies within GFG, including its financing arrangements with Greensill Capital". It had been running a covert investigation since the Bank reported its concerns about Wyelands. (*Tycoon given taxpayer loans despite fraud fears.* The Times (London) May 25, 2021 Tuesday)	[41]
		The Financial Times reported in April that loans to Liberty from Greensill were based on suspect invoices. The UK's Serious Fraud Office said last month it had launched an investigation into suspected fraud and money laundering at GFG, including its "financing arrangements" with Greensill. GFG has denied wrongdoing and pledged to cooperate fully with the SFO probe. (*Trafigura warned Credit Suisse on Greensill's suspect Gupta invoice; Commodities trader raised alarm Bank's $10bn funds collapsed Due diligence under fire.* Financial Times (London) June 3, 2021 Thursday)	[42]
	Controlling access of SCF providers to powerful office and lobbying by beneficiaries	Greensill Capital gave a government guaranteed coronavirus loan to a business owned by a neighbour of founder Lex Greensill, after the two men jointly lobbied their local council to adopt its controversial supply-chain finance model... The two men set up a meeting in 2018 to "discuss the potential benefits of the supply chain finance model being promoted by [Greensill's] companies", according to documents released by Cheshire West and Chester Council. (*Greensill gave Covid loan to neighbour's business;?Pair lobbied council on funds model? Alleged abuse of scheme probed.* Financial Times (London) December 14, 2021 Tuesday)	[43]
		For critics, the move will look like yet another attempt by business to buy a seat at the table of power. Always questionable, it looks controversial with David Cameron's lobbying for Greensill, the collapsed supply chain finance business, so fresh in the memory. But Cameron was an egregious example of what is common. There has always been a procession of people from politics and policy cashing in their chips for big money in the private sector. (*Be thankful that the path from public sector to private is not blocked off.* The Times (London) September 8, 2021 Wednesday)	[44]
	Preventing conflict of interest	Lex Greensill's appointment to a Downing Street role was a "screaming conflict of interest", a Cabinet Office ethics chief admitted yesterday as it emerged the Australian financier advised David Cameron's government for three years. (*Conflicts of interest, leaks and the unknown source of decorating cash; Top civil servant is met with frustration and disbelief as he tackles pressing questions.* The Daily Telegraph (London) April 27, 2021 Tuesday)	[45]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		And his letter of appointment continued a provision drafted by Mr Greensill himself which "created ambiguity about the potential for conflicts of interest". The report questioned whether there was any need for Greensill to have been provided with a government post, which he was able to leverage to gain clients for his private company. (*'Privileged few' get undue access to cabinet officials.* The Independent - Daily Edition July 23, 2021 Friday)	[46]
Constraining operational Risk	Controlling over-exposure to recipients	The BBB's own inquiry centres on the way Greensill used the 80% government-backed coronavirus large business interruption scheme (CLBILS) to lend tens of millions of pounds to Gupta's GFG Alliance. Concerns first emerged about Greensill's involvement in the scheme in October 2020 when the FT reported it had provided tens of millions of pounds worth of government-backed loans to two of Gupta's companies, which employed just 11 people. Since then, it has emerged that Greensill loaned firms connected to Gupta an estimated £400m. (*British Business Bank launched probe into Greensill Capital before collapse*. The Guardian (London) March 26, 2021 Friday)	[47]
		A further - post-Greensill - lesson, say risk experts, is to avoid concentration. Greensill had about $5bn of exposure to metals magnate Sanjeev Gupta's GFG Alliance group of companies. An insurance executive at Sydney based The Bond & Credit Co (BCC), which provided billions of dollars worth of cover to Greensill, was reportedly "frightened" at the amount of exposure building up to the industrialist's businesses, according to one person familiar with Gupta's financing in late 2019. (*Diversify exposure to prevent repeat of Greensill failures; Supply chain finance Experts are calling for greater transparency and use of technology writes Ian Smith 'It is important that all parties know exactly what the underlying risks are'.* Financial Times (London) April 15, 2021 Thursday)	[48]
	Controlling SCF provider's reliance on insurance	He told MPs that Tokio Marine's move was "deeply regrettable" and "ensured Greensill's collapse" later that month, though he admitted his company had become too reliant on one insurer. (*Tokio Marine defends its conduct over Greensill; Insurance*. Financial Times (London) May 21, 2021 Friday)	[49]
		However well the credit insurers perform, it would be a mistake to rely on them to smooth disruptions in supply-chain finance during the Covid-19 crisis. Governments have a crucial part to play. In Britain, a starting point would be the revival of the 2009 scheme to top up existing trade credit insurance policies. (*Budget/credit insurance: state backstop needed; Twitter: @FTLex.* Financial Times (London) March 13, 2020 Friday)	[50]
	Controlling use for off-balance sheet financing	Some of those companies quickly realised that loans to cover suppliers' bills would not show up in their reported debt, helping to flatter their balance sheets. (*Cameron, Greensill and the seeds of*	[51]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		Carillion's collapse; Construction. Corporate borrowing Outsourcer had seized on supply-chain finance to disguise its crippling debt. Financial Times (London) May 10, 2021 Monday)	
		While it is an established financial product that large banks offer their corporate clients, the messy unravelling of supply chain finance specialist Greensill Capital this year has drawn attention to the ways in which it can be used to flatter and distort corporate balance sheets. (*Mastercard takes bet on supply chain finance deal despite Greensill collapse; Fixed income.* Financial Times (London) October 22, 2021 Friday)	[52]
Restricting risky Extension	Controlling extension into employee remuneration	Now he says he wants to extend the idea to employees, who would get early access to their pay from Greensill through an app that acts "as an ATM". At a meeting last month he told Scott Morrison the system could be applied to the 150,000 employees of the commonwealth public service. But critics of supply-chain financing have warned that it can encourage businesses to push out the terms they offer their suppliers, effectively using them as a source of finance... Unlike advances he offers to corporate suppliers - and also unlike a payday loan - Greensill proposes that it would be the employer, not the employee, who would pay a fee to his company for the credit. For employees, the fee would be nothing - "ever" - he said. (*Wages upfront: the financier who wants to change how Australians are paid; Lex Greensill says public servants could benefit from his supply-chain financing scheme, but others warn it already poses risks in the commercial world. The Guardian (London) November 30, 2019 Saturday*)	[53]
		The government is inviting bids for an £80 million Greensill-style invoice financing contract to cover the entire public sector despite the collapse of its flagship pharmacy scheme. The Crown Commercial Service, the government's procurement arm, is advertising an "advance payment solutions" framework that proposes to extend supply chain finance across the public sector and offer five million staff the option of taking their wages early. (*Whitehall's £80m 'Greensill' deal; Four-year invoice financing contract to cover whole of public sector.* The Times (London) March 30, 2021 Tuesday)	[54]
	Controlling re-packaging and onward transfer of instruments	Greensill was founded in London a decade ago and specialises in supply chain finance, which enables companies and their suppliers to smooth their cashflows. It bundles the advances to suppliers to companies such as Astra- Zeneca and Ford into bonds. Greensill then sells securities to fund management groups such as CreditSuisse, which in turn offer them to investors looking for a return on their spare cash. (*Adviser's resignation piles more pressure on embattled Greensill.* The Times (London) March 3, 2021 Wednesday).	[55]

Dimensions and Themes	Concepts	Illustrative quotes (examples)	References
		What Greensill, 44, was up to is as old as commerce: a form of supply chain finance. He just put a twist on the practice of reverse factoring, where suppliers sell at a discount debts owed by their customers to a third party, which then collects the full amount later. His trick was to repackage that debt and sell it on to investors: a wheeze straight out of the banks' "collateralised debt obligations" playbook that helped trigger 2008's financial crisis. (*Shine a spotlight on shadow banking; business commentary Alistair Osborne* The Times (London) March 11, 2021 Thursday)	[56]
		Greensill also used a particularly exotic form of financing, extending cash to Liberty based on "future receivables" up to three years ahead? so the sale of steel that was still iron ore and coal in the ground. In return, Greensill took security over many of Gupta's assets. (*Gupta's house of cards on brink as Greensill caves; The steel tycoon's tight relationship with the supply chain finance firm has turned toxic.One is about to go down, the other is in peril, writes John Collingridge.* The Sunday Times (London) March 7, 2021 Sunday)	[57]
	Controlling unusual arrangements (future receivables)	Gupta and Greensill's expertise was in dreaming up ever more exotic forms of supply-chain finance. They mastered a form of financing whereby "future receivables" could be turned into hard cash. For a mobile phone giant such as Vodafone, which has a predictable and steady stream of direct debit payments, this is a racy but not implausible source of raising cash in advance. But for a steel maker running factories that barely scrape a profit, it was highly aggressive. (*Anatomy of a scandal; Sanjeev Gupta's deal spree has left 5,000 UK jobs in jeopardy. We unpick the chicanery and chutzpah that powered the steel king's empire.* The Sunday Times (London) March 21, 2021 Sunday)	[58]

Appendix A. The abuse and misuse of SCF between 2015-2021

Year	Firm	Issues in relation to SCF	References
2015	**Abengoa S.A**., a Spanish renewable energy company entered pre-insolvency proceedings.	1. €1.2 bn or 43% of its cash and cash equivalents were related to reverse factoring debt 2. Forced long supplier payment terms (219 days)	Moody's (2015); Jafari and Kalousova (2018)
2018	**Carillion**, the second largest UK construction company and a major UK government supplier went into compulsory liquidation.	1. Used reverse factoring to conceal its debt of £498m by misclassifying it as 'other debtors' 2. Forced standard supplier payment terms of 120 days, owing about £2 billion to its 30,000 SME suppliers at the time of collapse	Business Energy and Industrial Strategy and Work and Pensions Committees (2018); Frances (2018); Moody's (2018)
2020	**NMC Health**, a FTSE 100 healthcare provider, was forced into administration by Abu Dhabi Commercial Bank	1. Had access to $335m (£260m) from reverse factoring without the knowledge of its board nor with it being disclosed in its financial reports 2. Allegedly used fake invoices for medical supplies to withdraw money from banks under SCF programmes	Kerr and O'Murchu (2020); Matt (2020); Partridge (2020)
2021	**Greensill Capital,** the largest non-bank funder of SCF, went into liquidation	1. Suspected fraud in financing arrangements with its largest customer, the steel empire GFG Alliance, to which it had a $5 billion exposure 2. Lobbying scandal in which former UK Prime Minister, David Cameron, allegedly used his personal contacts on behalf of Greensill	Jones and Onstad (2021); Ramnarayan (2021)

Appendix B. Common SCF mechanisms and definitions

(Adapted from Global SCF Forum, 2016)

SCF mechanism	**Definition (Adapted from Global SCF Forum, 2016)**
Inventory finance	A loan provided for the holding or warehousing of goods.
Factoring	Suppliers sell receivables at a discount. Banks perform credit control and collection
Invoice discounting	Suppliers sell receivables at a discount. Suppliers perform credit control and collection.
Reverse factoring	Suppliers sell approved receivables at a discount on a non-recourse basis.
Dynamic discounting	The dynamic settlement of invoices for any payment before the due date in which the supplier grants to the buyer a pre-defined discount on the face value of the invoice (Gelsomino et al., 2016b).
Distributor finance	Banks finance the distributor's purchases of goods from their corporate supplier.
Purchase order finance	A loan provided for the buying or processing of raw materials into finished goods.

Appendix C. SCF funding models with example SCF actors

(Adapted from Global Business Intelligence Corp, 2012; PwC, 2018, p.3)

<table>
<tr><th rowspan="2">Funding model</th><th colspan="3">Example SCF actor</th></tr>
<tr><th>Funder(s)</th><th>Platform provider</th><th>Firm(s)</th></tr>
<tr><td rowspan="2">A corporate firm develops its own platform using single or multiple banks/fintech lenders</td><td>Santander, BNP Paribas, Unibanco</td><td rowspan="2">In-house developed platform</td><td>Carrefour</td></tr>
<tr><td>Deutsche Bank</td><td>Metro Group</td></tr>
<tr><td rowspan="2">A bank uses its own proprietary platform (i.e. single bank, single platform*)</td><td>Citi</td><td rowspan="2">Bank proprietary platform</td><td>Nestle</td></tr>
<tr><td>Santander</td><td>Unilever</td></tr>
<tr><td rowspan="2">A fintech platform provider partners with a single or multiple banks/fintech lenders</td><td>RBS</td><td>PrimeRevenue</td><td>Sainsbury’s</td></tr>
<tr><td>Multiple</td><td>Demica Citadel</td><td>Co-op</td></tr>
<tr><td>A fintech lender partners with a fintech platform provider</td><td>Greensill Capital</td><td>Taulia</td><td>Multiple</td></tr>
</table>

*There are also i) multiple banks, single platform, i.e. syndicate: Lead bank with participating banks/fintech lenders to co-fund and share risk using the lead bank’s platform; and ii) multiple banks, multiple platforms in which each bank uses its own platform.