



Why banks insure structured commodity trade finance risk: evidence from a worldwide survey

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Abstract

We identify major drivers of the demand for credit insurance, using a worldwide survey among banking executives in the structured commodity trade finance business. Our results show that a bank's propensity to purchase insurance increases in its experience and expertise with the product, the impact of insurance coverage on its balance sheet, the risk of the underlying transaction, as well as the intensity of broker relationships. Other factors, such as the size of the commodity trade finance portfolio, the competitiveness of the insurance price, and the risks arising from commodity price volatility, seem to be of lesser relevance.

Keywords Structured commodity trade finance · Pre-export finance · Pre-payments · Borrowing base · Risk perception

Introduction

Structured commodity trade finance (SCTF) is centered around cross-border loans that are repaid from the sales proceeds of a flow of commodities. Borrowers use the financing for their liquidity management and for the purchase of raw, semi-refined, or semi-processed materials. SCTF is a sophisticated commodity-based

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financing technique, specifically designed by banks for commodity producers and trading houses, conducting business in emerging markets. Through their SCTF loans, banks bear the performance or payment risk of the commodity producer or trader. Consequently, they are subject to rigorous regulatory requirements, especially with the implementation of the Basel IV regulation framework, which will come into force in 2023 and intensify capital requirements. The full implementation in 2028 will result in an average increase of 15.4% on the current Tier 1 minimum required capital of banks in the European Union (EU). To comply with the new framework, EU banks thus require EUR 9.4 billion of additional Tier 1 capital (European Banking Authority 2020a, b). In order to mitigate the risk and capital requirement associated with their commodity trade finance activities, banks have increasingly utilised credit insurance over the past decade. A credit insurance cover provides capital and exposure relief to the financial institution by replacing the probability of default of the commodity producer with the one of the insurance company that sells the protection.

To our knowledge, there is relatively little empirical evidence on the factors influencing banks' demand for credit insurance. In particular, no empirical study to date has connected banks' insurance demand and SCTF. We address this research gap by examining the major determinants of a bank's decision to purchase SCTF insurance. For our research, we developed an online survey that was sent to banking executives worldwide who either work in the area of SCTF or are responsible for purchasing insurance coverage for their banking organisations. The results of our analysis show that the probability of a bank purchasing SCTF insurance is positively influenced by the impact that the coverage has on the balance sheet, the bank's expertise and experience with credit insurance policies, the risk of the underlying SCTF structure as well as the intensity of the bank's broker relationships. In contrast, other factors, such as the size of the commodity finance operations of the bank, the adequacy of the insurance premium and the risk arising from commodity price movements, do not seem to strongly influence the purchasing decision. Our results provide valuable insights for the sales strategy and product development of insurance providers active in the SCTF business.

With the paper at hand, we contribute to the relatively underdeveloped literature on SCTF. Weber and Beeler (1999) derived sustainability business practices for financial institutions with respect to structured trade and commodity finance. Kluge and Lehrbass (2003) analyse default probabilities in SCTF based on a cash flow model, considering commodity spot prices and production levels. Suták (2012) focuses on the risk inherent in commodity finance for commercial banks. He shows that the goods themselves are not the primary risk in trade finance, but rather the relation between the bank and its client as well as the risk management and risk prevention techniques of the bank. In another study, Suták and Kozár (2013) examine different commodity-based asset financing structures for trading houses from the perspective of collateral and risk. They suggest an optimal commodity trade financing structure that provides producers and traders the opportunity to release capital tied up in stocks. Furthermore, they develop a financial model to estimate the optimal level of loan collateralisation (coverage ratio) during the repayment



period, considering commodity price volatility, the cost of funding, and interest rate movements.

Our work also adds to the more general literature on trade credit¹ in the context of trade finance. The most basic form of trade finance is trade credit collateralised by the traded goods, combined with trade credit insurance against the possibility of default.² Exporters are the most common users of trade finance due to the higher perceived risk of international transactions.³ Antràs and Foley (2015) explore the patterns of international trade financing terms on U.S.-based firms exporting poultry and postulate that the most common financing terms represent cash in advance⁴ and open account terms⁵ (trade credit) depending on cross-country differences in contractual enforcement and the relationship between exporter and importer. A common explanation for trade credit is that suppliers enjoy a monitoring advantage over banks.⁶ Burkart and Ellingsen (2004) focus on the monitoring advantage theory and argue that the source of the supplier's advantage is the input delivery itself. The availability of trade credit increases the willingness of the bank to lend. Other scholars, such as Bolton and Scharfstein (1990), Petersen and Rajan (1997), and Cunat (2007), explain the existence of trade credit with the supplier's ability to enforce debt repayments better than banks due to the cost of substitution. Elliehausen and Wolken (1993) develop a model of the demand for trade credit by small US businesses, which Wilson and Summers (2002) expand, using a wider range of motivations for the trade credit demand of small companies in the U.K. Deloof and Jegers (1996) consider trade credit for large companies in Belgium from the perspective of pecking order theory. Atanasova and Wilson (2003) provide evidence that firms which are credit rationed by financial institutions increase their reliance on trade credit. Lee and Rhee (2011) describe trade credit from the supplier's perspective and present it as a tool for supply chain coordination. Li et al. (2014) explore the impact of trade credit insurance on the interest rate decision of the bank and find that the use of trade credit insurance does not always help the supplier obtain lower interest rates from the bank.

Finally, our work contributes to the literature on insurance demand (Doherty and Smith 1993; Gollier 2005; Graham and Rogers 2002; Krummaker 2020; Yamori 1999). Mayers and Smith (1982, 1987) develop a theory for the decision of a firm to purchase insurance coverage. This theoretical framework has been extended with empirical studies on corporate demand.⁷ Hussels et al. (2005) examine the demand for insurance with respect to economic growth, identifying economic, legal/political, and social factors. In the export credit guarantee context, several scholars

¹ Trade-credit is a short-term business loan for a buyer's purchase of goods from a seller, who finances the purchase by allowing the buyer to delay payment (Lee and Rhee 2011).

² See, e.g., Ahn et al. (2011).

³ See, e.g., Amiti and Weinstein (2011).

⁴ Cash in advance terms require the importer to pay before goods are shipped and title is transferred.

⁵ Open-account terms allow a customer to delay payment until a certain time following receipt of the goods.

⁶ See Schwartz (1974) and Emery (1987).

⁷ See, e.g., Hoyt and Khang (2000), Regan and Hur (2007), Krummaker (2011), and Jia et al. (2012).



postulate that insurance is an essential tool for exporters.⁸ Klasen (2014) argues that demand for insurance is also driven by firm-specific factors such as insurance services, liquidity, and balance sheet protection. A specific piece of research focusing on political risk by Braun and Fischer (2018) shows that a company's demand for political risk insurance increases with its perceived exposure, its perceived experience, and expertise with political risk insurance, as well as the perceived adequacy of the price.

The remainder of this paper is structured as follows. In the second section, we introduce SCTF. We start with the definition, followed by an overview of different structure types, including an example of a pre-export finance structure. Subsequently, we describe the different types of insurance for SCTF and their providers. In the third section, we develop seven hypotheses concerning the determinants of the bank's decision to purchase insurance for SCTF transactions. The fourth section contains a description of our survey, the participant recruitment process, and a brief introduction to the statistical techniques of exploratory factor analysis and logistic regression that are utilised to evaluate the resulting data set. The penultimate section represents the main part of our research, including descriptive statistics, the derivation of our empirical findings, and the interpretation as well as economic implications of our results. Finally, in the last section we draw our conclusion and propose suggestions for practitioners to tackle the major barriers that currently seem to prevent banks from purchasing more insurance for SCTF transactions.

Structured commodity trade finance

Definition and structure types

Commodities are the raw material for the world economy. Their basic specification has become standardised by commodity exchanges and trade associations in Chicago, London, New York, and Paris. Oil is the leading traded commodity due to its strategic importance and high liquidity: oil contracts are traded on futures exchanges worldwide. Hard commodities include base metals (e.g., zinc, nickel, iron ore) and precious metals (e.g., silver, gold, platinum) as well as steel. Soft commodities, on the other hand, are crop-based commodities (e.g., sugar, coffee, cocoa).⁹ According to TXF's 2019 Commodity Finance Report,¹⁰ the total volume for SCTF deals amounted to USD 35.7 billion in 2019 compared to USD 63.5 billion in 2018. The largest recipient of commercial bank loans was the oil and gas sector with 58%. The most active regions in the SCTF sector are Europe (including Russia and Turkey) and the Middle East.

SCTF is a financing technique which was developed and introduced by a few international banks in the early 1990s. SCTF provides liquidity management and risk mitigation for the production, purchase, and sale of raw, semi-refined, or

⁸ See, e.g., Felbermayr et al. (2012), Coppens (2009), and Abraham and Dewit (2000).

⁹ See MacNamara (2017).

¹⁰ See TXF Research (2020).



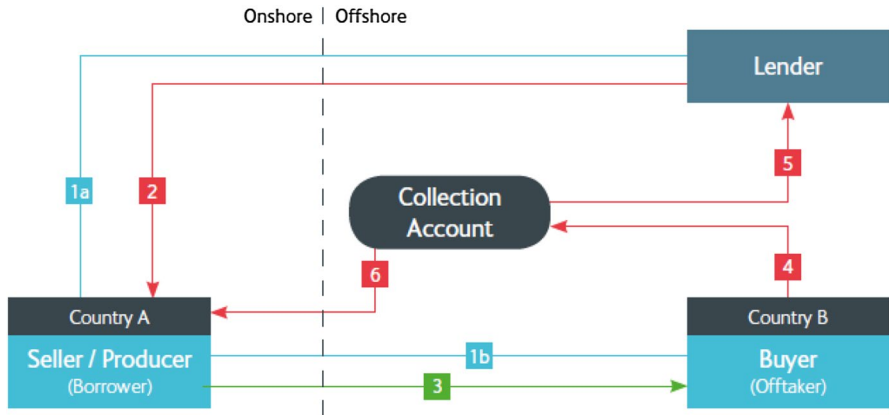


Fig. 1 Pre-export finance mechanics

semi-processed materials.¹¹ Hereby, banks provide financing to commodity producers, thus ensuring the availability of sufficient cash flows to maximise their output. SCTF structures utilise the commodities—with relatively predictable cash flows given price forecasts—to mitigate risk and secure the loan granted by the bank.¹² Thus, a corporate borrows against a commodity’s expected worth. Under normal circumstances, the lending bank is repaid through the sale of the commodities. Otherwise, it has recourse to the secured assets, accounts, and contracts.

Borrowers of SCTF—usually commodity producers in emerging markets—are generally less creditworthy than borrowers in developed markets. The end-buyer’s credit profile, however, is typically very strong. SCTF is “structured” in that the lending bank mitigates payment defaults by structuring the transactions in a manner that the loan is repaid by the end-buyer (major energy companies or trading houses often located in developed countries) directly to the bank (see Fig. 1).¹³ A comparison of SCTF financing in developing markets and traditional financing methods reveals that repayment by an offshore off-taker, rather than by the borrower, has historically proven to be a more effective tool against payment risk.¹⁴ Moreover, SCTF is an instrument to mitigate currency risk. Commodities are traded in US dollars. Hence, loans are mostly granted in US dollars as well, providing attractive hard currency liquidity to the producer from an emerging market. Repayment again takes place in US dollars through the end-buyer.

The SCTF lender bears the performance risk of the commodity producer. Thus, unlike traditional financing, focusing on the balance sheet of a borrower, SCTF analyses the individual commodity transaction structure, the company’s performance

¹¹ See MacNamara (2001).

¹² See Gundogdu (2010).

¹³ See MacNamara (2001).

¹⁴ See Moors (2003).



capability, the flow of the goods, and their origins—with repayment realised from the export and sale of commodities in exchange for hard currency. In other words, the lender’s risk assessment is primarily related to the company’s ability to perform, i.e., to produce and deliver commodities, even under unstable or uncertain political and financial circumstances. Hence the term “performance risk.” The value-added of SCTF solutions is their built-in ability to provide maximum security to all the parties of a transaction—producer, buyer, and lender—essentially by converting payment and sovereign risk into performance risk.

For the lenders, SCTF presents an opportunity to add new customers and expand into markets that are not accessible through traditional channels. European commodity trade finance lending banks, such as ING, Deutsche Bank, Natixis, Société Générale, and BNP Paribas, have a long tradition in financing commodity trade on behalf of their clients, dating back to the 1980s. Moreover, South African banks with proven expertise and regional knowledge have dominated the African trade finance sector. Examples are Nedbank, Standard Bank, or Rand Merchant Bank. Banks seek out opportunities to assist commodity producers in accessing new markets and customers by providing special expertise, country, and commodity knowledge as well as full legal documentation. Volatility in commodity prices can make SCTF a risky business. Lenders charge interest for any funds disbursed as well as fees for arranging the transaction.

Table 1 summarises the most common SCTF structures (*pre-export finance*, *pre-payment facilities*, and *borrowing base facilities*) along with their main characteristics. All structures rely on self-liquidating, offshore cash flows generated from the trading of commodities to support the finance structure and mitigate associated credit and transfer risks.¹⁵ Hence, there are some generic structural components in the financing arrangements. Generally, the loan amount is based on the face value/market value of liquid commodities and the financing bank has recourse over export contracts, inventory, shipments, and receivables, which serve as a collateral. The bank tracks the goods from procurement to sales. Depending on the structure of the arrangement, further hedges can be part of the collateral.¹⁶

In Fig. 1, we illustrate a pre-export finance (PXF) structure, which is the most common SCTF structure used today. In the course of PXF, a bank (lender) advances funds to a commodity producer (borrower) based on proven orders from buyers (offtakers). The borrower usually requires the funding to produce and supply the goods.¹⁷ In most cases, the buyer is instructed to transfer the payment directly to the lending bank. The lender will advance the funds to the producer less deduction for charges and interest associated with the loan. The structure enables the producer to receive the payment in advance for the goods he will ship to the buyer soon. It also allows the buyer to enter long-term contracts, something it might not have been able to do without the financing provided by the lender. The producers are often situated in developing countries with a high degree of political risk, whereas the

¹⁵ See, e.g., Deutsche Bank (2019).

¹⁶ See, e.g., International Finance Corporation (2017).

¹⁷ See, e.g., Trade Finance Analytics (2019).



Table 1 Overview of common SCTF structures

	Pre-export finance (PXF)	Pre-payment facility	Borrowing base facility
Business description	Borrower is a corporation with existing production. Buyers are external parties or trading companies.	Borrower is a trading company (with limited recourse). An offtake agreement is in place between the producer and the trading company for the term of the structure.	Borrower is a corporation with existing production. Buyers are external parties or trading companies.
Purpose of financing	Pre-payment of exports	Limited recourse financing to trader (buyer) (e.g., 10% recourse) to supplement credit strength of producer. Full recourse with respect to payment risk once the seller has delivered the goods. Lenders take the performance risk of the producer (seller).	Working capital credit facilities secured by current assets.
Tenor	Usually up to 7 years, amortising	Up to 7 years, amortising	Short to medium term, amortising
Volume	Typically, USD 100m up to USD 2-3bn	Typically, USD 50m up to USD 1-2bn	Typically, USD 50m up to USD 3bn
Security taken	Assignments of sales contracts, receivables, and pledge over collection account. Depending on the strength of the borrower, the structure may also include pledges of fixed assets.	Assignment of the buyer's right and interest under the sales (offtake) contract (e.g., right to goods that have been prepaid). Security interest over collection account where principal and interest payments are retained (from the final payment of the seller to the buyer).	Current assets which consist of (i) cash, (ii) trade receivables, and (iii) inventory (commodities) serve as collateral. Security package may also include pledge of sales contracts and collection accounts. Size of the loan is calculated by applying discounts to the predefined asset base.



bank and buyer are typically located in a developed economy. Generally, the lender has a long-standing relationship with the buyer and understands its business model. The most important securities granted to the lender are the assignment of the sales contract and control over the collection account. From an accounting perspective, a PFX loan is a long-term financial debt position on the borrower's balance sheet.

- (1a) Lender and producer (borrower) enter into a PFX loan agreement, whereby a loan is made available for the purposes of the purchase of raw material, production and the export of goods.
- (1b) Buyer and producer enter into a long-term commodity purchase contract, matching the tenor and repayment profile set out in the PFX loan agreement.
- (2) The lender transfers the funds to the producer.
- (3) The seller exports and ships the goods to the buyer.
- (4) The buyer transfers funds into a specific collection account, segregated from the general cash accounts of the seller, and secured in favor of the lender.
- (5) The lender is repaid from the funds in the collection accounts.
- (6) Any excess cash after the repayment of the lender will be released to the producer.

Structured commodity trade finance insurance

SCTF as a low-risk, low-reward, and high-volume business is challenging under the current Basel III and even more so under the upcoming Basel IV capital regulations (MacNamara 2017). Commodity finance banks face profitability hurdles as well as limit restrictions on counterparties, countries, and commodities. Traditionally, commodity finance banks have been using large volumes of credit insurance to reduce their exposure to certain counterparties or countries in the SCTF arena. The supply side of the market for SCTF insurance mostly consists of specialised private entities. Some insurance companies have built a decade-long track record in insuring SCTF business as well as extensive knowledge in the business model of their insured banks. Major players for SCTF insurance are, among others, Swiss Re Corporate Solutions,¹⁸ Lloyd's, Liberty, Chubb, AXA XL, and Zurich. Large private credit insurance companies such as Coface, Euler Hermes, and Atradius, in contrast, mainly focus on classical trade credit insurance.

Public providers such as state-owned export credit agencies (ECAs) have played a minor role in the SCTF sector.¹⁹ However, they exhibit a strong presence in export credit insurance and are highly specialised financing institutions such as EKF and Finnvera.²⁰ There are over 110 national ECAs worldwide acting on behalf of national governments with the mandate to promote their domestic exporters by providing export credits (Dawar 2020). Several scholarly publications have focused on

¹⁸ See Swiss Re, Bank Trade and Infrastructure.

¹⁹ In comparison with private insurers, ECAs are funded by their government to promote foreign trade as well as facilitate the export for local companies.

²⁰ See Finnvera, EKF.



Table 2 Classification of risk perils and conditions for comprehensive credit insurance

	Insurance policy contract	Risk participation agreement
Risks covered	All commercial and political risks	All commercial and political risks
Trigger event	Non-payment of due principal or interest	Non-payment of due principal or interest
Exclusion	War, nuclear event, radiation, material default, fraud by insured	Fraud by the insured
Onus of proof	Insured	Insurer
Capital relief	Depends on wording	Yes
Premium	Percentage of original margin on the loan	Percentage of original margin on the loan
Premium payment	For example, semiannually, quarterly	When received
Product flexibility	Medium	High
Waiting period	Usually 180 days	Few days
Proof of loss	Yes	No
Indemnity	Up to 90%	Equal or less than retention rate of the bank

ECAs (Gianturco 2021; Jennekens and Klasen 2022; Kim 2020; Klasen et al. 2022; Oramah 2020). ECAs in advanced economies were created as an instrument to support national exports to risky countries. Export credit insurance provides coverage against non-payment risk under the export contract (Kim 2020). ECAs step in if commercial banks or private insurers do not offer sufficient cover (Klasen et al. 2022). The insurance products offered are credit insurance and guarantees. An export credit insurance is usually granted to an exporter, while the export credit guarantee is provided to a financial institution. Export credit insurance facilitates trade finance, because commercial banks are willing to lend against assets backed by export credit insurance (Willsher 1995).

Common types of credit insurance are trade credit (domestic and export) insurance, asset protection insurance, non-payment insurance, political risk insurance, and comprehensive credit insurance. SCTF insurance is a comprehensive credit insurance, which covers a non-payment event due to commercial or political risk triggers. Classical political risk insurance covers a default triggered by political events (political violence, sovereign non-payment, expropriation, currency convertibility),²¹ whereas comprehensive credit insurance has a wider definition of cover, including both commercial and political events. Comprehensive credit insurance can be written in the form of an insurance policy or as a risk participation agreement. In Table 2, we describe the differences between the two products. Compared to an insurance policy, a risk participation agreement is a first demand guarantee product with enhanced benefits for the insured. Major advantages of a risk participation agreement are the very short waiting period, unconditional payment without proof of loss, no or few

²¹ See, e.g., Braun and Fischer (2018).



exclusions and eligibility for capital relief.²² An insurance policy, on the other hand, provides a higher indemnity up to 90% (the bank retains 10% of the risk).

Development of hypotheses

In this research, we use the term SCTF as a general concept, covering the most common transaction structures outlined in the Sect. “[Definition and structure types](#).” Additionally, as explained in the Sect. “[Structured commodity trade finance insurance](#),” SCTF insurance is a contract, covering the risk of an SCTF transaction. Below, we develop the hypotheses that serve as a basis for our survey, followed by the respective empirical analysis. Where no suitable academic literature could be found, we relied on industry experts and their opinions to ensure the suitability and relevance of the hypotheses.

Commonly, the SCTF business is part of the corporate banking division of a commercial bank, providing banking solutions to large, medium, and small companies. Banks with a small SCTF credit exposure often face limit restrictions. Moreover, the onboarding of new counterparties without a previous credit track record may result in lower (internal) credit ratings and higher capital costs, thus increasing the need to mitigate risk with insurance. We confirmed this posture with industry experts, who argue that banks with a small and relatively new SCTF portfolio will demand a high level of insurance due to the lack of a track record and experience.

However, the size of the SCTF portfolio can be expected to grow over time. Growth in the SCTF operation not only results in increased capital funding needs due to higher credit exposure per counterparty, but also in an increased number of counterparties and thus better diversification. In line with this notion, research investigating the effects of firm size on corporate insurance demand has revealed a negative effect.²³ In addition, a study on bank credit risk transfer solutions (e.g., loan securitisation) by Beyhaghi et al. (2016) finds that capital and liquidity concerns as well as the riskiness of the borrower are more likely drivers for credit risk transfers than size of the portfolio. Combining these insights, we postulate the following:

Hypothesis 1 There is a negative relationship between the size of a bank’s SCTF portfolio and its demand for SCTF insurance cover.

Previous research in property and casualty insurance for retail customers finds a negative relation between the insurance price and the demand for coverage.²⁴ Cummins and Doherty (2006), in contrast, study commercial property and casualty

²² The eligibility of an insurance policy for capital relief depends on its wording.

²³ See, e.g., Michel-Kerjan et al. (2014), or Regan and Hur (2007). A reduced demand for insurance by larger firms can have various reasons such as lower perceived value of services provided by insurers, the non-proportionality of bankruptcy costs to firm size as well as better geographical and business diversification.

²⁴ See, e.g., Outreville (1990), Browne et al. (2000) or Esho et al. (2004).



insurance and find that the price is only one of several criteria for corporate insurance buyers. The latter also consider the type of coverage, the risk management services provided, as well as the reputation, the claims management, and the financial strength of the carrier. Usually, coverage is not just placed with the lowest price bidder. It can thus be expected that the perceived adequacy of the price instead of the objective price itself constitutes the actual demand driver. Braun and Fischer (2018) provide evidence for this notion. In an empirical study of political risk insurance for corporations, they identify the perceived adequacy of the insurance price as a major demand driver.

In the context of SCTF insurance, very little is publicly known about the exact pricing approaches employed by various providers. One of the most common approaches is margin-based pricing. Hereby, the premium for SCTF insurance is derived from the interest rate of the underlying loan transaction. Most insurance providers share into the credit spread of the underlying loan with a certain percentage ranging between 50 and 85% of the overall margin. In addition, the insurer could request a share in different fees related to the loan as well. With this approach, it is rather easy for banks to access and compare the prices across various providers. In addition, the SCTF business is a niche market where common actors such as banks, traders, brokers, and insurers are known to each other. This enhances the transparency in the price building process. Therefore, we expect the decision to purchase SCTF to strongly depend on whether the bank perceives the price to be fair and adequate.

Hypothesis 2 A higher perceived adequacy of the pricing of SCTF insurance increases the likelihood that a bank will purchase coverage.

The SCTF business is highly complex and requires specialised knowhow combined with long-term experience within the bank. Various studies focusing on individual consumer and corporate demand for non-life insurance have shown that education and knowledge foster the understanding of risk and consequently the demand for insurance.²⁵ We expect the same effect to be present in banks' decision-making process for insurance purchases. More specifically, a good understanding of the different policy wordings, previous claims experience, the existence of an established syndication team as well as familiarity of the internal risk management with SCTF credit insurance should have a positive impact on the acceptance of the insurance product and its benefits for risk mitigation. This leads to the following hypothesis:

Hypothesis 3 A bank's tendency to purchase an SCTF credit insurance policy increases with the experience and expertise it has with such products.

²⁵ See, e.g., Outreville (1990), Esho et al. (2004), Cole et al. (2013), Giné et al. (2008) or Jehu-Appiah et al. (2011), Braun and Fischer (2018).



With the introduction of the Basel III regulatory framework, followed by Basel IV,²⁶ banks are required to manage and, if necessary, reduce their risk-weighted assets as well as maintain an adequate leverage ratio. The primary focus of Basel IV is the quantitative and qualitative remodulation of capital requirements for global banks. Banks will be required to hold an increased minimum of their own funds, to establish additional capital buffers, they will also be required to adopt prudential rules in terms of loss-absorbing capacity. In combination with limitations on the use of internal risk models²⁷ for the purpose of determining capital requirements, these changes could reduce the viability of banking activities (Amorello 2016).

Due to their emerging market angle and the weaker credit quality of the producers, SCTF transactions exhibit a high risk profile. Consequently, they are capital intensive. The insurance literature has shown that the costs of bankruptcy motivate corporates to purchase insurance against credit risk.²⁸ Similarly, a number of empirical studies have investigated banks' choices of credit risk transfer mechanisms.²⁹ They find that banks are more likely to manage the credit risk of their loan portfolios through a risk transfer instrument, when they are facing capital and liquidity constraints (Beyhaghi et al. 2017). Moreover, previous research found that funded loan syndications are primarily driven by the banks' capital considerations, both in the form of their capital-to-asset ratio and their loan-to-capital ratio.³⁰

An SCTF insurance cover provides benefits in terms of capital relief, since the default risk for the covered portions is transferred to the insurer. Hence, a higher demand for SCTF insurance can be anticipated for banks that are particularly focusing on holistic balance sheet management³¹ to comply with regulatory capital requirements:

Hypothesis 4 The higher the importance of holistic capital and balance sheet management, the higher the demand for SCTF insurance cover.

Extant research has focused on the relation between the probability of loss, the loss amount, and insurance consumption, both for individuals as well as for corporates.³² The findings show strong evidence that an increase in the probability of loss or the loss amount leads to an increase in insurance demand. This was confirmed by Braun and Fischer (2018), who show that a company's propensity to buy political

²⁶ See European Banking Authority (2020a, b).

²⁷ Basel IV is expected to revisit the scope of internal model-based rules in the calculation of risk weights. The new prudential package will limit banks' use of internal models to estimate risk variables, giving preference instead to an augmented standardised approach that better captures the vast array of exposure risks and improves comparability among banks. See BCBS, *Revisions to the Standardized Approach for Credit Risk*, *supra* note 27, at 3–4.

²⁸ See, e.g., Hoyt and Khang (2000) and Core (1997).

²⁹ See, e.g., Minton et al. (2008), Taylor and Sansone (2007), and Bolton and Oehmke (2011).

³⁰ See Simons (1993), Pennacchi (1988), and Gao and Jang (2018).

³¹ Holistic capital management refers to integrated top-down capital management focusing on the aggregate risk-weighted assets of the bank rather than on the transactional level.

³² See Mossin (1986), Schlesinger (1981) and Barro (1993).



risk insurance increases with its exposure to political risk. Similarly, Beyhaghi et al. (2017) argue that banks are more likely to sell/securitise loans of higher risk borrowers. Borrowers of SCTF are generally less creditworthy. Thus, this form of trade finance uses structured finance techniques to isolate the assets or commodities from the corporate borrower. As described in the Sect. “[Definition and structure types](#),” the core products of SCTF rely on the same generic structural features. Nevertheless, the precise design can vary, implying different levels of risk. The perceived risk of a structure mainly depends on the security package, pledges of floating and fixed assets, recourse rights of the lender, tenor, and the banks’ risk appetite. Also, in the case of a default, the legal enforcement of the loan collateral in certain emerging markets can be a challenge. We expect that a bank’s propensity to purchase insurance coverage increases with the perceived riskiness of an SCTF structure:

Hypothesis 5 The larger the perceived risk of the SCTF structure, the more likely the bank will obtain SCTF insurance coverage.

The price of the underlying commodity is a key element in SCTF, as it drives the value of the collateral and has a significant influence on the borrower’s performance. Consequently, the borrower’s vulnerability to changing commodity prices will influence its default risk.³³ Depending on the borrower, a higher or lower price could constitute the risk. If the borrower is a commodity producer with own sourcing (the physical owner of the product), an increased price of the respective commodity would have a positive impact on its creditworthiness. On the contrary, if the borrower is a commodity processor/manufacturer without own sourcing, a lower purchase price would have a positive impact, unless price increases can be fully or partially passed through to the end customer.³⁴ Taken together, for lenders the commodity price plays an important role in assessing the creditworthiness of the borrower. In anticipation of changing commodity prices, risk can be mitigated through SCTF insurance to reduce exposure to the counterparty.

Hypothesis 6 The perceived default risk of the borrower arising from commodity price volatility has a positive impact on the demand for SCTF insurance.

The deregulation and liberalisation of insurance markets has resulted in greater product differentiation and lower market transparency, which in turn increased demand for brokerage services.³⁵ Insurance brokers act as agents of the policyholder and enhance market efficiency by reducing the information asymmetries between insurers and buyers that can cause adverse selection. A study of insurance broker and client relationships by Beloucif et al. (2004) concludes that a good quality of the relationship is essential to a successful business outcome.

³³ See, e.g., Suták and Kozár (2013).

³⁴ See, e.g., Deloitte (2018)

³⁵ See Maas (2010).



Broker relationships are also essential for financial institutions to find the right credit insurance solution. Especially banks without established syndication teams or specialised knowledge about SCTF insurance rely on the expertise and services of experienced broker firms such as AON, Guy Carpenter, BPL Global, JLT, Arthur Gallagher, Texel. The latter advise banks in all aspects of their lending activities and in obtaining specialty credit insurance products that offer protection against obligor default and qualify for regulatory capital relief. Drawing on their strong technical expertise and access to a wide network of insurers, brokers are able to exploit the competitive dynamics of the insurance market to secure the right coverage at the best price for their clients.³⁶ Furthermore, brokers assist with policy wording, price negotiation, claims management, and invoicing during the tenor of the insurance policy. The brokerage fee consists of a percentage of the premium paid on each policy and is paid by the insurer.³⁷ The importance of brokers in the SCTF insurance market is captured by the following hypothesis³⁸:

Hypothesis 7 The intensity of broker relationships in the SCTF area have a positive impact on the demand for SCTF credit insurance.

Data and methodology

Questionnaire design

The variables, which influence the demand for credit insurance, are very specific to the nature of the industry. We captured the general factors affecting demand for credit insurance and, additionally, we included variables specifically linked to SCTF. To this end, we consulted international SCTF bank experts in London and the Netherlands. Furthermore, we interviewed insurance brokers coordinating the SCTF insurance purchase activities of international banks in London and Geneva. To measure the constructs underlying our hypotheses, we developed suitable item batteries. The first draft of the questionnaire was tested by piloting it through bank experts and brokers to obtain their feedback in terms of completeness and comprehensiveness. The comments received were carefully considered and reasonable responses were implemented in the final version. In Fig. 2, we provide an overview of the questionnaire structure. The questionnaire was divided into two parts. The first part (A–B) includes general variables such as the business sector (role) of the responding financial institution (bank, commodity trader, broker), the respondent's specific working area within the firm, his/her position within the firm, the headquarter country of the

³⁶ See BPL Global.

³⁷ See Cummins and Doherty (2006).

³⁸ An intensive relationship to a broker thus has the opposite effect of an intensive relationship to the borrower. Existing research by Dass and Massa (2011) and Bharath et al. (2011) suggests that banks are less likely to use credit risk transfer mechanisms if they have a strong past relationship with borrowers.



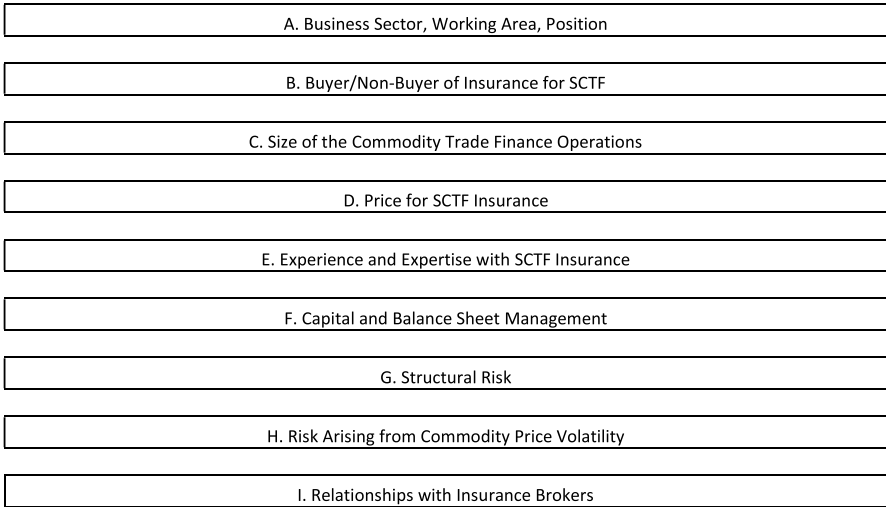


Fig. 2 Questionnaire structure

firm, and whether the firm is a buyer of insurance. The second part (section C–I) includes 40 items that measure the potential drivers of demand for SCTF insurance. Items in section C through D were measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Participant recruitment

The final version of the questionnaire was sent to participants through the Unipark online survey tool. The participation in the questionnaire was on an anonymous basis, however, participants could voluntarily provide their contact details to receive the results of our study. The survey target group consisted of banking executives worldwide, who either work in SCTF or are responsible for purchasing insurance coverage for their banking organisations. SCTF is a highly specialised sub-area of trade finance, demanding expert knowledge and long experience. Given the high market entry barriers, only large international banks with expert teams are active in this area. Therefore, the range of suitable participants was narrow by the nature of the market. However, as industry professionals in this sector know each other quite well, we were able to cover a high percentage of the market. To establish contact with the prospective respondents, we pursued several different approaches simultaneously. First, we leveraged the industry network of the corresponding author. At the same time, we identified potential participants who revealed themselves to be working in the commodity trade finance area in social networks such as Xing and LinkedIn and approached those via email. The questionnaire was launched at the



beginning of June 2019 and sent to 550 participants. Reminders were sent out via email and personal calls were made where possible. Overall, 160 participants started the questionnaire (non-zero duration), but 36 did not finish it, implying a relatively low attrition rate of 22.5%. The 124 fully completed questionnaires represent a response rate of 24.8%, which is above average compared to similar studies.³⁹

Compensating for missing survey data

In section A, participants were asked to characterise their SCTF operations in terms of the number of employees, the size of the SCTF book (in USD mn), the number of active client relationships, and the revenues achieved per year (in USD mn). Due to confidentiality reasons, eight participants could not provide this data. To compensate for the missing survey data, we followed Graham (1983) and projected the missing data units based on the answers of respondents with matching characteristics, using mean-value imputation. To this end, we divided our sample into four imputation classes in terms of qualitative control variables. Depending on the control variable filled in by the participant and on its value, we formed subclasses along values for the available items (small, middle, large) and assigned the subclass mean-value to all missing items in that subclass. In case of surveys with four missed control variables, we formed subclasses for every country and assigned the class weight to each control variable. The country information was available for all participants.

Exploratory factor analysis and logistic regression analysis

We start our empirical analysis with an exploratory factor analysis (EFA) to obtain the factor scores for the potential demand drivers discussed in our hypotheses. EFA is a dimension reduction method through which the individual items from our survey are bundled into a smaller number of factors.⁴⁰ The resulting factor should exhibit a strong relationship with its variables (items), whereas the cross-factor loadings should be minimal. For a compact technical explanation of EFA, we refer to Braun et al. (2013). To test the appropriateness of the factor analysis, we use Kaiser–Meyer–Olkin measure (KMO) for sampling adequacy⁴¹ and Bartlett’s test of sphericity. Furthermore, the normality of the data is tested by means of the Kolmogorov–Smirnov (K–S) test, the Shapiro–Wilk test, and the Henze–Zirkler test. The results determine the choice of the factor extraction method.

Based on the factor scores obtained from the EFA, we estimate a logistic regression model to measure the relationship between the factors and the dichotomous-dependent variable *SCTF insurance buyer* (yes/no). Non-buyers are firms indicating that they had not yet purchased insurance coverage for SCTF transactions and that they do not intend to do so in the future. In contrast, buyers of SCTF insurance are

³⁹ See Wilson and Summers (2002).

⁴⁰ See Gunjan and Kushagra (2019).

⁴¹ See Kaiser (1974).



Table 3 Descriptive statistics of the SCTF business size

	Mean	Median	SD	Min	Max	K-S stat	<i>p</i> value
Full sample	67.59	30.00	93.92	2	500	0.275	0.000***
No. of employees	98.19	50.00	114.05	5	750	0.209	0.000***
No. of client relationships	97.32	43.00	118.60	0.5	550	0.239	0.000***
SCTF revenue (USDm)							
Buyers	78.70	40	102.11	2	500	0.274	0.000***
No. of employees	110.21	60	123.73	5	750	0.198	0.001***
No. of client relationships	109.72	50	127.10	0.5	550	0.218	0.000***
SCTF revenue (USDm)							
Non-buyers	26.86	19	25.04	3	100	0.233	0.148
No. of employees	55.06	40	43.15	10	160	0.255	0.088*
No. of client relationships	48.29	30	50.95	4	220	0.224	0.182
SCTF revenue (USDm)							

Mean, median, standard deviation (SD), minimum (Min), and maximum (Max) for the three variables of the size of the SCTF operations (Nr. of employees, Nr. of client relationships and Revenues in SCTF area) of the banks in the sample. The results of the Kolmogorov–Smirnov (K–S) test of the null hypothesis that the variables are normally distributed are displayed in the last two columns. The survey participant's answers regarding the revenue generated in the SCTF area of the bank was converted to USD, using the following the exchange rates: USD/CHF = 1.020, and USD/EUR = 1.102

The asterisk denotes the significance level: ****0.1%, ***1%, **5%, *10%

defined as those firms that claim to have bought insurance for SCTF transactions in the past or that they intend to purchase it in the future.⁴² As regressors, our model specification includes seven explanatory factors (obtained from the EFA) and five dummy control variables. Due to the large dispersion of the values for the size variable (see Table 3), we use a logarithmic transformation.

Empirical results

Sample breakdown and descriptive statistics

Table 4 shows the breakdown of our sample composition by country of origin and business sector (role) of the financial institution as well as hierarchy level and working area of the respondents. The sample structure is a good reflection of the SCTF market structure, particularly geographically. The largest groups of participants represent banks from countries with a strong SCTF history such as Germany, Switzerland, The Netherlands, South Africa, and France. However, participants from France with large commodity trading banks are slightly underrepresented compared to

⁴² Five banks stated their intention to discontinue buying SCTF insurance in the future. For consistency reasons, we included these in the sample of buyers. To test the robustness of our model, we reran our analysis by including these five participants in the sample of non-buyers and our results still hold.



Table 4 Sample composition

	Full sample		Buyers of insurance		Non-buyers of insurance	
	No	%	No	%	No	%
Argentina	1	0.81	1	1.00	0	0.00
Austria	3	2.42	1	1.00	2	8.33
Brazil	2	1.61	2	2.00	0	0.00
Cote D'Ivoire	1	0.81	1	1.00	0	0.00
France	9	7.26	9	9.00	0	0.00
Germany	25	20.16	20	20.00	5	20.83
Italy	1	0.81	1	1.00	0	0.00
Japan	2	1.61	2	2.00	0	0.00
Nigeria	1	0.81	1	1.00	0	0.00
Philippines	1	0.81	0	0.00	1	4.17
Russia	9	7.26	6	6.00	3	12.50
South Africa	15	12.10	15	15.00	0	0.00
Switzerland	25	20.16	16	16.00	9	37.50
The Netherlands	22	17.74	20	20.00	2	8.33
U.K.	6	4.84	4	4.00	2	8.33
U.S.	1	0.81	1	1.00	0	0.00
Total	124	100	100	100.00	24	100
Business sector						
Banking	120	96.77	97	97.00	23	95.83
Commodity trading	3	2.42	2	2.00	1	4.17
Insurance broker	1	0.81	1	1.00	0	0.00
Total	124	100	100	100	24	100
Hierarchy level						
Associate	10	8.06	8	8.00	2	8.33
Vice President	38	30.65	24	24.00	14	58.33
Director	50	40.32	44	44.00	6	25.00
Managing Director	8	6.45	8	8.00	0	0.00
Regional Managing Director	18	14.52	16	16.00	2	8.33
Total	124	100.00	100	100	24	100
Working area of participants						
Structured commodity trade finance	51	41.13	46	46.00	5	20.83
Commodity trade and traders finance	37	29.84	29	29.00	8	33.33
Trade finance general	19	15.32	12	12.00	7	29.17
Others	17	13.71	13	13.00	4	16.67
Total	124	100	100	100	24	100

The above table provides an overview of the full sample size of our survey with 124 participating international banks. The data are categorised by country, business sector, hierarchy level and working area of the participants. Furthermore, the data were segregated into buyers of SCTF and non-buyers of SCTF. The group of non-buyers of SCTF insurance includes those participants who indicated that their bank had not yet purchased insurance cover for SCTF transactions and did not intend to do so in the future



those from Switzerland. The sample also comprises smaller participant groups from Russia, Austria, and the U.K. In addition, we were able to capture one or two survey responses from Argentina, Brazil, Cote D'Ivoire, Italy, Japan, Nigeria, Philippines, and the U.S.

In terms of business sector, our sample shows a very high homogeneity with 97% of the responding firms representing banks. 19.17% of the banks are non-buyers of credit insurance. Regarding the geographical spread, 36% of the Swiss and 20% of the German participants are non-buyers of insurance. Among the Russian subgroup, the percentage of non-buyers is even 50.0%, since most of the approached banks are under international sanctions without access to the insurance market.

The exact working area of the survey participants within a bank allows us to assess the representativeness of the sample regarding trade finance. 41.13% of the participants work directly in SCTF, 29.84% in commodity and traders finance, and 15.3% in the general trade finance area. Most of the respondents hold a senior or managing position within their firm. 40.32% indicated to be at the director level, and 20.97% at the managing or group managing director level.

Univariate results

Table 3 shows the mean, median, standard deviation, minimum and maximum for the three SCTF business size proxies from our survey. We also provide a breakdown into two subsamples: one for buyers and one for non-buyers of SCTF insurance. All three size variables exhibit a positive skewness (their medians are smaller than their means) and a large variation. The smallest bank in the sample has only two employees in the SCTF area, whereas the largest bank operates with 500 specialists in trade finance, including front and back office. We want to test whether the differences in the mean values of the three size variables between buyers and non-buyers are statistically significant. This cannot be done by means of a standard t test, because the significant K-S goodness-of-fit test indicates non-normality of the size data. Hence, we run a Mann-Whitney U test. According to the results in Table 5, we reject the null hypothesis that the data have been drawn from the same distribution for all three variables at least on the 10% significance level. This indicates that size is a relevant variable to be controlled for in our multivariate analysis.

Results of the explanatory factor analysis

To determine the adequacy of the data for an EFA, we compute the KMO measure. KMO values larger than or equal to 0.8 indicate that the data set is well suited for the methodology.⁴³ Based on the KMO measure, we eliminate 17 variables (with KMO values less than 0.51) from our data set. The remaining sample comprises 23 variables and achieves a KMO value of 0.7912. Moreover, we apply Bartlett's test of sphericity to test for a significant difference between the correlation matrix and

⁴³ See, e.g., Cerny and Kaiser (1977).



Table 5 Results of Mann–Whitney U test

No. of employees		No. of client relationships		SCTF revenue (USDm)	
N	124	N	124	N	124
Mann–Whitney U	1644	Mann–Whitney U	1510	Mann–Whitney U	1548
p value	0.00497***	p value	0.05001*	p value	0.02782**

The Mann–Whitney U test assesses whether the differences in the average Nr. of employees, Nr. of client relationships, and Revenues in SCTF area between buyers and non-buyers of SCTF insurance are statistically significant. The null hypothesis underlying this test states that the two samples have been drawn from the same distribution

The asterisk denotes the significance level: ****0.1%, ***1%, **5%, *10%

the identity matrix.⁴⁴ The result is a χ^2 test statistic of 1450.166 with 253 degrees of freedom at a significance level of 1%. Ultimately, the KMO value and the results from the Bartlett's test indicate that an EFA can be applied to the sample.

In the next step, we run the K–S test as well as the Shapiro–Wilk test to assess each of the 23 items separately for univariate normality. We reject the null hypothesis in all cases. We then test for multivariate normality using the multivariate Shapiro–Wilk test and the Henze–Zirkler test. The corresponding results confirm the non-normality of data. The maximum likelihood method for factor extraction in an EFA is sensitive to skewed data.⁴⁵ Hence, it should not be applied to non-normally distributed variables. In contrast, the minimum residual method is not limited to distributional assumptions and can handle small sample sizes. Therefore, we run our EFA with the minimum residual extraction methodology. Several additional analyses have been performed using other extraction techniques (MLE, parallel analysis) to ensure the robustness of the model.

With respect to factor selection, we took guidance from our seven hypotheses. The Kaiser criterion suggests only using factors with an eigenvalue greater than 1, which supports a selection of seven factors. Moreover, we apply the very simple structure (VSS) method⁴⁶ and Velicer's minimum average partial (MAP) criterion⁴⁷ to additionally confirm the appropriateness of seven factors. The VSS criterion reaches its maximum of 0.8 for seven factors. Similarly, the MAP test⁴⁸

⁴⁴ See, e.g., Snedecor and Cochran (1989).

⁴⁵ See, e.g., Briggs and MacCallum (2003).

⁴⁶ The VSS method compares the original correlation matrix to a simplified version of the original factor matrix that contains the greatest loadings per variable for a given number of factors. The optimum number of factors is obtained where the VSS criterion reaches its peak. For further details on the VSS criterion please refer to Revelle and Rocklin (1979).

⁴⁷ See, e.g., Gorsuch (1983).

⁴⁸ The Velicer MAP is an iterative process to determine the number of factors to be retained. First, the largest principal component (factor) is retained, and the correlations among all other variables are calculated without taking the selected factor into account. Next, two, three, and so on factors are partialled out of the (original) correlation matrix and the partial correlations are calculated. The partial correlations are then squared and averaged to obtain an average partial correlation for each model. The optimal number of factors is the one that entails the minimum average partial correlation (Velicer 1976).



points to seven factors with a minimum of 0.03. As a conclusion, all three statistical approaches and our hypotheses indicate that the use of seven factors adequately describes our data set. To increase the discriminatory power as well as interpretability of the factors, we rotate them with the orthogonal varimax method.⁴⁹

The results of the EFA are presented in Table 6. Cross-loadings below the level of 0.500 have been suppressed to improve the readability. Overall, each of the seven item batteries loads highly on a single factor. The highest loading is 0.921 and the lowest exhibits a value of 0.513. With one exception (factor 7), all factors show a Cronbach's α in excess of 0.7, which indicates internal consistency.

All items apart from four show communality values above 0.55, ruling out problems due to the sample size (MacCallum et al. 1999).⁵⁰ We thus have a meaningful and stable factor structure. Regarding the interpretation of the factors, we resort to our hypotheses. It should be borne in mind that virtually all factors are based on subjective perceptions of the responding banks, as expressed through our survey. To simplify the subsequent discussion, however, we refrain from carrying along the attribute "perceived" below. In a nutshell, we interpret the seven factors as follows:

- Factor 1: Experience and expertise with SCTF insurance (Hypothesis 3).
- Factor 2: Importance of capital and balance sheet management (Hypothesis 4).
- Factor 3: Size of the commodity trade finance operations (Hypothesis 1).
- Factor 4: Price for SCTF insurance (Hypothesis 2).
- Factor 5: Intensity of relationships with insurance brokers (Hypothesis 7).
- Factor 6: Structural risk (Hypothesis 5).
- Factor 7: Commodity price volatility (Hypothesis 6).

Results of the logistic regression analysis

Next, we draw on the factor to test our seven hypotheses in a logistic regression model. We additionally include five variables, which were not suitable for the EFA (KMO value < 0.5), as controls on a standalone basis. These variables include the importance of syndication teams, capacity constraints on single obligors and countries, the intention to provide higher ticket sizes to clients, and the value-added role of silent participations. We map these variables from their original five-point Likert Scale to a dummy coding (Likert values 5, 4, and 3 are summarised in category "1" and Likert values 2 and 1 are coded "0"). In line with the new variable type, we also

⁴⁹ The method indicates that the design of the factors is statistically independent, and multicollinearity is not relevant. Additional unreported analysis has proved the stability of results for alternative rotation methods.

⁵⁰ MacCallum et al. (1999) show that common rules of thumb regarding sample size (minimum sample size N or a minimum ratio of sample size to question items $N:q$) are not useful. Instead, the communalities play a crucial role: when communalities are consistently high, the impact of sample size and other aspects of design are greatly reduced. Consequently, a good recovery of population factors can be achieved even with a sample size of below 100.



Table 6 Rotated factor loadings with further statistics

Item	F1	F2	F3	F4	F5	F6	F7
<i>Size of the commodity trade finance operations:</i>							
<i>No. of employees</i>			0.729				
<i>No. of client relationships</i>			0.737				
<i>SCTF revenue (m USD)</i>			0.907				
<i>Price for SC TF insurance: Our bank considers...</i>							
<i>... the price for SC TF credit insurance as risk-adequate</i>				0.753			
<i>... the price for SC TF insurance as competitive</i>				0.807			
<i>... the price for SC TF credit insurance as affordable</i>				0.556			
<i>Experience and expertise with SC TF insurance: Our bank...</i>							
<i>...has a strong expertise with credit insurance for SC TF business</i>	0.921						
<i>...has a clear understanding of the insurance policy wording</i>	0.809						
<i>...has experience with the insurance claims management</i>	0.682						
<i>...has a credit committee who is familiar with SC TF insurance</i>	0.649						
<i>Capital and balance sheet management: Our bank...</i>							
<i>... uses risk mitigants to manage its risk-weighted assets</i>		0.717					
<i>... reflects credit risk mitigants in internal capital costing model</i>		0.706					
<i>... aims to achieve capital relief</i>		0.815					
<i>... actively manages its leverage ratio</i>		0.731					
<i>Structural risk: Our bank considers as higher risk...</i>							
<i>... transactions without offshore repayment structure</i>						0.561	
<i>... the lack of pledge on the collection accounts</i>						0.729	
<i>... the lack of pledge on off-taker and/or export contracts</i>						0.908	
<i>Commodity price volatility risk: Our bank believes that...</i>							
<i>... commodity price is a key driver of counterparty's credit risk</i>							0.576
<i>... default risk increases with higher commodity price volatility</i>							0.715



Table 6 (continued)

Item	F1	F2	F3	F4	F5	F6	F7
... borrowers should closely manage commodity price volatility							0.526
Relationships with insurance brokers: Our bank...					0.513		
... has strong business relationships to brokers in the SCTF field					0.857		
... relies on broker's expertise in credit insurance for SCTF				0.781			
... considers the broker as first point of contact for SCTF insurance							
Eigenvalues	3.023	2.522	2.122	1.859	1.83	1.808	1.465
Explained variance (%)	13.14	10.96	9.23	8.08	7.97	7.86	6.37
Cumulative explained variance (%)	13.14	24.11	33.33	41.42	49.39	57.25	63.62
Cronbach's Alpha	0.895	0.848	0.843	0.785	0.830	0.765	0.691

The questionnaire included a 5-point Likert scale to measure the answers for the 23 items. The Kaiser–Meyer–Olkin test to measure the sampling adequacy indicates a value of 0.7912. Bartlett's test of sphericity: test statistic of 1450.166 with 253 degrees of freedom and p value = 0.000. Applied extraction method: minimum residual method. Rotation method: varimax. Dimensionality: seven factors are well suited according to Kaiser criterion, VSS criterion, and MAP test. To show a better overview of our data set, the factor loadings below 0.500 have been suppressed. Overall, the seven factors explain 63.62% of the total variance of the sample. Cronbach's α confirms the internal consistency of each item battery. Factor reliability: Tucker–Lewis Index = 1.02429



Table 7 Logistic regression results including all potential determinants

<i>N</i> = 124					
	β_k	$\exp(\beta_k)$	s.e	Wald	<i>p</i> value
Constant	2.306	10.034	0.685	3.367	0.000****
Size of the commodity trade finance operations	0.247	1.280	0.309	0.798	0.424
Adequacy of the price	0.698	2.01	0.486	1.437	0.151
Importance of balance sheet management	0.662	1.939	0.318	2.080	0.038**
Expertise and experience with SCTF insurance policies	1.004	2.73	0.355	2.824	0.004****
Risk of the underlying SCTF structure	0.568	1.764	0.292	1.946	0.048**
Intensity of broker relationships	0.642	1.900	0.302	2.125	0.033**
Risk arising from commodity price	0.076	1.079	0.367	0.209	0.834
Control variables					
Existence of internal syndication teams	-0.425	0.654	0.754	-0.3564	0.573
Existing capacity constraints on single obligor level	-0.438	0.645	0.966	-0.454	0.650
Existing capacity constraints on countries	1.054	2.869	1.113	0.947	0.343
Intention to provide higher ticket sizes to clients	-0.658	0.517	0.941	-0.700	0.484
Value added of silent participations	0.114	1.121	1.207	0.094	0.925
Goodness of fit	χ^2		d.f.		<i>p</i> value
-2LL ₀ (null model)	121.849		123		0.513
-2LL _m (considered model)	86.639		111		0.958
LR (likelihood ratio test)	35.543		12		0.000****
Hosmer–Lemeshow test	5.34		8		0.720
Nagelkerke					0.398
McFadden					0.291
Pseudo <i>R</i> ² measure					<i>p</i> -value
Cox and Snell					0.249
Nagelkerke					0.398
McFadden					0.291

Results of the logistic regression analysis of the binary-dependent variable (buyer/non-buyer of SCTF insurance) on seven explanatory variables, five control variables and a constant. The coefficients β_k indicate the extent to which each independent variable influences the logit. $\exp(\beta_k)$ stands for the impact on the odds and s.e. denotes the standard error of each parameter. The Wald statistic tests the significance of the logit coefficients and its result is given by the *p* value. The abbreviation d.f. stands for the degrees of freedom of the χ^2 -distribution. -2LL₀ is an abbreviation for minus two times the log-likelihood value for the null model including only a constant. Similarly, -2LL_m stands for minus two times the log-likelihood value for our model (H_0 : perfect model fit). The likelihood ratio (LR) is calculated as the difference between -2LL₀ and -2LL_m and used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo *R*²-measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit

The asterisk denotes the significance level: ****0.1%, ***1%, **5%, *10%



Table 8 Classification table for the full model

Observed	Predicted		
	Buyer of insurance	Non-buyer of insurance	% Correct
Buyer of insurance	94	6	94.00
Non-buyer of insurance	14	10	41.67
Overall			83.87

The classification table is used to assess the predictive accuracy of the logistic regression model from Table 7. The figures are derived by rounding the probability of buying to a zero-digit number. Hence, when the probability of buying stays strictly below 0.50, a bank is considered a non-buyer of SCTF insurance

Table 9 Logistic regression results including all significant determinants

<i>N</i> = 124					
	β_k	$\exp(\beta_k)$	s.e	Wald	<i>p</i> value
Constant	1.854	6.385	0.305	6.074	0.000****
Importance of balance sheet management	0.595	1.813	0.271	2.197	0.028**
Expertise and experience with credit insurance policies	0.947	2.578	0.273	3.472	0.001****
Risk of the underlying SCTF structure	0.452	1.571	0.258	1.751	0.080*
Intensity of broker relationships	0.634	1.885	0.277	2.285	0.022**
Goodness of fit	χ^2		d.f.		<i>p</i> value
–2LL ₀ (null model)	121.85		123		
–2LL _m (considered model)	92.056		119		
LR (likelihood ratio test)	29.794		4		0.000****
Hosmer–Lemeshow test	6.895		8		0.548
Pseudo R^2 measure					<i>p</i> value
Cox and Snell					0.214
Nagelkerke					0.341
McFadden					0.245

Results of the logistic regression analysis of the binary-dependent variable (buyer/non-buyer of SCTF insurance) on four explanatory variables and a constant. The coefficients β_k indicate the extent to which each independent variable influences the logit. $\exp(\beta_k)$ stands for the impact on the odds and s.e. denotes the standard error of each parameter. The Wald statistic tests the significance of the logit coefficients and its result is given by the *p* value. The abbreviation d.f. stands for the degrees of freedom of the χ^2 -distribution. –2LL₀ is an abbreviation for minus two times the log-likelihood value for the null model including only a constant. Similarly, –2LL_m stands for minus two times the log-likelihood value for our model (H_0 : perfect model fit). The likelihood ratio (LR) is calculated as the difference between –2LL₀ and –2LL_m and used to test the null hypothesis that all logit coefficients of the model are zero. The Hosmer–Lemeshow (HL) statistic tests the null hypothesis that the observed and predicted event rates do not differ in each category of the dependent variable. Pseudo R^2 -measures take values between 0 and 1, where values above 0.200 indicate acceptable results and values above 0.400 indicate a good model fit

The asterisk denotes the significance level: ****0.1%, ***1%, **5%, *10%



Table 10 Classification table for the model with all significant determinants

Observed	Predicted		
	Buyer of insurance	Non-buyer of insurance	% Correct
Buyer of insurance	95	5	95.00
Non-buyer of insurance	14	10	41.67
Overall			84.68

The classification table is used to assess the predictive accuracy of the logistic regression model from Table 9. The figures are derived by rounding the probability of buying to a zero-digit number. Hence, when the probability of buying stays strictly below 0.50, a bank is considered a non-buyer of SCTF insurance

rephrase the variable names. *Importance of syndication team, e.g., becomes existence of syndication team.*

The logistic regression results are presented in Table 7. We observe statistically significant positive coefficients for the predictors *importance of balance sheet management, expertise, and experience with credit insurance policies, risk of the underlying SCTF structure, and intensity of broker relationships.* These results confirm hypotheses 3, 4, 5, and 7. The coefficients of the remaining factors as well as the control are not significant and hence do not appear to be relevant drivers for banks' SCTF insurance purchasing decision.

Table 7 also shows typical goodness-of-fit measures for the logistic regression analysis. We use the χ^2 -distributed statistic $-2LL_m$ (minus two times the log likelihood of our model) to test the null hypothesis of a perfect fit. $-2LL_m$ has $N-k-1$ degrees of freedom, where k is the number of independent variables (in our case 7 factors plus 5 control variables). The p value of 0.958 does not allow us to reject the null hypothesis. Furthermore, we run the likelihood ratio test (null hypothesis: all logit coefficients are zero). Its test statistic LR is also χ^2 -distributed and equals the difference between $-2LL_0$ and $-2LL_m$. Given the p value of 0.000, the null hypothesis can be rejected. This implies that the addition of our explanatory variables to a naïve null model, which exclusively comprises a constant, results in a significant improvement of the model fit. We additionally perform the Hosmer–Lemeshow (HL) test, which is specifically designed to assess the goodness of fit for models with dichotomous response variables. Based on the χ^2 -distributed HL test statistic with 12 degrees of freedom, the null hypothesis cannot be rejected. Thus, there seems to be no difference between the observed and the predicted event rates in each class of the binary variable. Finally, we report common pseudo R^2 -measures (Cox and Snell, MacFadden, and Nagelkerke) and a classification table (Table 8). The former indicate an acceptable model fit. The latter shows that our model correctly predicts 94% of the buyers of SCTF insurance and, overall, 83.87% of all banks in the sample.

In Table 9, we present the results of a second logistic regression model, excluding all independent variables which did not show a statistically significant logit coefficient in the first analysis. Those are *size of the commodity trade finance operations, adequacy of the price, and risk arising from the commodity price.* The control



variables were also removed, as none of them exhibited statistical significance. The remaining variables are still statistically significant and their explanatory power for the probability of purchasing SCTF insurance is practically unchanged. The goodness-of-fit statistics and the pseudo R^2 -measures also change only marginally. Given the lower number of regressors, the classification table for the second logistic regression model (Table 10) exhibits a slight reduction in correctly predicted buyers and non-buyers of SCTF insurance. Overall, our results provide evidence for hypotheses 3, 4, 5, and 7.

Economic implications

Our results have several important implications for brokers and insurance companies. This research shows that brokers play an important role in the distribution of SCTF insurance and, hence, are key for the future development of both the product and the market. Considering that balance sheet management is a major driver of the demand for SCTF insurance, brokers could increase their service offerings to banks by setting up dedicated balance sheet and capital advisory teams. Those could be enhanced with advisory on bank captives to efficiently transfer risk to the insurance market. In doing so, brokers could materially improve banks' experience with SCTF insurance placements and, as our research has shown, increase the likelihood of further transactions. In addition, choosing the contact point at a bank can also have a strong impact on successfully closing a transaction. As we found capital relief to be a major motivation, the CFO department is likely to be a good reference to start a successful transaction.

We also found that the structural risk of a transaction significantly increases the likelihood of purchasing SCTF insurance. This finding implies that brokers should focus their sales activities on clients and regions where certain structural aspects are a distinct feature. Such aspects can be weak recourse rights of lenders, long tenors, floating pledged assets, and weak loan collateral enforcement.

Moreover, there are multiple ways brokers can increase a bank's expertise with SCTF insurance products. First, brokers could provide targeted trainings and knowledge transfer sessions to banks involved in SCTF. The training should cover various topics, such as the impact of SCTF insurance under Basel IV, claims handling and processing, pricing of SCTF insurance and policy wordings. The training platform can also be used to promote a broker's advisory unit to banks.

Another way to increase banks' expertise with a product is the regular publication and advertisement of successful transactions. This would lead to more transparency and therefore benefit both the buy and the sell side. Banks can get familiar with the products and their benefits without necessarily having to purchase the product upfront. This type of advertisement can create referral situations and increase awareness, particularly when a bank realises that its competitors in this space are utilising SCTF insurance products.

Furthermore, banks' expertise with SCTF insurance can be increased by providing more data and market benchmarking. Brokers, which generally have a more complete view of a market by working with various clients, could create anonymised



market benchmarks and pricing indices for SCTF products. This would provide potential clients with an additional source of information and could notably increase their comfort with the product.

Lastly, brokers can also improve banks' experience with SCTF insurance. Currently, most SCTF insurance placements are single loan insurance policies, meaning that each loan is insured separately. As such placements are associated with a considerable effort, the broker could enhance the process by creating more automatic solutions. A panel of potential re/insurers could be set up to provide a standing source of capacity via a treaty solution, as opposed to current facultative placements.

In addition to brokers, insurance companies may take a variety of actions to bolster the SCTF insurance market. The experience of a client with SCTF insurance evidently lies in the hands of the insurance company. Insurers should aim for clear communication, short-run availability to clients, digitalisation, and an efficient claims handling process. Furthermore, they should ensure that high-performing personnel is assigned to their SCTF business. Maintaining a great service level will require regular training and development of the insurance company's staff. Given that price considerations have not shown up as a significant driver for SCTF insurance demand, providers could even be able to charge a markup for a good client experience that puts them apart from the competition.

In addition, insurers can raise their clients' expertise with SCTF insurance through trainings on various aspects of the product. This practice is already widespread in the reinsurance industry: reinsurers train their clients for several days to better understand reinsurance treaty structures and pricing. Insurers could also set up specialised advisory teams for SCTF insurance. Both enhanced training and advisory are also recommended to brokers, so a close collaboration between insurers and brokers is reasonable. Beyond traditional training approaches, insurance companies could also offer rotation opportunities to the staff of banks. This means that bank employees could spend a few weeks or months with the SCTF insurance team at the insurer and learn the processes and product features first-hand. Finally, the insurance industry could work with the regulator and industry-wide bodies such as the International Credit Insurance and Surety Association (ICISA) or the Berne Union to publish expert documents on SCTF insurance and its treatment under banking regulations.

Utilising the results of our study, insurance companies can also change the product design of SCTF insurance to attract new clients. For example, SCTF insurance could be provided as a free add-on to other insurance policies (e.g., property and casualty policies) that the bank purchases from the same insurance carrier. This way the bank could build up experience and expertise around the product and in the long run this could result in additional purchases of standalone SCTF insurance. Product design can also play an important role when addressing structural risk. Insurance companies should be aware of the various structural risks that arise in different regions and specifically address these issues through smart product design.



Conclusion

Banks play a vital role in modern trade through various financing solutions that they provide to their customers. For the exploration and trade of raw materials, SCTF addresses the needs of bank clients. Over the past years, the role of insurance companies in providing SCTF insurance coverage to banks and, hence, in fostering the development and expansion of the SCTF market and the associated trade flows, has gained substantial importance. To further increase insurance penetration in this segment and transfer risk to the best owner, a better understanding of the demand side of the SCTF insurance product is essential.

Through our work, we contribute to the underserved research area on the interplay of the banking and insurance markets for specialised credit solutions in trade finance. We address a persistent knowledge gap in this area by identifying the major determinants of banks' SCTF insurance purchasing decisions. Through a comprehensive survey among banking executives worldwide and a rigorous statistical analysis, we were able to detect that the experience and expertise of the bank with SCTF insurance policies, the importance of balance sheet management to the bank, the intensity of their broker relationships, and the perceived risk of the underlying SCTF structure each have a significant influence on the bank's decision to purchase insurance. Other factors, such as the size of the commodity trade finance portfolio, the perceived adequacy of the pricing, and the risks arising from commodity price volatility seem to be of lesser relevance. Knowledge of these factors allows insurers and brokers alike to further increase the attractiveness of the SCTF insurance product and thereby grow the market. Through service offerings around the Basel regulatory framework, specifically targeted marketing, transparency and data, additional training, and enhanced capacity via reinsurance treaty solutions, brokers can play a material role in the future of the SCTF insurance market. Similarly, insurance companies should be aware of the steps they need to take to further develop their product: market research and publications, advisory, a good client service, and targeted product designs are just a few among a range of opportunities.

In addition to these practical implications, our study also provides directions for further research. A longitudinal study focusing on the group of prospective buyers and on a larger sample size with a higher share of non-buyers could yield further insights. In addition, both theoretical and empirical research could aim to identify still undiscovered determinants of the demand for SCTF insurance. For example, the mobilisation of institutional capital is a very important factor for multilateral banking institutions such as development banks. To what extent a purchase of insurance can support their mandate to motivate institutional investors to participate in their transactions across emerging markets could be further investigated with a survey focusing on development banks. Moreover, the exact role of the broker firms combined with the bank's internal centralised syndication team in the sales process and the connection with the experience and expertise of the bank as a demand driver could be examined in greater detail. Finally, several participants stated that they bought insurance in the past, however, discontinued to do so and vice versa. The factors that led to this changed purchasing behavior warrant further investigation.



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Data Availability The data that supports the findings of this study are available upon reasonable request from the corresponding author (csilla.schreiber-orosz@student.unisg.ch). The data are not publicly available due to confidentiality restrictions.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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References

- Abraham, F., and G. Dewit. 2000. Export promotion via official export insurance. *Open Economies Review* 11: 5–26.
- Ahn, J., M. Amiti, and D.E. Weinstein. 2011. Trade finance and the great trade collapse. *American Economic Review* 101 (3): 298–302.
- Amity, M., and D.E. Weinstein. 2011. Exports and financial shocks. *The Quarterly Journal of Economics* 126 (4): 1841–1877.
- Amorello, L. 2016. Beyond the horizon of banking regulation: What to expect from Basel IV? *Harvard International Law Journal* 58: 21–38.
- Antràs, P., and F. Foley. 2015. Poultry in motion: A study of international trade finance practices. *Journal of Political Economy* 123 (4): 853–901.
- Atanasova, C.V., and N. Wilson. 2003. Bank borrowing constraints and the demand for trade credit: Evidence from panel data. *Managerial and Decision Economics* 24: 503–514.
- Bharath, S.T., D. Sandeep, A. Saunders, and A. Srinivasan. 2011. Lending relationships and loan contract terms. *The Review of Financial Studies* 24 (4): 1141–1203.
- Barro, R.J. 1993. *Macroeconomics*. New York: Wiley.
- Beloucif, A., B. Donaldson, and U. Kazanci. 2004. Insurance broker–client relationships: An assessment of quality and duration. *Journal of Financial Services Marketing* 8 (4): 327–342.
- Beyhaghi, M., N. Massoud, and A. Saunders. 2017. Why and how do banks lay off credit risk? The choice between retention, loan sales and credit default swaps. *Journal of Corporate Finance* 42: 335–355.
- Bolton, P., and M. Oehmke. 2011. Credit default swaps and the empty creditor problem. *The Review of Financial Studies* 24 (8): 2617–2655.
- Bolton, P., and D. Scharfstein. 1990. A theory of predation based on agency problems in financial contracting. *American Economic Review* 80 (1): 93–106.
- BPL Global. n.d. *Our expertise and experience, Commodity Traders*. BPL Global. <https://bpl-global.com/expertise/commodity-traders/>.
- Braun, A., and M. Fischer. 2018. Determinants of the demand for political risk insurance: Evidence from an international survey. *The Geneva Papers* 43: 397–419.



- Braun, A., K. Müller, and H. Schmeiser. 2013. What drives insurers' demand for cat bond investments? Evidence from a Pan-European Survey. *The Geneva Papers on Risk and Insurance—Issues and Practice* 38: 580–611.
- Briggs, N.E., and R.C. MacCallum. 2003. Recovery of weak common factors by maximum likelihood and ordinary least squares estimation. *Multivariate Behavioral Research* 38 (1): 25–56.
- Browne, M.J., J. Chung, and E.W. Frees. 2000. International property–liability consumption. *Journal of Risk and Insurance* 67 (1): 73–90.
- Burkart, M., and T. Ellingksen. 2004. In-kind finance: A theory of trade credit. *American Economic Review* 94 (3): 569–590.
- Cerny, B.A., and H.F. Kaiser. 1977. A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate Behavioral Research* 12 (1): 43–47.
- Cole, S., X. Giné, J. Tobacman, P. Topalova, R. Townsend, and J. Vickery. 2013. Barriers to household risk management: Evidence from India. *American Economic Journal: Applied Economics* 5 (1): 104–135.
- Coppens, D. 2009. How much credit for export credit support under the SCM agreement? *Journal of International Economic Law* 12 (1): 63–113.
- Core, J.E. 1997. On the corporate demand for director's and officer's insurance. *Journal of Risk and Insurance* 64 (1): 63–87.
- Cummins, J.D., and N.A. Doherty. 2006. The economics of insurance intermediaries. *The Journal of Risk and Insurance* 73 (3): 359–396.
- Cunat, V. 2007. Trade credit: Suppliers as debt collectors and insurance providers. *The Review of Financial Studies* 20 (20): 491–527.
- Dass, N., and M. Massa. 2011. The impact of a strong bank–firm relationship on the borrowing firm. *The Review of Financial Studies* 24 (4): 1204–1260.
- Dawar, K. 2020. Official export credit support: Competition and compliance issues. *Journal of World Trade* 54 (3): 373–396.
- Deloitte. 2018. *Commodity price risk management*. Deloitte. <https://www2.deloitte.com>.
- DeLoof, M., and M. Jegers. 1996. Trade credit, product quality and intragroup trade: Some European evidence. *Financial Management* 25 (3): 33–43.
- Deutsche Bank. 2019. *Structured trade finance, Trade Solutions*. Deutsche Bank. <https://www.cib.db.com/solutions/trade-finance/structured-trade-finance.htm>.
- Doherty, N.A., and C.W. Smith Jr. 1993. Corporate insurance strategy: The case of British Petroleum. *The Journal of Applied Corporate Finance* 6 (3): 4–15.
- EKF, The Danish Export Credit Agency. 2020. *EKF for banks*. EKF. <https://www.ekf.dk/en>.
- Elliehausen, G.E., and J.D. Wolken. 1993. The demand for trade credit: An investigation of motives for trade credit use by small businesses. *Federal Reserve Bulletin*.
- Emery, G. 1987. An optimal financial response to variable demand. *Journal of Financial and Quantitative Analysis* 22 (2): 209–225.
- European Banking Authority. 2020a. *EBA updates impact of the Basel III reforms on EU banks' capital*. European Banking Authority. EBA updates impact of the Basel III reforms on EU banks' capital | European Banking Authority (europa.eu).
- European Banking Authority. 2020b. *EBA publishes final guidelines on credit risk mitigation for institutions applying the IRB approach with own estimates of LGDs*. European Banking Authority. <https://eba.europa.eu/eba-publishes-final-guidelines-credit-risk-mitigation-institutions-applying-irb-approach-own>.
- Esho, N., A. Kirievsky, D. Ward, and R. Zurbruegg. 2004. Law and the determinants of property–casualty insurance. *Journal of Risk and Insurance* 71 (2): 265–283.
- Felbermayr, G., I. Heiland, and E. Yalcin. 2012. Mitigating liquidity constraints: Public export credit guarantees in Germany. CESifo Working Paper Series No. 3908.
- Finnvera, The Export Credit Agency of Finland. 2020. *Export guarantees*. Finnvera. <https://www.finnvera.fi/eng/products/guarantees/export-guarantee>.
- Gao, J., and Y. Jang. 2018. What drives global syndication of bank loans? Effects of capital regulations. Working Paper.
- Gianturco, D.E. 2021. *Export Credit Agencies: The unsung giants of international trade and finance*. Quorum Books. ISBN 1-56720-429-5.
- Giné, X., R. Townsend, and J. Vickery. 2008. Patterns of rainfall insurance participation in rural India. *World Bank Economic Review* 22 (3): 539–566.



- Gollier, C. 2005. Some aspects of the economics of catastrophe risk insurance. CESifo, 1409. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=668384.
- Gorsuch, R.L. 1983. *Factor analysis*. Hillsdale: Erlbaum.
- Graham, J.R., and A. Rogers. 2002. Do firms hedge in response to tax incentives. *The Journal of Finance* 57 (2): 815–839.
- Gundogdu, A.S. 2010. Islamic structured trade finance: A case of cotton production in West Africa. *International Journal of Islamic and Middle Eastern Finance and Management* 3 (1): 20–35.
- Gunjan, S., and K. Kushagra. 2019. Customer criterion for selecting a bank: And exploratory factor analysis from an Indian perspective. *International Journal of Customer Relations* 7 (2): 01–08.
- Graham, K. 1983. *Compensating for missing survey data*. Survey Research Center, Institute for Social Research, The University of Michigan. ISBN 0-87944-282-4.
- Hoyt, R.E., and H. Khang. 2000. On the demand for corporate property insurance. *Journal of Risk and Insurance* 67 (1): 91–107.
- Hussels, S., S. Ward, and R. Zurbrugg. 2005. Stimulating the demand for insurance. *Risk Management and Insurance Review* 8 (2): 257–278.
- Jehu-Appiah, C., G. Aryeetey, I. Agyepong, E. Spaan, and R. Baltussen. 2011. Household perceptions and their implications for enrolment in the national health insurance scheme in Ghana. *Health Policy and Planning* 27 (3): 222–233 (online publication 18 April).
- Jennekens, B., and A. Klasen. 2022. How “safe” is the WTO “safe haven”? A need to modernize disciplines for officially supported export credits. *Journal of International Trade Law and Policy*. ISSN 1477-0024.
- Kaiser, H. 1974. An index of factorial simplicity. *Psychometrika* 39 (1): 31–36.
- Kim, S.M. 2020. Export credit guarantee and prohibited subsidies under the SCM agreement. *Journal of World Trade* 54 (3): 439–454.
- Klasen, A. 2014. Export credit guarantees and demand for insurance. *Cesifo Forum - Ifo Institut - Leibniz-Institut Für Wirtschaftsforschung an Der Universität München* 15 (3): 26–33.
- Klasen, A., R. Wanjiru, J. Henderson, and J. Philips. 2022. Export finance and the green transition. *Global Policy* 13 (5): 710–720.
- Kluge, D., and F. Lehrbass. 2003. Default probabilities in structured commodity finance. In *Credit risk. Contributions to economics*, ed. G. Bol, G. Nakhaeizadeh, S.T. Rachev, T. Ridder, and K.H. Vollmer. Heidelberg: Physica-Verlag.
- Krummacker, S. 2011. What drives the corporate demand for insurance: A case study based approach. In *Beiträge zu Versicherungsnachfrage und Risikomanagement*, ed. S. Krummacker. <http://www.econis.eu/PPNSET?PPN=663214629>.
- Krummacker, S. 2020. Export credit insurance markets and demand. In *The handbook of global trade policy*, ed. A. Klasen, 536–554. Oxford: Wiley.
- Jia, J., M. Adams, and M. Buckle. 2012. Insurance and ownership structure in India’s corporate sector. *Asia Pacific Journal of Management* 29: 129–149.
- International Finance Corporation. 2017. *Trade and commodity finance solutions*, Product Guide. International Finance Corporation. https://www.ifc.org/wps/wcm/connect/349e7095-970a-48be-b82d-c64f2878ba84/2017_Trade-and-Commodity-Product-Book.pdf?MOD=AJPERES&CVID=m3.JxB.
- Lee, C.H., and Byong-Duk. Rhee. 2011. Trade credit for supply chain coordination. *European Journal of Operational Research* 214: 136–146.
- Li, Y., X. Zhen, and X. Cai. 2014. Trade credit insurance, capital constraint, and the behavior of manufacturers and banks. *Annals of Operational Research* 240: 395–414.
- MacCallum, R.C., K.F. Widaman, S. Zhang, and S. Hong. 1999. Sample size in factor analysis. *Psychological Methods* 4 (1): 84–99.
- Maas, P. 2010. How insurance brokers create value—A functional approach. *Risk Management and Insurance Review* 13 (1): 1–20.
- MacNamara, J. 2001. *Structured trade and commodity finance in emerging markets: What can go wrong and how to avoid it*. Cambridge: Woodhead Publishing Limited. ISBN 9781855735446.
- MacNamara, J. 2017. *The renaissance of STCF*. Trade Finance Review. https://cib.db.com/docs_new/TFR_February_2017_Part64-7.pdf.
- Mayers, D., and C.W. Smith. 1982. On the corporate demand for insurance. In *Foundations of insurance economics. Huebner international series on risk, insurance and economic security*, vol. 14, ed. G. Dionne and S.E. Harrington. Dordrecht: Springer.



- Mayers, D., and C.W. Smith Jr. 1987. Corporate insurance and the underinvestment problem. *The Journal of Risk and Insurance* 54 (1): 45–54.
- Michel-Kerjan, E., P. Raschky, and H. Kunreuther. 2014. Corporate demand for insurance: New evidence from the U.S. terrorism and property markets. *The Journal of Risk and Insurance* 82 (3): 505–530.
- Minton, B.A., R. Stulz, and R. Williamson. 2008. How much do banks use credit derivatives to hedge loans? *Journal of Financial Services Research* 35: 1–31.
- Moors, E. 2003. *Structured commodity finance: Techniques and application for successful financing arrangements*, 1187–1230. London: Euromoney Books.
- Mossin, J. 1986. Aspects of rational insurance purchasing. *Journal of Political Economy* 76 (4): 553–568.
- Outreville, J.F. 1990. The economic significance of insurance markets in developing countries. *The Journal of Risk and Insurance* 18 (3): 487–498.
- Oraham, B.O. 2020. Export credit arrangements in capital-scarce developing economies. In *The handbook of global trade policy*, ed. Andreas Klasen, 1st edn. Wiley. ISBN 9781119167389.
- Pennacchi, G.G. 1988. Loan sales and the cost of bank capital. *The Journal of Finance* 43 (2): 375–396.
- Petersen, M.A., and R.G. Rajan. 1997. Trade credit: Theories and evidence. *Review of Financial Studies* 10 (3): 661–691.
- Regan, L., and Y. Hur. 2007. On the corporate demand for insurance: The case of Korean nonfinancial firms. *The Journal of Risk and Insurance* 74 (4): 829–850.
- Revelle, W., and T. Rocklin. 1979. Very simple structure: An alternative procedure for estimating the number of interpretable factors. *Multivariate Behavioral Research* 14: 403–414.
- Schlesinger, H. 1981. The optimal level of deductibility in insurance contracts. *The Journal of Risk and Insurance* 48 (3): 465–481.
- Schwartz, R. 1974. An economic model of trade credit. *Journal of Financial Quantitative Analysis* 4 (9): 643–657.
- Simons, K. 1993. Why do banks syndicate loans. *New England Economic Review*, 45–52.
- Snedecor, G.W., and W.G. Cochran. 1989. *Statistical methods*, 8th ed. Ames: The Iowa State University Press.
- Suták, P. 2012. Structured commodity finance. *Applied Studies in Agribusiness and Commerce* 6 (5): 77–83.
- Suták, P., and L. Kozár. 2013. *Examination of the trading house financing structure*. Debrecen: University of Debrecen Karoly Ihrig School of Management and Business Administration.
- Swiss Re, Bank Trade & Infrastructure. n.d. <https://corporatesolutions.swissre.com/insurance-solutions/credit-surety/bank-trade-and-infrastructure.html>.
- Taylor, A., and A. Sansone. 2007. *The handbook of loan syndications and trading*. The Loan Syndications and Trading Association.
- Trade Finance Analytics. 2019. *What is structured commodity trade finance*. Trade Finance Analytics. <https://tradefinanceanalytics.com/what-is-structured-commodity-finance>.
- TXF Research. 2020. *Commodity Finance Report 2019*. TXF Research. <https://www.txfnews.com/News/Article/6949/Commodity-finance-report-2019-Structured-deal-volume-drops-by-nearly-half>.
- Velicer, W.F. 1976. Determining the number of components from the matrix of partial correlations. *Psychometrika* 41 (3): 321–327.
- Weber, O., and R. Beeler. 1999. Incorporating sustainability aspects in structured trade and commodity finance. *Journal of Applied Accounting Research* 5 (1): 97–111.
- Willsher, R. 1995. *Export finance: Risks, structures and documentation 80*. London: Macmillan Press.
- Wilson, N., and B. Summers. 2002. Trade credit terms offered by small firms: Survey evidence and empirical analysis. *Journal of Business Finance and Accounting* 29 (3–4): 317–351.
- Yamori, N. 1999. An empirical investigation of the Japanese corporate demand for insurance. *The Journal of Risk and Insurance* 66 (2): 239–252.



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