

DIGITAL TRADE FINANCE INFRASTRUCTURE AND SME EXPORT PARTICIPATION: CROSS-BORDER PAYMENT INTEROPERABILITY AS A DRIVER OF INTERNATIONAL DIGITAL INTEGRATION

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Abstract

This thesis examines how digital trade finance infrastructure shapes the participation of small and medium-sized enterprises (SMEs) in export markets and, through them, the competitiveness of a national economy. While existing literature establishes that credit constraints and payment frictions reduce export performance, it pays less attention to the infrastructural layer: the legal recognition of electronic trade documents, the interoperability of payment systems, and the data standards that allow banks to assess and finance cross-border transactions at low cost. The study develops a conceptual framework that links four infrastructural components – legal, messaging, payment and data – to three firm-level outcomes: the decision to export, the intensity and diversification of exports, and the cost and duration of the cash conversion cycle. A staggered-adoption empirical design is proposed for testing these relationships, and a sequenced reform agenda is outlined for Uzbekistan as a country deepening its international digital integration. The thesis argues that for SMEs the binding constraint is less often the absence of capital than the high fixed cost of proving creditworthiness and executing payments across borders, and that interoperable digital infrastructure is the most direct instrument for reducing that cost.

Keywords: *digital trade finance, cross-border payment interoperability, SME exporters, electronic transferable records, ISO 20022, financial inclusion in trade, export competitiveness, international digital integration*

1. Introduction

The competitiveness of a country's exports is increasingly determined by factors that sit behind the price of a product: how quickly a buyer can be paid or can pay, how reliably documents are verified, and how easily a small producer can obtain working capital against a foreign order. A large share of world trade relies on bank-intermediated finance such as letters of credit, guarantees and trade loans, and shortfalls in the supply of such finance have been repeatedly shown to fall hardest on smaller firms and on firms in developing economies (Auboin, 2009; Asian Development Bank, Trade Finance Gaps, Growth, and Jobs Survey).

Theoretical and empirical research has clarified why this matters. Exporters face a timing problem: goods are shipped before payment arrives, and enforcement across jurisdictions is imperfect, so the choice of payment contract and the availability of bank

intermediation shape what is traded and with whom (Schmidt-Eisenlohr, 2013; Antràs & Foley, 2015). Credit constraints influence which firms enter export markets, how much they sell and how many products they offer (Manova, 2013), and shocks to the supply of finance transmit directly into export volumes (Amiti & Weinstein, 2011; Chor & Manova, 2012).

What has changed in recent years is the technology and the rule set with which these frictions can be addressed. International standards now allow trade documents and payment messages to exist and circulate in electronic form with legal effect: the UNCITRAL Model Law on Electronic Transferable Records (MLETR, 2017), the ICC Uniform Rules for Digital Trade Transactions (URDTT, 2021), the eUCP supplement to UCP 600, and the migration of payment messaging to ISO 20022. In parallel, the G20 cross-border payments programme coordinated by the Financial Stability Board has set targets for lowering cost, raising speed, widening access and improving transparency of cross-border payments (FSB, 2020).

For economies such as Uzbekistan, which are liberalising trade, diversifying export destinations and advancing toward deeper integration in the world trading system, the practical question is how to translate these global standards into functioning domestic infrastructure that SMEs can actually use. This thesis addresses that question.

Research aim. To identify the channels through which digital trade finance infrastructure affects SME export participation and national export competitiveness, and to propose a sequenced reform framework for an emerging exporter economy.

Research questions.

Which infrastructural components of digital trade finance most strongly reduce the fixed costs of SME export entry?

How does cross-border payment interoperability affect the cash conversion cycle and the diversification of exports?

In what sequence should legal, technological and institutional reforms be implemented to maximise the effect on export competitiveness?

2. Literature background and conceptual positioning

Three strands of literature frame the study. The first, the finance–trade nexus, shows that financial development is a source of comparative advantage, particularly in sectors that depend on external finance (Beck, 2002), and that financing frictions affect both the extensive and intensive margins of exports (Manova, 2013). The second, trade finance theory, treats the choice among cash in advance, open account and letters of credit as an optimal response to weak contract enforcement and shows that the role of banks varies with country risk (Schmidt-Eisenlohr, 2013; Niepmann & Schmidt-Eisenlohr, 2017). The third strand concerns digitalisation and trade: it argues that digital technologies lower trade costs, ease information asymmetries and widen participation by small firms, although the benefits depend on complementary regulation and infrastructure (WTO, 2018).

The gap this thesis addresses lies between these strands. The first two typically treat financial conditions as a given supply of credit or a given contracting environment. The third often treats digitalisation as a general reduction in trade costs. Less attention has been paid to the specific infrastructural layer that converts digital technology into usable trade finance: legal recognition of electronic documents, standardised and structured payment messages, interoperable payment rails, and shared data that lets lenders assess a transaction rather than only a borrower. The present study places this layer at the centre of analysis.

3. Conceptual framework: four infrastructure layers and three outcomes

The framework distinguishes four layers of digital trade finance infrastructure.

Legal layer. Recognition of electronic transferable records, electronic signatures and digital presentation under letters of credit, in line with MLETR and URDTT. Without this layer, electronic documents remain “digital copies” of paper originals and the efficiency gains are lost, because banks and counterparties revert to physical presentation.

Messaging and data layer. Adoption of ISO 20022 and structured data fields, allowing automated sanctions screening, reconciliation and traceability. Richer, standardised data also lowers the cost of compliance checks that frequently delay or block payments to and from smaller markets.

Payment layer. Interoperability among domestic fast payment systems and their connection to regional and bilateral cross-border arrangements, including settlement in local currencies where economically justified. This layer determines how many intermediaries a payment crosses and thus its cost, speed and predictability.

Credit-information layer. Linking transaction data from customs, logistics, banks and tax authorities, with appropriate privacy safeguards, so that lenders can finance a verified export order or receivable rather than rely solely on collateral and credit history. This is the layer that most directly opens trade finance to SMEs.

These layers act on three outcome groups:

Export entry (extensive margin): the probability that a firm begins exporting and the number of destinations it serves.

Export performance (intensive margin and diversification): the value of exports per destination and product, and the breadth of the export basket.

Financial efficiency: the cost of payments, document processing time, rejection rates for financing requests, and the length of the cash conversion cycle.

The core proposition is that the layers are complements. A legally recognised electronic document is of limited value if payment rails are not interoperable; interoperable rails add little for SMEs without data that allow lenders to price risk. Consequently, partial digitalisation – for example, an electronic document portal not integrated with bank systems – may deliver far smaller gains than a coordinated reform.

4. Research hypotheses and empirical design

H1. Improvements in the legal and data layers of digital trade finance increase the probability of SME export entry, with larger effects in sectors that rely heavily on external finance.

H2. Greater payment interoperability shortens the cash conversion cycle and raises export diversification across destinations, with larger effects for smaller markets served through longer correspondent chains.

H3. The layers are complementary: the joint effect of payment interoperability and credit-information access exceeds the sum of their separate effects.

Cross-country specification. A structural-gravity framework with exporter-year, importer-year and pair fixed effects is proposed:

$$X_{ijt} = \exp[\alpha_{it} + \gamma_{jt} + \delta_{ij} + \beta_1 \cdot DTF_{it} + \beta_2 \cdot PAY_{ijt} + \beta_3 \cdot (DTF_{it} \times PAY_{ijt}) + \theta \cdot Z_{ijt}] \cdot \varepsilon_{ijt}$$

where X_{ijt} is exports from country i to country j in year t ; DTF_{it} is an index of digital trade finance infrastructure of the exporting country (legal recognition of electronic records, ISO 20022 adoption, availability of data-sharing arrangements); PAY_{ijt} measures bilateral payment connectivity; Z_{ijt} contains time-varying trade policy variables; and the interaction term tests complementarity (H3). Because the equation includes many zero trade flows, estimation by Poisson pseudo-maximum likelihood is appropriate. Exporter-year and importer-year fixed effects absorb multilateral resistance and all country-level shocks, so identification rests on bilateral and policy variation.

Firm-level specification. Where firm-level customs and banking data are accessible, a staggered difference-in-differences design exploits the gradual roll-out of electronic document platforms or payment connections across banks and regions:

$$Y_{ft} = \mu_f + \lambda_t + \beta \cdot ADOPT_{ft} + \theta \cdot W_{ft} + u_{ft}$$

where Y_{ft} is an outcome (export entry, number of destinations, export value, days of receivable outstanding), $ADOPT_{ft}$ indicates exposure to the new infrastructure, and W_{ft} contains firm controls. Because conventional two-way fixed-effects estimators can be biased under staggered treatment timing with heterogeneous effects, estimators robust to this problem should be used, with event-study plots to verify parallel pre-trends. Complementary evidence can come from a structured survey of exporters and bank trade-finance officers measuring processing time, costs and the incidence of rejected financing requests.

5. Situation analysis for Uzbekistan: constraints and opportunities

Uzbekistan's opening of its trade regime, liberalisation of the foreign-exchange market, and efforts to accede to the World Trade Organization have increased the number of firms and products engaging in export activity. At the same time, several constraints on digital trade finance can be identified from the structure of the system rather than from precise statistics, which should be collected in the empirical phase:

Fragmented information systems. Banks, customs, tax and certification bodies maintain separate systems; documents are frequently re-entered or re-submitted in different formats, so SMEs bear the repeated cost of establishing the same facts.

Legal alignment. The degree to which electronic transferable records and digital presentation under documentary credits are recognised in domestic law and bank practice needs systematic assessment against MLETR and URDTT principles.

Dependence on correspondent channels. For several export directions, payments pass through multiple intermediaries, raising cost and uncertainty, especially for small-value transactions that matter most to SMEs.

Thin data for risk assessment. Collateral-based lending dominates, while financing of export receivables and verified purchase orders (factoring, supply-chain finance) remains relatively underdeveloped for small firms.

Measurement gap. There is no unified set of indicators tracking the speed, cost and accessibility of export finance, which weakens policy feedback.

Opportunities arise from the existing domestic digital payment ecosystem and the policy priority attached to export diversification. Domestic fast-payment infrastructure that is already widely used can be a foundation for regional interlinking, and the expansion of electronic government services provides a basis for a single-window approach in which financing is the final step of an integrated export workflow.

6. Policy framework: a sequenced reform agenda

The analysis suggests that the order of reforms matters, because of the complementarity between layers. A three-stage sequence is proposed.

Stage 1 – Foundations (legal and standards). Conduct a legal gap analysis against MLETR and URDTT; clarify the legal status of electronic transferable records and electronic signatures; adopt ISO 20022 for domestic and cross-border messaging with a clear migration timetable; and define data-protection and cybersecurity requirements for shared trade data. This stage is low in capital cost but is the precondition for all subsequent gains.

Stage 2 – Connectivity (platform and payments). Build an interoperable trade-finance data exchange that links banks, customs, logistics and insurers through open interfaces; pilot electronic letters of credit and digital presentation among a small group of banks and priority sectors; and expand bilateral and regional payment connections, beginning with the largest partners and with corridors where small-value flows are significant.

Stage 3 – Inclusion (products and incentives). Introduce transaction-based scoring that uses verified export orders and receivables, promote digital factoring and supply-chain finance for SMEs, and digitise state export-support instruments such as credit insurance, guarantees and partial interest support through automated application and risk assessment. Public support should be tied to the use of digital channels to create demand for the infrastructure.

Throughout, a monitoring dashboard should track: share of trade documents exchanged electronically; average document processing time; average cost and duration of cross-border payments by corridor; share of SME exporters with access to trade finance; rejection rate of financing requests; and export diversification by destination and product. Regular publication of these indicators would provide the feedback needed to adjust policy.

Two caveats should be stated. First, digital infrastructure complements rather than substitutes for sound trade policy, logistics and macroeconomic stability; it increases the effectiveness of these but cannot offset their weaknesses. Second, integration expands exposure to cyber risk and to concentration in a small number of technical providers, so resilience, interoperability standards and competition in the provision of services must be part of the design.

7. Expected contribution

The thesis contributes to the literature by (i) shifting analytical attention from the aggregate supply of trade credit to the infrastructural layer that determines who can access it; (ii) specifying testable hypotheses of complementarity among legal, messaging, payment and credit-information components; (iii) proposing an empirical design that combines structural-gravity estimation with staggered adoption analysis at the firm level; and (iv) offering a sequenced reform framework adapted to an emerging exporter economy. For practice, the results can inform central bank oversight of payment modernisation, commercial bank product design, export-promotion agencies and customs authorities.

8. Conclusion

Digital trade finance infrastructure is best understood not as a set of isolated technologies but as an interdependent system of legal rules, data standards, payment rails and information flows. For SMEs, whose export participation is limited mainly by the fixed cost of verification and payment rather than by product quality alone, such a system can lower entry barriers, shorten the cash conversion cycle and widen the range of destinations. For Uzbekistan, the priority is to sequence reforms so that legal recognition and data standards come first, platform and payment connectivity second, and SME-oriented financial products third, with continuous measurement of results. Pursued in this way, digital trade finance becomes a practical channel of international digital integration and a durable source of export competitiveness.

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