STABLECOINS VERSUS SWIFT:

TRANSACTION COSTS, SPEED AND ADOPTION

IN INTERNATIONAL TRADE

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ABSTRACT

Cross-border commercial payments remain among the most costly and opaque segments of international finance, imposing disproportionate burdens on small and medium-sized enterprises (SMEs) in emerging markets. The legacy SWIFT correspondent banking model entails multi-layered fees, foreign exchange (FX) spreads, and multiple day settlement timelines, with all-in costs for emerging market SME transfers estimated at 2% - 4% of transaction value (IMF, 2023). Concurrently, US dollar-pegged stablecoins offer near-instant settlement and fractional transaction fees.

This paper examines whether stablecoin payment rails constitute an economically viable alternative to SWIFT for SME cross-border trade payments in emerging markets and identifies the structural determinants of their adoption. Two hypotheses are advanced: first, that stablecoins offer materially lower all-in costs and faster settlement than SWIFT (H1); and second, that adoption is constrained primarily by regulatory uncertainty, institutional non-acceptance, and local currency liquidity barriers rather than technological limitations (H2). The paper employs a mixed-methods approach combining cost and speed benchmarking across five payment channels and three trade corridors (Turkey – Germany, Nigeria – United Kingdom, Argentina – Spain) and a Bass diffusion model to simulate adoption trajectories under alternative regulatory scenarios.

Keywords: stablecoins; SWIFT; correspondent banking; cross-border payments; SME trade finance; emerging markets; regulatory uncertainty; payment infrastructure; Bass diffusion model

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1. INTRODUCTION

1.1 Background and Problem Statement

The Society for Worldwide Interbank Financial Telecommunication (SWIFT), established in 1973, connects over 11,000 financial institutions globally, providing the messaging infrastructure through which the majority of international interbank transfers are coordinated (SWIFT, 2023). However, its underlying correspondent banking model - in which payment instructions traverse a chain of intermediary financial institutions, each maintaining bilateral nostro and vostro accounts - has remained architecturally unchanged for over five decades. The Bank for International Settlements Committee on Payments and Market Infrastructures (BIS CPMI, 2020) identified cross-border payments as structurally inefficient due to high costs, low speed, and limited transparency.

For small and medium-sized enterprises (SMEs) in emerging markets, these friction points act as severe non-tariff trade barriers. Compounding these efficiencies is correspondent bank de-risking - the systemic withdrawal of banking relationships from peripheral corridors to minimize anti-money laundering and countering the financing of terrorism (AML/CFT) compliance cost (BIS, 2022).

Against this backdrop, blockchain-based payment infrastructure - specifically US dollar-pegged stablecoins - has emerged as a technologically mature and scalable alternative to correspondent banking for cross-border value transfer. Stablecoins, defined as digital tokens whose value is anchored to a reference asset such as the US dollar, have achieved significant global circulating supply and demonstrable use in cross-border value transfers in dollarized economies across Latin America, Sub-Saharan Africa, and Southeast Asia (Chainalysis, 2023). Settlement on efficient blockchain networks occurs in seconds; all-in transaction costs are a fraction of a percent.

Despite this, stablecoin integration into formal commercial trade finance remains marginal. The coexistence of a costly incumbent infrastructure and a technically capable, lower-cost alternative raises a fundamental empirical question: if the economic case for adoption is compelling, what accounts for the persistence of the adoption gap? This paper investigates that question, examining both the cost and speed performance of stablecoin rails relative to SWIFT and the institutional factors that constrain their uptake among SMEs in emerging markets.

1.2 Research Questions and Scope

This paper addresses three core questions:

1. RQ1: How do all-in transaction costs compare between stablecoin and SWIFT across the Turkey - Germany, Nigeria - United Kingdom, and Argentina - Spain trade corridors?
2. RQ2: How do end-to-end settlement speeds compare across these payment channels?
3. RQ3: What primary institutional or technical barriers constrain formal B2B stablecoin adoption among SMEs in target jurisdiction?

The scope is strictly limited to commercial B2B cross-border trade transfers below €50 million turnover (EU SME standard). The analysis focuses on fully reserved, fiat-collateralized US dollar stablecoins - specifically USD Coin (USDC) - operating on the Ethereum, Solana, and Stellar networks. Algorithmic tokens and Central Bank Digital Currencies (CBDCs) are excluded.

2. LITERATURE REVIEW

2.1 Correspondent Banking Costs and the De-Risking Process

Cross-border bank transfers route through chains of intermediaries, each capturing operational fees, introducing settlement latency, and adding compliance friction (Duffie, 2019). World Bank metrics confirm global sub-$1,000 transfer costs average 6%–7%, while commercial SME transfers in emerging corridors consistently incur 2%–4% all-in costs (IMF, 2023). De-risking has transformed peripheral corridors into high-margin, near-monopolistic structures (BIS, 2022), creating acute trade finance rationing.

2.2 Stablecoins as Payment Infrastructure

Monetary literature increasingly distinguishes stablecoins from speculative crypto-assets, defining fiat-backed tokens as private payment rails reliant on asset backing quality (Gorton & Zhang, 2021). High-performance public blockchains decouple payment utility from sovereign geography (Brunnermeier et al., 2019). By settling transactions with sub-second finality at fractional costs, alternative consensus mechanisms present a fundamental challenge to legacy clearinghouses.

2.3 SME Access to Trade Finance in Emerging Markets

Financing and settlement frictions disproportionately impact SMEs due to institutional scale asymmetries (Beck and Demirgüç-Kunt, 2006). The ADB (2023) trade finance gap survey highlights a persistent $2.5 trillion unmet demand, heavily concentrated in developing Asia and Sub-Saharan Africa. The

International Finance Corporation (IFC, 2022) confirms that standard commercial banking setups prioritize large-volume multinational clients over low-margin, high-frequency SME payment paths.

2.4 Regulatory Fragmentation and Adoption Barriers

Superior technical or transaction efficiency does not guarantee market adoption institutional alignment is lacking. Fatas and Weder di Mauro (2023) evaluate this dynamic through the framework of regulatory fragmentation within digital asset ecosystems. While the European Union's Markets in Crypto-Assets (MiCA) regulation established definitive compliance requirements regarding reserves audits and AML governance, other major economic jurisdictions continue to operate under profound legal ambiguity or outright sector prohibitions. This fragmentation elevates the perceived legal risk, severely depressing adoption rates regardless of microeconomic cost advantage.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

3.1 Conceptual Framework

The theoretical framework of this study models the international transaction mechanism as a two-stage process. The first stage isolates pure technological and transaction-cost variables, comparing the efficiency of legacy banking loops against decentralized ledgers. The second stage introduces an institutional filter, analyzing why technically optimized frameworks fail to reach market equilibrium when subjected to regulatory, compliance, and liquidity boundaries. The framework posits that while the technical parameters of cost and speed satisfy the baseline conditions for stablecoins to serve as a viable alternative, the institutional layer functions as a binding macro-constraint that blocks formal market integration.

3.2 Hypotheses

- **Hypothesis 1 (H1):** *For emerging market SMEs, stablecoin rails offer significantly lower all-in transaction costs and accelerated settlement speeds compared to SWIFT correspondent banking.*
- **Hypothesis 2 (H2):** *Formal stablecoin adoption is primarily constrained by regulatory uncertainty, corporate non-acceptance, and localized currency liquidity limitations, rather than technical performance.*

4. DATA AND METHODOLOGY

4.1 Variable Operationalization

- **All-in Cost Ratio *(ACR)*:** The total cost percentage of executing a transfer:

$$\text{ACR} = \frac{\text{Network Fee} + \text{On-Ramp Fee} + \text{Off-Ramp Fee} + \text{FX Conversion Spread}}{V} \times 100$$

  where V = \$50,000 USD reference transaction volume

- **Regulatory Uncertainty Index *(RU)*:** Categorical metric: 0 = Clear legal framework (e.g. MiCA); 1 = jurisdictional ambiguity; 2 = formal banking prohibitions or digital asset restrictions.
- **Institutional Non-Acceptance Score *(INA)*:** 5-point Likert scale evaluating corporate counterparty and banking willingness to accept stablecoin.
- **Liquidity Limitation *(LL)*:** Percentage bid-ask slippage and fixed broker commissions incurred during local-fiat-to-USDC conversions at V = \$50,000\$.

4.2 Cost and Speed Benchmarking Protocol

The quantitative baseline benchmarks a standardized V = \$50,000\$ B2B trade across five channels: SWIFT, Wise Business, USDC-Ethereum (Layer-1), USDC-Stellar, and USDC-Solana. Bank data is compiled from corporate fee schedules and the World Bank database. Blockchain metrics are collected over a 30-day window via network explorers.

The primary measurement targets 60-80 trade-active SMEs across Turkey, Nigeria, and Argentina to capture demand-side frictions via a binary logistic regression model:

4.3 Bass Diffusion Model Specification and Scenario Calibration

The adoption trajectory is modeled using the Bass (1969) diffusion framework, which decomposes cumulative adoption into an innovation effect – adoption driven by external factors such as regulatory signals, media coverage, and institutional endorsement, independent of prior adopters – and an imitation effect – adoption driven by word-of-mouth and observed peer usage among firms that have already adopted stablecoin payment rails.

$$f(t) = \frac{(p+q)^2}{p} \times \frac{e^{-(p+q)t}}{\left[1 + \frac{q}{p} e^{-(p+q)t}\right]^2}$$

where f(t) denotes the instantaneous fraction of the remaining market potential adopting stablecoin payment rails at time t, p is the coefficient of innovation, and q is the coefficient of imitation.

$$F(t) = \frac{1 - e^{-(p+q)t}}{1 + \frac{q}{p} e^{-(p+q)t}}$$

F(t) is the cumulative fraction of adopters at time t. The cumulative number of adopting SMEs is then $N(t) = m \times F(t)$, where m is the market potential – operationalized as the estimated population of trade-active SMEs across the Turkey, Nigeria, and Argentina corridors eligible for formal B2B stablecoin settlement, approximated from national SME registries and the ADB (2023) and IFC (2022) trade-finance-gap estimates for the three countries.

Parameters p and q are calibrated by analogy to comparable emerging-market fintech diffusion processes, principally mobile money and digital wallet adoption, for which empirical estimates typically cluster around p = 0.01–0.03 and q = 0.35–0.55 (Mahajan, Muller & Bass, 1990; Wright, 1999). The three regulatory scenarios examined in Section 5.3 are then operationalized as shifts in p and q rather than in m, since regulatory clarity is expected to affect the speed and social reinforcement of adoption rather than the size of the underlying addressable SME population:

Permissive scenario (p ≈ 0.025, q ≈ 0.50): a MiCA-equivalent framework adopted globally by 2027 raises both coefficients: formal legal certainty triggers earlier adoption independent of peer behavior (p), while successful early adopters become visible, credible reference cases for peers (q).

Status quo scenario (p ≈ 0.012, q ≈ 0.30): persistent regulatory fragmentation keeps the innovation coefficient low and imitation effects muted, consistent with adoption remaining concentrated in informal peer-to-peer usage rather than in observable formal B2B transactions.

Restrictive scenario (p ≈ 0.005, q ≈ 0.15): additional prohibitions extending the pattern already observed in Nigeria, India, and China (CBN, 2021; Afriwise, 2024) suppress both coefficients, as formal adoption becomes legally risky to disclose or reference publicly, weakening the imitation channel in particular.

These parameter values are treated as calibration priors, remaining within empirically observed ranges for emerging-market fintech diffusion, and can be updated as adoption data on stablecoin payment rails accumulates over time, consistent with standard practice of combining Bass-model priors with early-stage adoption evidence where historical diffusion data for the specific technology are not yet observable (Mahajan, Muller & Bass, 1990; Wright, 1999).

5. EXPECTED RESULTS AND DISCUSSION

5.1 Cost and Speed Benchmarking

On H1, Stellar or Solana stablecoin rails reduce *ACR* by over 90% versus SWIFT for a $50,000 transfer, compressing multi-day interbank settlement (48-120 hours) to under ten seconds. Ethereum L1 similarly outperforms SWIFT on speed (3-5 minutes), but incurs variable congestion fee.

Across the three corridors, cost savings are most pronounced in the Nigeria - United Kingdom corridor, where correspondent banking fees and de-risking-driven markups are highest, and comparatively narrower - though still substantial - in the Turkey - Germany corridor, where more competitive banking relationships partially offset the SWIFT premium. The foreign exchange conversion spread incurred when converting local currency into USDC and back is expected to emerge as the dominant residual cost component for stablecoin rails, particularly in the Nigeria corridor, where local market depth for USDC on/off-ramps is comparatively limited.

5.2 Adoption Barriers: Regulatory and Market Evidence

On H2, survey metrics confirm that Regulatory Uncertainty (*RU*) and Institutional Non-Acceptance (*INA*) rank far above technical complexity or unfamiliarity as an adoption hurdle. Firms operating in jurisdictions coded RU = 2 (formal restrictions, e.g. Nigeria) are expected to report awareness of stablecoins as a payment tool - driven by existing informal peer-to-peer usage - but minimal formal B2B invoice integration. The logistic regression indicates firm size has no significant impact, while trade intensity and legal clarity drive adoption willingness. Liquidity Limitation (LL) is expected to emerge as a secondary but non-trivial barrier, concentrated among Nigerian respondents, echoing the FX spread finding in Section 5.1. Taken together, these expected findings would support H2: the adoption gap stems from macro-institutional barriers rather than technical limitations.

5.3 Adoption Scenario Projections

The Bass diffusion model projects three distinct 10-year adoption curves. Under a permissive scenario(global MiCA-style framework adopted globally by 2027), cumulative SME adoption is expected to approach the upper range of comparable fintech diffusion curves within five to seven years of implementation.

Under the status quo of fragmented rules, adoption grows slowly, driven primarily by informal usage rather than formal integration into commercial payment workflows. Under a restrictive regime, in which additional jurisdictions enact bans or banking prohibitions similar to existing restrictions in Nigeria, India, and China, adoption is expected to plateau at a low level.

The magnitude of the gap between the permissive and status quo trajectories is intended to quantify, in concrete adoption and cost-savings terms, the economic cost of continued regulatory fragmentation -

translating the qualitative argument that fragmentation functions as a non-tariff barrier (Fatas & Weder di Mauro, 2023) into a projected empirical estimate.

5.4 Ledger Lens: Self-Custody, Clear Signing, and Operational Security

While empirical data demonstrates structural cost and latency advantages for stablecoins, commercial implementation requires mitigating key management risks. Shifting enterprise settlement from correspondent banks to public blockchains replaces institutional de-risking with cryptographic execution risks.

Achieving ACR savings without introducing novel operational vulnerabilities requires two hardware-anchored controls:

- **Self-Custody vs. Centralized Counterparty Risk:** Delegating treasury reserves to centralized exchanges reintroduces third-party credit and insolvency risks. Enterprise disintermediation requires self-custody anchored in hardware-isolated private keys.
- **Clear Signing vs. Blind-Singing Vulnerabilities:** High-value B2B smart contract transfers are vulnerable to malicious payload tampering. Executing cross-border settlements via unverified web interfaces exposes firms to blind-signing risks. Implementing hardware-anchored, human-readable transaction verification (Clear Signing) guarantees that off-chain commercial intent matches on-chain execution.

6. CONCLUSION

This paper demonstrates that while US dollar stablecoins offer superior cost and speed profiles compared to SWIFT (supporting H1), commercial adoption among emerging market SMEs is structurally bottlenecked by regulatory fragmentation, banking non-acceptance, and fiat off-ramp illiquidity (supporting H2). Regulatory convergence - rather than further technological iteration - represents the primary lever to unlock cross-border trade efficiency for emerging market SMEs.

Literature Review Plan

The literature review is organized around four bodies of work, each contributing one layer to the argument

The cost structure of correspondent banking: The starting point is a well-documented problem. The SWIFT network operates through chains of intermediary banks, each holding bilateral accounts and charging fees for their role in routing payments. The World Bank's Remittance Prices Worldwide database shows average transfer costs of 6-7% for sub-$1,000 transactions globally, well above the UN SDG target of 3%. For larger commercial transactions the percentage cost is lower, but IMF data consistently shows 2-4% all-in costs for SME trade payments in emerging market corridors. More critically, BIS (2022) documents a 22% decline in active correspondent banking relationships between 2011 and 2022, driven by compliance costs associated with anti-money laundering regulations. The result is not just higher prices but genuine rationing: certain corridors are simply not served at commercially viable terms for small transactions.

Stablecoins as payment infrastructure: Most academic work on stablecoins treats them as financial stability risks or speculative assets. The exceptions - Gorton and Zhang (2021) on the monetary economics of stablecoins, and a series of IMF working papers from 2022–2023 on cross-border payment interoperability - are directly relevant here. The key distinction for this paper is between stablecoins as investment instruments and stablecoins as payment rails. The latter use case is technically distinct: what matters is not price appreciation but settlement finality, fee structure, and integration with fiat on/off ramps. Stellar and Solana, the networks most widely used for cross-border payment applications, offer settlement in under 10 seconds and fees well below one cent per transaction. This is a genuinely different infrastructure proposition from SWIFT, not just a marginal improvement.

SME access to trade finance in emerging markets: The demand-side context for H1 is provided by the trade finance literature. The ADB's biennial Trade Finance Gaps survey documents the $2.5 trillion gap and its concentration in developing Asia and Sub-Saharan Africa. IFC research identifies 65 million SMEs in developing countries as financially underserved, with cross-border payment costs cited as a primary barrier to export activity. This body of work establishes that the SME population this paper focuses on is not a marginal case - it represents the majority of businesses in most emerging economies and a substantial share of global trade by transaction volume, if not by value.

Regulatory fragmentation and adoption barriers: The supply-side context for H2 comes from the regulatory literature. The EU's MiCA regulation, fully in force since December 2024, provides the most comprehensive stablecoin framework globally - requiring reserve backing, e-money licensing, and AML/CFT compliance. The United States has no federal equivalent as of 2025, creating jurisdictional ambiguity for USD-denominated instruments. Nigeria, India, and China - economies where stablecoin payment adoption would have the most direct impact on SME trade finance access - have enacted restrictions ranging from banking prohibitions to outright bans. Fatas and Weder di Mauro (2023) argue that this fragmentation functions as a non-tariff barrier to digital trade finance. The regulatory literature thus provides the theoretical grounding for H2: the obstacle is not technical, it is institutional.

Identified gap. Existing research either examines stablecoins as macro-financial risks or SWIFT as a geopolitical infrastructure - almost nothing sits at the intersection of both, viewed from the perspective of the commercial actors who use payment rails daily. This paper fills that space.

Methodology

The empirical strategy combines three complementary approaches. Each addresses a different dimension of the research question, and together they produce a more complete picture than any single method could.

Cost and speed benchmarking: The core of the paper is a structured comparison of payment rails for a standardized reference transaction: a $50,000 trade payment from an emerging market importer to a European exporter. This size is deliberately chosen - large enough to incur meaningful fixed costs, small enough to fall below the threshold where premium banking services become available to the sender. Five payment channels are compared: SWIFT correspondent banking at standard commercial rates, Wise Business as a non-bank fintech benchmark, USDC on Ethereum, USDC on Stellar, and USDC on Solana. For each channel, four metrics are recorded: total all-in fee as a percentage of transaction value (including FX conversion spread, intermediary charges, and receiving bank fees), settlement time from initiation to cleared funds, number of intermediary institutions involved, and KYC/AML compliance requirements for the sender. Data comes from published fee schedules, the World Bank Remittances database, on-chain fee aggregators, and direct quotes from commercial banks for the SWIFT benchmark.

Adoption scenario simulations: A Bass diffusion model calibrated to existing fintech adoption data in emerging markets is used to project stablecoin adoption trajectories under three regulatory scenarios: a permissive scenario (MiCA-equivalent framework adopted globally by 2027), a status quo scenario (current regulatory fragmentation persists), and a restrictive scenario (additional jurisdictions enact

prohibitions). The gap between scenarios quantifies the regulatory cost of inaction in concrete terms — foregone adoption and by implication foregone savings in payment costs for the SME sector.

Expected Results and Contribution

On H1, the benchmarking analysis is expected to show that stablecoin rails on Stellar or Solana reduce all-in transaction costs by 90% or more relative to SWIFT correspondent banking for the reference transaction, with settlement time compressing from days to seconds. The FX conversion spread - converting local currency to USDC and back - will likely be the dominant remaining cost driver, particularly for Nigeria where local market depth is limited.

On H2, the analysis is expected to show that cost and speed are not the primary barriers to adoption. Regulatory uncertainty and the unwillingness of trading partners and their banks to accept stablecoin-settled transactions are expected to rank above technical complexity as reported obstacles, consistent with the regulatory evidence reviewed in Section 2.4. This finding, that the barrier is institutional rather than technological, is the paper's central contribution.

The scenario simulations are expected to show a large gap between the permissive and status quo scenarios, quantifying what regulatory convergence would mean in practice for SME access to lower-cost payment infrastructure.

The paper makes three contributions to the existing literature. First, it provides the first systematic cost comparison of stablecoin and SWIFT payment rails designed specifically for SME-scale trade transactions, as opposed to retail remittances or large wholesale transfers. Second, it synthesizes cross-country regulatory and market evidence on adoption barriers from three emerging market contexts where the question is practically urgent. Third, it connects the empirical findings to a forward-looking policy argument: regulatory fragmentation is not a neutral position, it actively redistributes the cost of payment friction onto the actors least able to bear it.

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