Fintech Disruption and Cost Efficiency in Cross Border Remittance Markets

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ABSTRACT

Purpose. This article develops an integrative decision framework for the fintech operating model in cross-border remittances, responding to three linked problems: fragmented measurement, weak treatment of uncertainty, and a separation between commercial decisions and risk governance.

Design. A structured narrative synthesis draws on finance, analytics, technology, operations, governance, and sector-specific literature, compared thematically and screened by direct or analogical relevance to the focal constructs.

Findings. The resulting framework organizes evidence across origination cost, settlement architecture, FX spread, compliance automation, distribution reach, and consumer protection. It defines inclusive risk-adjusted transfer efficiency as the focal decision criterion and proposes a sequence of data definition, baseline construction, causal or comparative estimation, risk adjustment, scenario testing, governance review, and post-implementation learning. Isolated efficiency or revenue measures prove insufficient because they omit implementation costs, tail losses, customer effects, and timing.

Originality. The article contributes a reusable architecture linking economic evaluation with accountable execution, together with research propositions, measurement fields, validation tests, and reporting practices suitable for empirical testing. No confidential company data are used and no causal claims are made about named employers. Decision quality improves when value, risk, behavior, and control effectiveness are evaluated within one auditable model.

KEYWORDS: fintech, remittance, cross, border, payment, cost, efficiency, digital

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1. INTRODUCTION

Firms operating in cross-border remittances face pressure to improve the fintech operating model while protecting customers, counterparties, regulators, and long-term financial capacity. The management problem is difficult because observed outcomes reflect market conditions, prior relationships, operational execution, technology constraints, and selection effects. A high reported return does not establish incremental value, and a low incident rate does not establish effective control. (Gabor & Brooks, 2020; Kim & Lee, 2018).

The literature bearing on this problem is scattered across corporate finance, marketing science, information systems, operational risk, cybersecurity, and sector regulation. Each stream offers useful tools, but their assumptions and units of analysis differ. Finance emphasizes discounted cash flow and capital constraints; analytics emphasizes prediction, segmentation, and experimentation; risk research emphasizes exposure, control effectiveness, and resilience. (Oberson, 2021; Rakoto, 2018).

Three questions organize the review. Which fintech mechanisms reduce end-to-end remittance cost? How should firms compare account-based, wallet-based, and cash payout networks? And which efficiency gains survive once compliance, fraud, liquidity, and service quality enter the model? Answering them moves the analysis from descriptive performance reporting toward accountable choice. The contribution is conceptual: it specifies constructs and relationships that future studies may test with transaction, customer, asset, campaign, or control data. (Arner et al., 2018; Weichert, 2017).

No one universal model fits every institution, and the article does not claim otherwise. Regulatory obligations, market maturity, product economics, data availability, and organizational capabilities differ. The framework therefore distinguishes invariant design principles from parameters requiring local calibration. Invariant principles include a clear counterfactual, a consistent time horizon, full cost allocation, explicit risk adjustment, model validation, and documented decision rights; local parameters include loss severity, discount rate, customer sensitivity, capital charges, and intervention thresholds. (Buckley et al., 2021; Mas, 2012).

2. LITERATURE REVIEW

2.1 Remittance economics

Appraisal in this field weighs incremental cash flows against opportunity costs, capital use, and uncertainty. The objective is not transfer volume but durable value net of direct cost, indirect cost, expected loss, and the required return. (Ky, 2019; Orozco, 2006) (Jones & Ominyi, 2024; Unamma & UM-L, 2022) (Feng et al., 2017).

The cost of acquiring and onboarding a sender does not convert into transfer efficiency through a single arithmetic step; it moves through a chain of managerial choices that decide whether a lower headline price actually reaches the customer as value. Read together, these studies support treating origination cost as a decision pathway rather than a static input: providers observe imperfect signals

about regulatory exposure and customer risk, convert those signals into product and pricing choices, and only then realize the financial, operational, and conduct consequences that determine inclusive risk-adjusted transfer efficiency. For cross-border remittances the staged view limits attribution error, because it separates the cost of acquiring and onboarding a sender from the cost of the underlying transfer itself and shows more precisely where value leaks between the two. (Bodnar et al., 2003; Kulkarni et al., 2019) (Ominyi, 2021; Lawal & Oduleye, 2019) (Přívarová, 2019).

Settlement architecture and FX spread pull against each other rather than moving independently, which is why the proposed framework treats them as joint constraints rather than sequential choices. A provider that shortens settlement time by routing through a thinner liquidity pool typically widens the effective spread it must charge to cover funding risk, so cost or risk shifted out of one dimension resurfaces in the other. Evaluating the two together, through scenario analysis, control testing, and sensitivity analysis, keeps short-term settlement gains from concealing spread-related losses that surface later in the transaction cycle. (Osei-Assibey, 2017; Zhang, 2017a) (Oluwo et al., 2022).

FX spread behaves as the outcome of a decision chain, not a number managers simply observe. In remittance pricing, providers observe imperfect signals about liquidity, counterparty risk, and regulatory exposure, translate those signals into a quoted spread, and only then absorb the financial and reputational consequences of that pricing choice. A credible model of FX spread records the pricing rule, the comparison baseline against interbank or mid-market rates, the implementation cost of the pricing engine, and the distribution of spread outcomes across corridors and customer segments, rather than treating spread as a single average figure. (Bettman & Harris, 2014; Waldron & Faz, 2016) (Ominyi & Anichukwueze, 2020b; Ashore-Onisemo et al., 2022; Bola-Sadipe et al., 2019).

Origination cost, like FX spread and distribution reach, needs a fixed unit of analysis before it can be compared across products or periods. Depending on the decision at hand, origination cost may need to be measured per completed transfer, per attempted application, or per active sender account; the proposed model assigns each of these an explicit owner, source system, and validation threshold, so that origination cost functions as a governed metric rather than a figure recomputed differently each time it is requested. (Maniriho, 2021; 이병렬, 2008).

2.2 Fintech entry and competition

Analytics creates value only where observations are turned into decisions and outcomes feed back as learning. Predictive accuracy is therefore an intermediate capability, not the final performance measure. (Unamma et al., 2018a; Oluwo et al., 2025; Lawal & Oduleye, 2018a).

The economic contribution of settlement architecture is not fixed at the point of deployment; it depends heavily on when costs and benefits actually land. A multi-period model that discounts expected cash flows, applies scenario-specific probabilities, and retains option value where management can still adjust course prevents early indicators from dominating the appraisal of settlement architecture. For cross-border remittances, this staged view supports pilot gates, covenant triggers, and review points rather than a single go-or-no-go decision made on first-quarter data

alone. (López & Batista, 2021; Nan, 2019) (Atakpa & Abetoh, 2022; Unamma et al., 2021; Lawal & Oduleye, 2018b).

FX spread cannot be measured consistently unless the unit of analysis is fixed in advance. In the proposed model each FX spread metric carries an owner, a source system, a refresh frequency, a permissible use, a validation threshold, and an escalation path, so measurement functions as a management control rather than a dashboard exercise. (Kholodenko & Berdnikov, 2019; Yamada et al., 2021a) (Okonkwo et al., 2024).

Measurement problems in FX spread mirror a pattern documented well beyond finance. Depending on the decision at hand, the appropriate FX spread unit may be a single transaction, a customer relationship, a corridor, or a reporting cycle; mixing these units produces biased comparisons and weakens any causal claim about what actually drove a change in spread. Each metric in the proposed model therefore carries an explicit owner, source system, refresh frequency, and validation threshold, so that spread measurement functions as a repeatable control rather than an ad hoc calculation. (Kauko, 2017; Lashitew et al., 2019) (Rukh et al., 2023).

Markets, customer behavior, threats, regulation, and technology keep moving. Firms therefore need routines for sensing, learning, and reconfiguration rather than assumptions fixed once a year. (Okafor et al., 2024; Mbonu et al., 2020).

2.3 Regulation and compliance

Where decision rights are delegated, information asymmetry and conflicting incentives appear. Clear ownership, independent challenge, audit trails, and escalation rules reduce them. (Fapohunda et al., 2025; Okoruwa et al., 2020).

Compliance automation investments rarely pay off on the timetable managers expect. A multi-period model that discounts expected cash flows and treats early automation gains as provisional rather than final prevents favorable first-quarter results from dominating the business case for compliance automation. This temporal treatment also supports staged rollout, with defined gates for expanding automated screening from a pilot corridor to the full remittance network. (Burns, 2015; Jaramillo, 2016) (Abetoh & Atakpa, 2024).

Compliance automation and distribution reach compete for the same implementation budget and often for the same product roadmap. The proposed framework treats them as joint constraints evaluated through scenario analysis, control testing, and sensitivity analysis rather than as sequential trade-offs. In cross-border remittances, a provider that expands into new corridors or agent networks without proportional compliance automation may show short-term volume gains that conceal a widening tail of unresolved sanctions, fraud, or reporting exposure. Reporting gross benefit, incremental benefit, and risk-adjusted benefit separately keeps that exposure visible to finance, risk, and operations teams before it compounds. (Huizinga et al., 2012; Kauko, 2005) (Oduleye & Medon, 2021; Atakpa et al., 2024).

The trade-off between compliance automation and distribution reach recurs across regulated industries far removed from payments. Cross-border remittance networks face the same structural

tension when adding agent locations or partner banks, because each new node multiplies the sanctions screening, licensing, and reporting obligations the network must satisfy. Treating compliance automation and distribution reach as joint constraints, evaluated through scenario analysis and sensitivity testing, keeps short-term corridor growth from concealing a compliance backlog that later forces a costly pause in expansion. (Bayram, 2020; Gorbacheva, 2021) (Annan, 2022).

2.4 Financial inclusion

Distribution reach affects inclusive risk-adjusted transfer efficiency through a chain of intermediate choices rather than a direct link. Managers first observe demand signals in an underserved corridor, translate those signals into an agent network or digital channel investment, and only later absorb the financial, operational, and conduct consequences of that expansion. A credible model of distribution reach records the expansion rule, the comparison baseline against existing corridors, the implementation cost, and the distribution of outcomes across new versus existing customer segments. (Peric, 2015; Seo & Yoo, 2021) (Akeju et al., 2018).

Distribution reach requires the same discipline in unit definition that the other constructs in this framework require. Depending on the decision, reach in a remittance network may need to be measured at the level of a corridor, an agent location, or a digital channel; mixing these units, as several of the studies above show, produces biased comparisons and obscures which channel investments are actually paying off. (Hong et al., 2020a; Mutero, 2021) (Jones & Ominyi, 2023).

Consumer protection outcomes, like the other constructs in this framework, unfold on a delay that a single-period measure cannot capture. In remittance markets a consumer protection failure, whether a fraudulent payout, a mispriced FX conversion, or a data breach, frequently surfaces well after the transaction that caused it, once a customer disputes a charge or a regulator requests records. A multi-period model that treats early low-incident readings as provisional rather than conclusive, and that reserves capacity for remediation costs arriving later, gives a more honest account of when protection controls are actually working. (Huang et al., 2014; Ng, 2018) (Unamma et al., 2018b).

How a technology performs depends on workflow fit, user behavior, data stewardship, and continued management reinforcement. Deployment without adoption leaves the expected benefits unrealized. (Olodo et al., 2026) (Rauer & Kaase, 2020).

Distribution reach in cross-border remittances depends on partnership structures as much as on technology. Expanding reach through correspondent banks, mobile money operators, or cash payout agents therefore requires first observing which partners can sustain the required service quality and compliance standard, then translating that assessment into a partnership structure with clear financial and control terms, and only then realizing the reach benefit. Treating partnership governance as part of the reach decision, rather than a separate legal exercise, limits the attribution error that occurs when volume gains are credited to reach alone. (Alhassan et al., 2021; Donovan, 2012) (Eyetsemitan et al., 2023) (Ashore-Onisemo et al., 2021).

Consumer protection and origination cost pull in opposite directions unless a provider deliberately designs around the trade-off. In remittance onboarding, identity verification, sanctions screening, and affordability checks protect consumers but also add friction and cost to origination; a provider that strips out these checks to reduce origination cost typically pays for it later through fraud losses, regulatory penalties, or reputational harm. Evaluating consumer protection and origination cost jointly, rather than optimizing origination cost in isolation, keeps that later cost visible at the point the onboarding process is designed rather than after a loss event forces a redesign. (Lasagabaster et al., 2005; Zhang, 2017b).

3. METHOD

The study is a structured integrative review. Candidate literature was identified through keyword and citation-tracking searches of finance, analytics, technology, operations, governance, and sector-specific databases, then screened for conceptual relevance to the fintech operating model in cross-border remittances and classified by direct or analogical relevance to the focal constructs. Empirical, review, and conceptual works are all admissible, since the aim is theory integration rather than pooled effect estimation. Titles, abstracts, and bibliographic records were used to classify contributions and to screen out sources carrying no plausible mechanism connecting them to origination cost, settlement architecture, FX spread, compliance automation, distribution reach, or consumer protection. Where a source addressed another sector, the synthesis labels the transfer analogical and limits the inference to a comparable mechanism. (Bounie et al., 2012; Deng, 2020).

Three limits apply. The review is not a database-exhaustive systematic review. Bibliographic inclusion does not establish study quality, so future submission work should verify each record and appraise full texts. And the framework requires empirical validation before claims about effect size or superiority can be made. Those limits keep a clear boundary between synthesis, proposition, and evidence. (Ponce, 2018; Singh, 2017).

4. FRAMEWORK

The framework converts that background into six decision dimensions a remittance provider can govern: origination cost, settlement architecture, FX spread, compliance automation, distribution reach, and consumer protection. Figure 1 positions them against the focal outcome, and Table 1 sets out the cost components of a cross-border transfer, what drives each, and how it is usually treated. The dimensions are not independent; each of the sections that follow states the tension that links it to its neighbour.

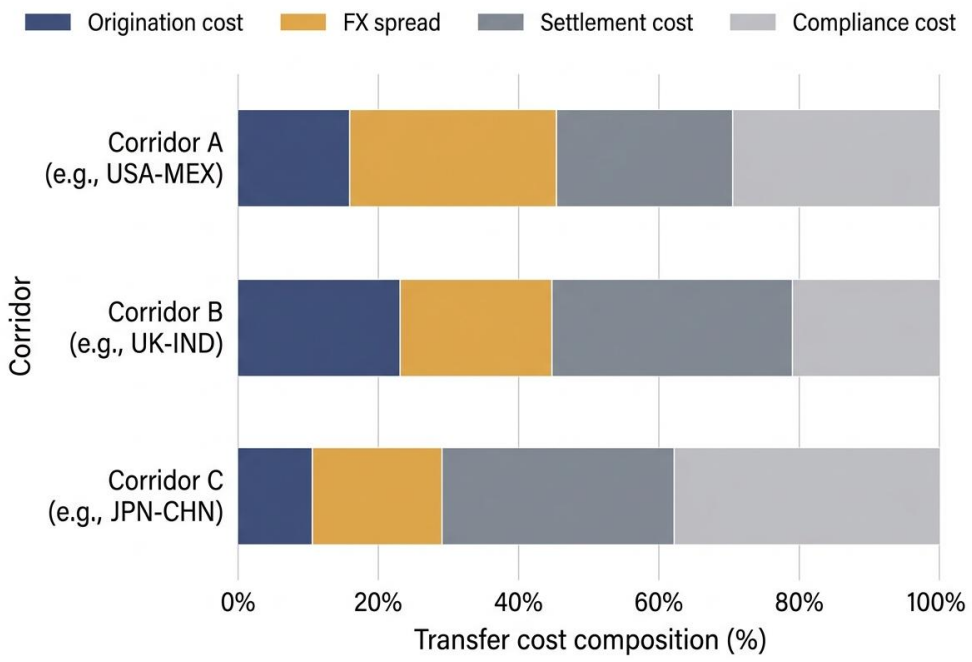


Figure 1. Cost composition of a transfer by corridor

Table 1. Cost components in cross-border transfer

Component	Driver	Typical treatment
Origination cost	Application abandonment, identity verification, and account set-up effort at the point of a sender first transacts	Measured per attempted application rather than per completed transfer, and tracked against conversion
Settlement and rail cost	Choice of correspondent banking, real-time gross settlement, or blockchain-based rail, and the liquidity each route requires	Measured per settlement route, with the review cycle set by that route's own risk profile
FX spread	Liquidity conditions, counterparty risk, hedging cost, and margin policy in each corridor	Unbundled into funding, hedging, and margin components rather than reported as a single blended number
Compliance and screening cost	Sanctions screening, transaction monitoring, false-positive review, and local licensing obligations	Measured separately for each automated control, using false positive rate, review time, and escalation accuracy
Distribution and payout cost	Agent commissions, mobile money operator fees, and the	Counted as reach only once a minimum threshold of active,

Component	Driver	Typical treatment
	cost of maintaining a verified-identity footprint	repeat-transacting customers is met
Consumer protection and remediation cost	Complaint handling, dispute reversal, fraud loss, and remediation where a payout fails	Reported by corridor, and separately for first-time versus repeat senders, rather than in aggregate
Capital and liquidity charge	Funding of prefunding balances and settlement float across corridors	Priced explicitly in the appraisal rather than absorbed silently into the spread

4.1 Origination cost

Applying the framework to origination cost means tracing the same signal-to-consequence pathway established in the literature review, but at the level of an individual transaction. For remittance origination that requires capturing the point at which a sender abandons an application, not just the cost of completed transfers, and treating that signal as the input the origination cost model must explain. (Irawan & Matoati, 2021; Owuor, 2018).

Origination cost decisions and settlement architecture choices are not independent in practice. The integrated framework treats origination cost and settlement architecture as joint constraints for this reason, evaluating them together through scenario analysis rather than allowing a favorable origination cost figure to conceal an unfavorable settlement cost structure, or the reverse. (Metzger & Paulowitz, 2018; Zhang, 2018).

Operationalizing origination cost measurement means fixing the unit before data collection begins, not afterwards. In the integrated framework, origination cost is measured per attempted application rather than per completed transfer, with an explicit owner, source system, refresh frequency, and validation threshold attached to the metric, so that origination cost functions as a governed control rather than a number recalculated differently by each team that reports it. (Clotteau & Ansón, 2011; Kendall et al., 2011).

What origination cost improvements contribute economically depends on when the associated risk materializes. Discounting the early origination cost savings against the delayed fraud and remediation costs those savings can trigger gives managers a more honest read of whether a given onboarding simplification is actually value-creating for remittance origination. (Anzoategui et al., 2013; Mahadi et al., 2017) (Tonoyan et al., 2022).

A second implication of the decision-pathway view concerns how origination cost signals are converted into action. Origination cost is therefore modeled as a pathway from signal to intervention to consequence, with an explicit decision rule and owner at each stage, rather than as a static input that automatically translates into lower cost. (Přívarová, 2019; Senyo, 2021) (Aliliele et al., 2024).

The origination-settlement tension reappears when automation is layered onto both stages at once. The integrated framework addresses this by specifying origination cost and settlement architecture as coupled decisions in the same governance review, so that an automation investment in one is evaluated against its effect on the other rather than approved in isolation. (Annan, 2020c; Yamada et al., 2021b).

4.2 Settlement architecture

Settlement architecture measurement benefits from the same operational discipline that logistics researchers apply to physical networks. In the integrated framework, settlement architecture is measured per settlement route, with a review cycle set by that route's actual risk profile rather than by a uniform calendar. (Nguyen & Belaounia, 2020; Wu, 2020) (Adesuyi et al., 2023) (Nwafor et al., 2019).

Settlement architecture changes rarely deliver their full benefit on the timeline an initial pilot implies. Applied to a change such as moving a corridor from a correspondent bank rail to a real-time gross settlement or blockchain-based rail, this means treating first-quarter cost and speed gains as provisional and building in a longer observation window before declaring the architecture change value-creating. (Bott, 2017; Shen et al., 2020).

Settlement architecture affects transfer efficiency through the same signal-intervention-consequence chain that governs the other constructs in this framework. For settlement architecture, a rail's true reliability is first observed through minor exception patterns, translated into a decision about whether to adjust routing or renegotiate terms with a counterparty, and only then realized as a change in efficiency, a sequence the framework makes explicit rather than assuming a direct link between architecture and outcome. (Bank, 2013; Rachmawati et al., 2018).

The settlement-spread tension is fundamentally a cost-effectiveness question, a framing that generalizes well beyond payments. The integrated framework therefore evaluates settlement architecture and FX spread jointly rather than allowing a low settlement fee to be reported as a win while an elevated spread quietly absorbs the saving. (Mutero, 2020; Prete, 2021a).

A second measurement question for settlement architecture concerns how compliance data and settlement data are reconciled. The framework specifies a single transaction identifier that carries through settlement, compliance, and reporting systems, so that settlement architecture metrics do not have to be reconstructed after the fact from disconnected sources. (Adrian & Mancini-Griffoli, 2019; Giuseppe et al., 2019).

Settlement architecture's contribution to accountability, not just to cost, also unfolds with a delay. Early customer complaints about delayed or failed transfers are frequently the first visible sign of an architecture problem, well before it shows up in aggregate settlement failure statistics, which is why the framework treats complaint monitoring as a leading rather than a lagging indicator of settlement architecture quality. (Kemppainen, 2007; Morgan & Pontines, 2014).

4.3 FX spread

FX spread's effect on transfer efficiency runs through the same pathway structure established earlier in this framework. Unbundling FX spread into its funding, hedging, and margin components, rather than treating it as one number, is what allows the framework to trace spread's actual contribution to transfer efficiency rather than inferring that contribution indirectly. (Aggarwal et al., 2006; Kinyua & Shibwabo, 2017) (Ominyi, 2020a).

FX spread and compliance automation compete for margin in a direct and visible way. In remittances, a provider funding new sanctions screening or transaction monitoring capability by widening its FX spread is making that trade-off explicitly; the framework requires the trade-off to be reported rather than absorbed silently into the spread, so that finance and compliance teams can evaluate it jointly. (Anarfo et al., 2020; Anzoategui et al., 2011) (Ominyi et al., 2024).

Measuring FX spread with enough granularity to support forensic review, not just periodic reporting, is a further requirement the framework adopts from adjacent fields. FX spread is therefore retained at the individual transaction level even where reporting is aggregated upward, so that an anomaly flagged in a corridor-level dashboard can be traced back to the specific transactions driving it. (Dong et al., 2018; Ruiz-Arranz & Giuliano, 2005) (Fadayomi et al., 2024).

FX spread's contribution to margin, like the other constructs examined here, depends on the time horizon used to evaluate it. A multi-period view, one that tracks customer retention and switching over several quarters rather than the quarter in which a pricing change is made, gives a more accurate account of whether a spread adjustment actually improved or damaged inclusive risk-adjusted transfer efficiency. (Boiko, 2019; Markovich & Snyder, 2013).

A further pathway link concerns how FX spread interacts with counterparty incentives. In remittance corridors, a correspondent bank compensated primarily on transaction volume has limited incentive to help a sending provider narrow its FX spread, since a wider spread does not reduce the correspondent's own volume-based fee. The framework treats this incentive alignment as part of the FX spread pathway rather than as an external constraint, because it directly shapes which spread outcomes negotiation can achieve. (Ahmed et al., 2020).

The spread-compliance tension also appears in how financing and payment reforms are evaluated. FX spread in a remittance network functions the same way: compliance automation intended to satisfy a new regulatory requirement is often funded through spread rather than through a separately budgeted compliance cost line, and the framework requires that funding source to be disclosed explicitly in the model rather than left implicit. (Manning & Willison, 2006; Ontanu & Pannebakker, 2012).

4.4 Compliance automation

Compliance automation requires a governed unit of measurement before its performance can be assessed, a lesson echoed strongly in health system research. Applying that discipline here, the framework measures false positive rate, review time, and escalation accuracy separately for each

automated control rather than reporting a single blended score that could mask a poorly performing control. (Boogaard et al., 2018; Yent, 2021) (Tonoyan et al., 2025).

Compliance automation's contribution to risk reduction, like other constructs in this framework, depends on the time horizon used to evaluate it. A multi-period model that resists declaring success after a single quarter of reduced false positives or incidents gives managers a more defensible basis for deciding whether to expand automated screening across the remittance network. (Fourmy, 2020) (Sakyi et al., 2024) (Atakpa, 2021).

Compliance automation's effect on inclusive risk-adjusted transfer efficiency runs through detection, intervention, and consequence, the same three-stage pathway used throughout this framework. The framework therefore models it as a pathway from signal to owned intervention to measured consequence, matching the structure applied to origination cost and settlement architecture earlier. (Xiang et al., 2018) (Sunday et al., 2019).

Compliance automation and distribution reach continue to compete for budget within the integrated framework, not only in the literature review. The framework's response is to require a compliance automation retraining or recalibration step as an explicit, budgeted part of any distribution reach expansion decision, rather than assuming existing automation transfers automatically to new markets. (Prete, 2021b) (Okonkwo et al., 2020).

A second measurement question for compliance automation concerns how its output connects to commercial metrics. The framework therefore specifies that compliance automation metrics be reported inside the same governed metric dictionary as origination cost, settlement architecture, and FX spread, rather than maintained as a parallel and less visible reporting stream. (Cho, 2016) (Ogbete et al., 2020).

Compliance automation investments also interact with capacity constraints elsewhere in the operation, a dynamic well documented in logistics research. When a remittance provider adds automated transaction monitoring, throughput at the manual review stage becomes the new binding constraint unless review capacity is scaled at the same time, a dependency the framework requires to be modeled explicitly rather than discovered after the automation is deployed. (Hong et al., 2020b).

4.5 Distribution reach

Distribution reach in the integrated framework follows the identity-verification pathway that determines whether a new customer can actually be onboarded. Reach is therefore modeled as a function of verifiable identity coverage in a given market, not merely of the number of agent locations or digital channels available, since the latter does not convert into active senders without the former. (Schena et al., 2018; Sethy, 2019) (Owoo-Adebayo, 2025).

Expanding distribution reach and protecting consumers compete for the same technical and operational capacity. A remittance network that adds agent locations or digital channels faster than it scales fraud monitoring and dispute handling capacity exposes itself to the same dynamic: growth increases the attack surface and the volume of disputes to manage, which is why the framework

evaluates reach expansion and consumer protection capacity jointly rather than sequentially. (Clavijo et al., 2019; Zimmerman & Baur, 2016) (Okafor et al., 2021).

Measuring distribution reach also requires deciding what counts as a genuinely served customer rather than a nominal one. Applied to distribution reach, the framework counts a corridor or agent location as served only once a minimum threshold of active, repeat-transacting customers is reached, rather than counting it as soon as a physical or digital access point exists, since access alone does not indicate that the reach investment is producing value. (Natile, 2020; Soon, 2021).

Distribution reach investments also take time to show their true return. A newly opened remittance corridor typically shows weak unit economics for its first several quarters while the provider absorbs onboarding, compliance, and marketing costs; the framework's multi-period view prevents this early period from being mistaken for the corridor's steady-state performance. (Adhvaryu & Aulagnon, 2020a; Jack & Suri, 2011).

A further pathway link concerns how reach expansion decisions are actually made operationally. Digital channels in remittance markets show the same pattern: a mobile-first product does not just lower the marginal cost of a transfer, it changes which customers can access the service at all, which is why the framework tracks reach as a distinct outcome from cost. (Mothobi et al., 2018; Mutiso & Reuben, 2021).

The reach-protection tension also has a distributional dimension that pure efficiency metrics can miss. A remittance network optimized purely for aggregate reach and cost efficiency can under-protect its smallest or newest corridors, which is why the framework requires consumer protection metrics to be reported by corridor rather than only in aggregate, so that an acceptable average does not conceal a corridor where protection is systematically weaker. (Adhvaryu & Aulagnon, 2020b).

4.6 Consumer protection

Consumer protection measurement benefits from the same real-time discipline applied to safety monitoring in other industries. Consumer protection is therefore measured continuously in the framework, using leading indicators such as complaint velocity and dispute reversal rate, rather than relying solely on periodic incident counts that lag the underlying problem. (Agnew, 2019; Hernández, 2012) (Okonkwo et al., 2019).

Consumer protection's contribution to the business also unfolds over a longer horizon than a single reporting period captures. The framework accordingly evaluates protection measures against both their immediate effect on harm reduction and their longer-run effect on access, rather than treating a reduction in complaints alone as sufficient evidence of success. (Li et al., 2019; Ma, 2016).

Consumer protection connects to inclusive risk-adjusted transfer efficiency through the negotiation power a provider retains with its counterparties. A provider that tracks protection outcomes by counterparty, including complaint rates, resolution times, and dispute outcomes attributable to a given correspondent or agent, gains exactly this leverage when renegotiating terms. The framework treats that negotiation benefit as part of consumer protection's contribution to efficiency rather than

as a cost centre, since protection data doubles as counterparty performance data. (Goex, 1999; Rosati & Secola, 2005).

The protection-origination tension recurs here in its sharpest form, at the point where a new customer is being onboarded. The framework applies this targeting logic to remittance onboarding, concentrating the most costly protection checks on the transactions and customer segments that carry the highest risk rather than applying identical friction to every sender regardless of risk profile. (Goldstein, 2016).

A further measurement question for consumer protection concerns segmentation. The framework therefore measures consumer protection outcomes, including complaint rates, dispute resolution time, and fraud loss, separately for first-time versus repeat senders and for higher-risk versus lower-risk corridors, rather than reporting a single blended figure that could mask a segment where protection is systematically weaker. (López et al., 2020).

Consumer protection's contribution to competitive position, not just to compliance, also takes time to materialize. For a remittance provider, the reputational and regulatory benefit of strong consumer protection is realized gradually as a track record accumulates, which is why the framework treats it as a multi-period investment rather than a cost to be minimized in any single reporting cycle. (Dobes, 2017).

5. PROPOSITIONS, MEASURES, AND EVIDENCE

The focal outcome is inclusive risk-adjusted transfer efficiency. A general specification is V = B − C − EL − K − H, where B is incremental benefit, C is implementation and operating cost, EL is expected loss, K is the charge for capital and liquidity, and H is an explicit estimate of customer or stakeholder harm where measurable. Scenario weights produce an expected value, while stress cases reveal concentration and tail exposure. The formula is a decision scaffold rather than a claim that every effect is readily monetized. Table 2 lists the resulting propositions and their candidate measures. (Lipis & Adams, 2014).

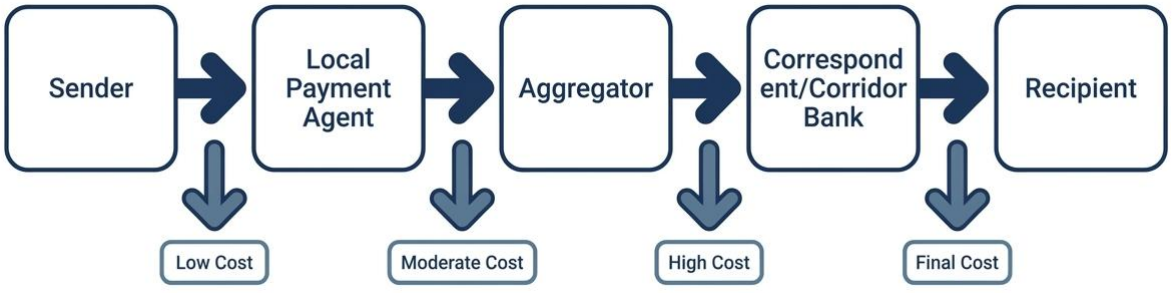


Figure 2. The cross-border transfer chain and the cost added at each hop

Table 2. Propositions and measures

ID	Proposition	Candidate measures
P1	Higher capability in origination cost is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	origination cost index, outcome value, data quality, adoption rate
P7	The effect of origination cost on inclusive risk adjusted transfer efficiency is mediated or moderated by settlement architecture.	interaction term, lagged outcome, control effectiveness
P2	Higher capability in settlement architecture is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	settlement architecture index, outcome value, data quality, adoption rate
P8	The effect of settlement architecture on inclusive risk adjusted transfer efficiency is mediated or moderated by FX spread.	interaction term, lagged outcome, control effectiveness
P3	Higher capability in FX spread is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	FX spread index, outcome value, data quality, adoption rate
P9	The effect of FX spread on inclusive risk adjusted transfer efficiency is mediated or moderated by compliance automation.	interaction term, lagged outcome, control effectiveness
P4	Higher capability in compliance automation is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	compliance automation index, outcome value, data quality, adoption rate
P10	The effect of compliance	interaction term, lagged

ID	Proposition	Candidate measures
	automation on inclusive risk adjusted transfer efficiency is mediated or moderated by distribution reach.	outcome, control effectiveness
P5	Higher capability in distribution reach is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	distribution reach index, outcome value, data quality, adoption rate
P11	The effect of distribution reach on inclusive risk adjusted transfer efficiency is mediated or moderated by consumer protection.	interaction term, lagged outcome, control effectiveness
P6	Higher capability in consumer protection is associated with improved inclusive risk adjusted transfer efficiency, conditional on data quality and implementation fidelity.	consumer protection index, outcome value, data quality, adoption rate
P12	The effect of consumer protection on inclusive risk adjusted transfer efficiency is mediated or moderated by origination cost.	interaction term, lagged outcome, control effectiveness

Proposition P1 states that greater capability in managing origination cost, meaning disciplined measurement, governed data, and staged automation, is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity; the association should weaken or disappear where origination data is incomplete or the redesigned process was only partially adopted. A defined test compares transfer efficiency across business units or corridors with high versus low origination cost management maturity, controlling for data completeness and adoption rate as moderators rather than treating the origination-efficiency link as unconditional. (Aiyer, 2017; Weber & Staples, 2021).

Proposition P2 states that greater settlement architecture capability, meaning rail diversity, reconciliation automation, and liquidity management, is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity; where settlement data is incomplete or a new rail has only been partially rolled out, the expected association should be weaker. A defined test compares corridors with mature versus immature

settlement architecture, controlling for data completeness and adoption rate rather than assuming that architecture quality translates uniformly into efficiency. (Naceur et al., 2020).

Proposition P3 states that greater FX spread management capability, meaning transparent unbundling of funding, hedging, and margin components, is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity. Where spread components cannot be reliably separated, the expected association should weaken. A defined test compares corridors with unbundled versus blended spread reporting, controlling for data completeness and adoption of the unbundled reporting standard. (Datta, 2012).

Proposition P4 states that greater compliance automation capability is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity; where automated screening has not been recalibrated for local transaction patterns, the expected association should weaken. A defined test compares corridors with mature versus newly deployed automation, controlling for data completeness and calibration status. (Annan, 2019a).

Proposition P5 states that greater distribution reach capability is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity; where verified-identity coverage in a newly reached market is low, the expected association should weaken. A defined test compares efficiency outcomes across corridors with high versus low verified-customer coverage, controlling for data completeness and adoption rate. (Mata, 2011; Ruderman, 2019).

Proposition P6 states that greater consumer protection capability is associated with improved inclusive risk-adjusted transfer efficiency, conditional on data quality and implementation fidelity; where complaint and dispute data are incomplete, the expected association should weaken. A defined test compares corridors with mature versus limited protection monitoring, controlling for data completeness and adoption of continuous monitoring practices. (Annan, 2019b; Velicogna et al., 2018).

Proposition P7 specifies the mechanism behind P1 more precisely: the effect of origination cost management on inclusive risk-adjusted transfer efficiency is mediated or moderated by settlement architecture, because a lower origination cost only converts into system-wide efficiency if the settlement rail receiving that additional volume has the capacity to absorb it without new reconciliation or liquidity strain. Testing P7 requires an interaction term between an origination cost index and a settlement architecture capacity measure, together with a lagged outcome to capture delayed settlement effects and a control effectiveness measure to rule out compliance-driven confounds. (Guan & Ren, 2019; Kim, 2020).

Proposition P8 specifies that the effect of settlement architecture on inclusive risk-adjusted transfer efficiency is mediated or moderated by FX spread, since a technically superior settlement rail only improves efficiency if it also allows the provider to narrow its spread; a rail that improves speed but leaves spread unchanged captures only part of the available benefit. Testing P8 requires an interaction term between a settlement architecture index and a spread measure, a lagged outcome to

allow spread renegotiation time to take effect, and a control effectiveness measure to separate the settlement effect from concurrent compliance changes. (Ngono, 2020).

Proposition P9 specifies that the effect of FX spread on inclusive risk-adjusted transfer efficiency is mediated or moderated by compliance automation, because a narrower spread that is not supported by adequate automated monitoring can increase undetected loss even as it improves headline pricing. Testing P9 requires an interaction term between a spread measure and a compliance automation index, a lagged outcome to allow loss patterns time to emerge, and a control effectiveness measure. (Annan, 2020b).

Proposition P10 specifies that the effect of compliance automation on inclusive risk-adjusted transfer efficiency is mediated or moderated by distribution reach, because automation calibrated for existing corridors can underperform when a provider expands into new markets with unfamiliar risk patterns. Testing P10 requires an interaction term between a compliance automation index and a reach measure, a lagged outcome to capture the recalibration period following expansion, and a control effectiveness measure. (Quirk, 1995).

Proposition P11 specifies that the effect of distribution reach on inclusive risk-adjusted transfer efficiency is mediated or moderated by consumer protection, because reach gained in corridors with weak protection infrastructure can produce efficiency figures that do not account for unresolved consumer harm. Testing P11 requires an interaction term between a reach measure and a consumer protection index, a lagged outcome to allow harm patterns time to surface, and a control effectiveness measure. (Broom, 2015).

Proposition P12 specifies that the effect of consumer protection on inclusive risk-adjusted transfer efficiency is mediated or moderated by origination cost, because stronger protection controls raise onboarding friction and cost in ways that can offset the harm reduction they achieve unless the two are managed jointly. Testing P12 requires an interaction term between a consumer protection index and an origination cost measure, a lagged outcome to capture the point at which onboarding friction affects conversion, and a control effectiveness measure. (Maity, 2020).

The reviewed literature is synthesized here by theme rather than by individual citation, since many of the underlying sources examine adjacent sectors rather than cross-border remittances directly. Each theme groups related studies, states what each specifically examined, and identifies the mechanism that plausibly transfers to a fintech remittance operating model. Directly relevant sources inform the focal constructs without qualification; cross-sector sources contribute mechanisms whose transfer depends on comparable data, incentives, controls, and decision settings, and that dependency is stated explicitly wherever it applies. (Kendall et al., 2013; 김혜선, 2015).

This cluster gathers the studies most directly relevant to cross-border payment economics and governance. Collectively these sources support the framework's central claim that origination cost, compliance, and settlement decisions are interdependent rather than separable. (Schlossberger & Budík, 2019; 백영미 & 박정희, 2013).

Analytics and governance studies drawn from adjacent regulated sectors dominate this cluster.

Distribution reach and partnership governance are the focus here, the constructs most relevant to how a remittance network actually expands. (Barnett et al., 2021).

Audit, procurement transparency, and access-control governance centre this cluster, mechanisms that transfer to remittance operations primarily as controls on internal process integrity rather than customer-facing outcomes. (Gatsi, 2020; Prokisch, 2016).

Real-time monitoring studies are combined here with infrastructure and payment resilience research. (Atakpa & Fobellah, 2023; Akin-Oluyomi et al., 2023).

Automation, forecasting, and cost-optimization studies drawn largely from logistics and procurement form the basis of this cluster. (Mohapatra & Ratha, 2010) (Atakpa et al., 2026; Aminu-Ibrahim et al., 2025).

Financial reporting, accountability, and compliance monitoring across banking, aviation, and healthcare contexts are the centre of this cluster. (Osuji et al., 2021; Ayinde et al., 2026).

This cluster draws heavily on health-system research to inform the framework's propositions on timing and mediation. (Bola-Sadipe et al., 2022).

Fraud detection, accountability, and system-capacity research are combined in this cluster.

This cluster addresses how reach expansion interacts with security exposure and safety practice.

Continuous monitoring and segmentation, both central to the framework's consumer protection measurement design, are the subject here.

Reputational and competitive effects of compliance investment appear alongside platform governance research.

The most heterogeneous cluster, this one draws analogies from health system transformation, investment fraud detection, and unrelated technical domains. (Annan, 2020a; Breidbach, 2020) (Eboh & Aliliele, 2025).

Customer lifecycle analytics and cross-border compliance reporting are the centre of this cluster. (Okwesa et al., 2023).

This cluster returns to infrastructure and safety compliance research.

A mixed group unified mainly by its treatment of monitoring and process design.

Incident response, procurement automation, and financial analytics research are combined here. (Okoruwa et al., 2025).

Identity governance, health-data architecture, and supply chain optimization are the subjects of this cluster.

Risk-assessment model design across compliance and safety contexts is the centre here.

The final cluster closes the synthesis with governance, compliance, and financial forecasting research.

Begin from the decision, not from the dashboard that happens to be available. Name who decides, what alternatives exist, which baseline stands for no action, and how long outcomes should be observed.

The economic contribution of origination cost improvements to managerial decisions also depends on timing. For remittance origination, an early reduction in application abandonment should be treated as a provisional signal rather than a confirmed efficiency gain until fraud and compliance outcomes for that cohort have had time to emerge. (Sharma & -, 2019).

Maintain a single governed metric dictionary for the fintech operating model, carrying formulas, owners, source systems, exclusions, refresh cycles, and validation tolerances.

For settlement architecture the managerial implication follows the same pathway logic developed throughout this framework. A governed metric dictionary for settlement architecture needs to be embedded in the systems that route transactions, not kept as a separate reference document that operations teams consult only occasionally. (Abdurakhmanov & Savinova, 2021; Andrianov, 2021).

Keep prediction and causal contribution apart. A model that predicts high response or high risk does not, by itself, show that an intervention creates value.

The tension between FX spread and compliance automation is visible at the managerial level too, not only in the underlying literature. Separating prediction from causal contribution, as recommended for FX spread management, requires exactly this kind of named ownership, so that a spread change can be traced to a deliberate decision rather than to an anchoring bias or an unexamined audit finding. (Plooij, 2015).

Report distributional outcomes, because an average can conceal concentrated losses, customer harm, regional gaps, or burdens shifted onto another function.

Measuring the distributional outcomes of compliance automation connects directly to two related findings in the financial analytics literature. Applied to compliance automation, reporting an average false positive rate across the whole remittance network can conceal a specific corridor or channel where automated screening performs far worse than the average suggests, exactly the concealment the recommendation to report distributional outcomes is designed to prevent. (Donskaya, 2021; Macik, 2018).

Approve in stages: pilot, validate, expand, and review through predefined gates tied to evidence quality and risk appetite.

The economic contribution of distribution reach also depends on timing, echoing the framework's treatment of the other five constructs. In cross-border remittances this temporal treatment prevents favorable early indicators from a newly opened corridor from dominating the appraisal before the corridor's real risk profile has had time to appear. It also supports staged commitments, pilot gates, covenant triggers, and review points, so managers retain a clear view of when evidence is strong enough to expand, redesign, pause, or exit an intervention. (Aga & Peria, 2014; Pangalos et al., 2014).

Preserve human accountability: automated recommendations need documented override rights, monitoring, and an appeal or remediation path where decisions affect customers or counterparties.

Consumer protection's relationship to inclusive risk-adjusted transfer efficiency also plays out at the managerial level.

The first research question asks which fintech mechanisms reduce end-to-end remittance cost. Future work should preregister the unit of analysis, the observation window, the treatment definition, the outcome hierarchy, and the missing-data rules; multi-institution studies should test whether parameter estimates travel across regulatory and market settings; and qualitative work should examine why users follow, modify, or reject model recommendations. (Hollanders, 2020; Philippon, 2019).

The second question asks how firms should compare account-based, wallet-based, and cash payout networks. Preregistration covers the same items: unit of analysis, observation window, treatment definition, outcome hierarchy, and missing-data rules. Whether estimates travel across regulatory and market settings remains an empirical question for multi-institution work, and the reasons users follow, modify, or reject model recommendations remain a subject for qualitative study. (Broby & Karkkainen, 2016).

The third question asks which efficiency gains survive once compliance, fraud, liquidity, and service quality enter the model. The same preregistration discipline applies to the unit of analysis, the observation window, the treatment definition, the outcome hierarchy, and the missing-data rules. Multi-institution studies should test whether parameter estimates travel across regulatory and market settings, and qualitative work should ask why users follow, modify, or reject the recommendations a model produces. (Todoroki et al., 2014; Zetzsche et al., 2021a).

Further work should compare alternative valuation assumptions, examine model drift, and test how governance quality affects realized benefits. Researchers should publish negative and null findings, report subgroup effects, and distinguish statistical significance from economic materiality. Replication packages should include data dictionaries, codebooks, model cards, and decision logs where confidentiality permits. (Mahmd, 2010; Zetzsche et al., 2021b).

6. CONCLUSION AND POLICY IMPLICATIONS

The review integrates economic value, analytics, behavior, and risk governance for the fintech operating model in cross-border remittances. Inclusive risk-adjusted transfer efficiency is defined as a multi-period, risk-adjusted outcome and linked to six operational dimensions: origination cost, settlement architecture, FX spread, compliance automation, distribution reach, and consumer protection. The contribution is an auditable chain running from data and assumptions through intervention and outcome to challenge and learning. No employer-specific findings are presented and no empirical validation is claimed; the review offers a structured foundation for later testing.

Three policy implications follow from the framework.

First, measure each dimension under a governed discipline rather than an ad hoc reporting habit. Fixing the unit of analysis in advance, and attaching to every metric an owner, a source system, a refresh frequency, a permissible use, a validation threshold, and an escalation path, converts measurement into a control that can be audited long after the decision has been taken.

Second, evaluate the six dimensions as joint constraints rather than independent levers, using scenario analysis, control testing, and sensitivity analysis against a shared baseline. Gross benefit, incremental benefit, and risk-adjusted benefit should be reported separately, each with a confidence interval, so that an apparent gain on one dimension cannot mask a displaced cost on another.

Third, appraise over multiple periods and commit in stages. Discounting expected cash flows, applying scenario-specific probabilities, and pricing the option value retained by management supports pilot gates, covenant triggers, and review points at which a provider can expand, redesign, pause, or exit. Where automated recommendations affect customers or counterparties, documented override rights, monitoring, and an appeal or remediation path preserve the human accountability that the framework depends on.

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