DESIGN MATTERS

How Interoperability Models Impact Financial Inclusion and Competition

GSMA
Mobile for Development

M4D

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at **gsma.com**

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily.

GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself.

Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

www.gsmaintelligence.com
info@gsmaintelligence.com

Authors:
Francisco Amaya, Economist, GSMA Intelligence
Kalvin Bahia, Senior Director of Economics, GSMA Intelligence

Contributors:
Kennedy Kipkemboi, Public Policy & Advocacy Director, Mobile Money, GSMA
Rishi Raithatha, Director, Data & Insights, GSMA
Gianluca Storchi, Data Manager, Mobile Money, GSMA
Karim Dia, Senior Mobile Money Regulatory Specialist, GSMA
Joyce Kong, Marketing Manager, GSMA

Contents

Executive summary

Interoperability describes the process of different products, services or systems working together in a way that creates value for businesses and consumers. There has been an increased focus on this in mobile money markets, with interoperability now existing in 91 countries that have at least one mobile money service in place. Initially, mobile money interoperability was market-led and driven by the need identified by mobile money providers for customers in different mobile money wallet ecosystems to transact. However, in recent years, governments have been more proactive in driving interoperability, in some cases imposing mandatory requirements as well as solutions (e.g. via national switches). There has been plenty of literature setting out the different approaches to implementing interoperability for mobile money, particularly technical solutions. However, little evidence exists on the impact of interoperability on outcomes such as financial inclusion and competition, which is a key objective of policymakers.

This report addresses these evidence gaps by assessing the causal impact of different types of interoperability methods on adoption and competition. The analysis shows that interoperability can significantly increase mobile money adoption. However, its impact on competition and usage depends on how and when it is implemented. The following key findings emerge based on the analysis undertaken.

Interoperability can drive financial inclusion, but only under the right conditions

Empirical findings confirm that interoperability can significantly increase mobile money adoption. However, its impact on competition and usage depends on timing and policy design. Interoperability delivers measurable benefits when introduced after markets have reached scale and through models that combine commercial viability with robust governance and fair pricing. These benefits are delivered by reducing switching costs and amplifying network effects. Conversely, early and rigid mandates can lead to neutral or negative outcomes, particularly for transaction values.

Timing matters: maturity must precede interoperability

Introducing interoperability before a market achieves sufficient scale offers limited benefits and can harm usage. When implemented too early, integration costs and 'free-rider' risks outweigh the gains, discouraging investment and innovation. After scale is reached, the benefits dominate and interoperability strengthens both adoption and competition.

Market-led models deliver the strongest results

Market-led interoperability produces the most consistent positive outcomes: adoption rises significantly and market concentration declines without negative effects on usage. In particular, the effects of implementing this policy is associated with an increase of 2–18 percentage points (pp) in active 90-day user adoption. These models work because they combine commercial alignment with other enablers, such as shared governance, sustainable pricing and transparent operational rules.

The analysis also shows that mandated national switches do not produce consistent gains in adoption or competition. In several cases, they are associated with declines in transaction values per active account. Our empirical estimations show that national switch policies are associated with up to a 30% reduction in transaction value. If countries with mandated interoperability had not implemented this approach, total transactions in 2023 in those markets could have been up to $800 billion, a difference of almost $250 billion. This suggests that restricted, centralised models can undermine incentives for innovation and reduce service quality when introduced without regard to market readiness.

Market-led interoperability combined with market maturity delivers maximum impact

The combination of market-led interoperability and implementation after markets have reached maturity delivers the strongest and most consistent results. If countries had implemented market-led approaches of interoperability when the market was sufficiently mature and avoided mandating interoperability when the market was in its early stages, there could have been 30–70 million more active 90-day active accounts of mobile money, equivalent to a 2–5 pp increase in adoption for 2023. This approach leverages network effects at full strength while maintaining incentives for investment and innovation.

Policy implications: sequencing and design are critical

Interoperability should be implemented in a way that maximises benefits while minimising risks. This requires the following:

- **Prioritising timing:** Interoperability should not be mandated in nascent markets. The focus should first be on enabling conditions for scale.
- **Favouring market-led or market-informed models:** These approaches combine commercial viability with operational safeguards, reduce free-rider risks and keep incentives for innovation. They also allow providers to build their governance and pricing frameworks, which is relevant for financial sustainability.
- **Designing governance frameworks that support competition:** Rules should ensure fair access while maintaining incentives for service improvement and product differentiation

When implemented under these principles, interoperability becomes an effective lever for expanding financial inclusion and fostering healthy competition without compromising sustainability or innovation.

1

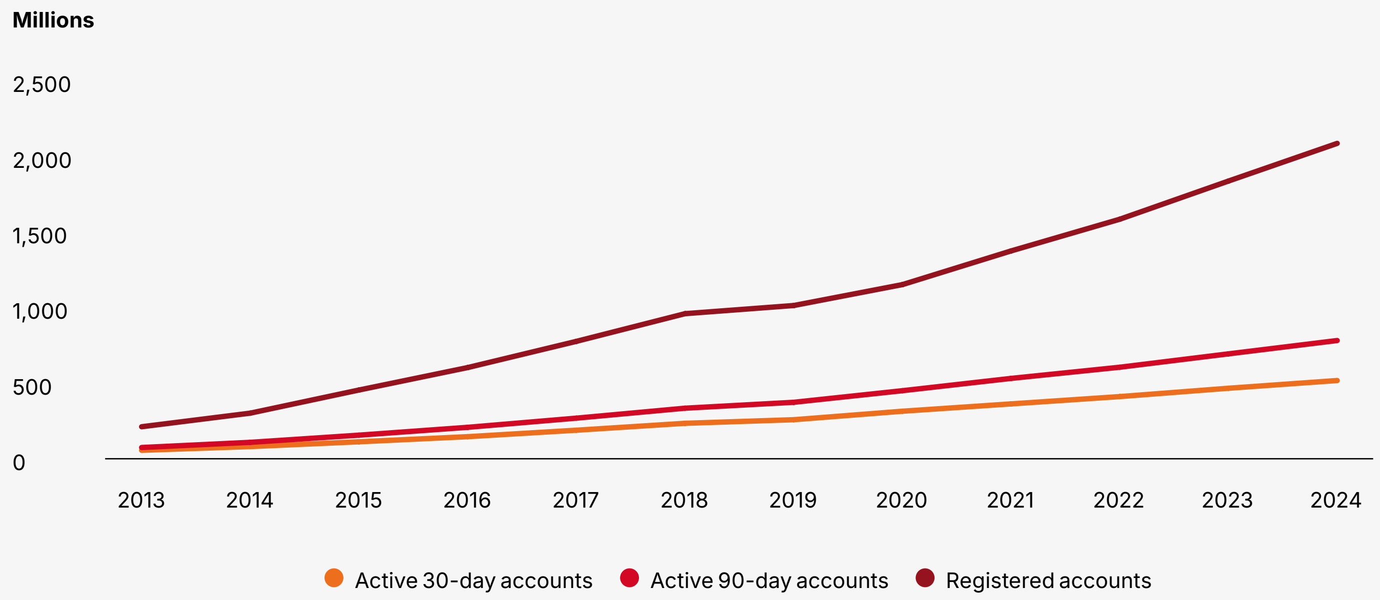
Mobile money and interoperability

1.1. Current global trends on mobile money interoperability

Interoperability describes the process of different products, services or systems working together in a way that creates value for firms and/or consumers. It is typically achieved by exchanging information or implementing a degree of standardisation by the participating organisations. Interoperability has been applied in a wide range of sectors, and it has a long and established history in the financial sector, such as for credit cards and automatic teller machines (ATMs), and in mobile telecommunications. The topic has gained particular attention in recent years in the context of digital markets, both as an ex ante tool to promote competition and an ex post competition remedy. It is therefore unsurprising that there has also been an increased focus on interoperability in mobile money markets.

Over the past decade, mobile money has emerged as a transformative force in financial inclusion, particularly across low- and middle-income countries, with the number of registered accounts increasing to more than 2 billion by the end of 2024 (see Figure 1). As mobile money markets started maturing, the question of how and when to implement interoperability (i.e. allowing users to transact across different providers) became increasingly central to policy debate.

Figure 1
Total number of active and registered mobile money accounts globally



Source: GSMA Global Adoption Survey and estimates

Interoperability in mobile money can apply to several dimensions, for example to the network, platform, agent or merchant.[1] The focus of this report is on horizontal platform interoperability between mobile money providers and other financial service providers, including banks. This has been the main dimension of interoperability across mobile money markets to date.

Specifically, this dimension refers to the ability of users of one mobile money service to send payments or transfers to users of another service – commonly known as account-to-account (A2A) interoperability. It is the most widespread type of interoperability in mobile money and can operate both domestically and across borders. It may involve transactions between mobile money providers or between mobile money services and other financial institutions (e.g. bank accounts). A2A interoperability can also be limited to specific payment use cases (e.g. peer to peer (P2P)) or extended to broader applications (e.g. person to business (P2B), person to government (P2G), bill payments and bulk disbursements).

Initially, interoperability was driven by market-led initiatives, with providers voluntarily entering into bilateral or multilateral agreements to enable cross-platform transactions. These arrangements were typically motivated by commercial incentives, such as expanding customer bases and enhancing user experience.

In recent years, however, governments have taken a more active role in imposing interoperability. In some cases, this has involved mandating interoperability and implementing centralised and regulated solutions (e.g. national switches). While interoperability overall can yield important benefits under specific conditions, they may also introduce trade-offs that hinder service adoption. It is therefore essential for policymakers to clearly articulate the rationale for intervention, as this will shape the design and scope of interoperability.

As highlighted in several studies, when interoperability is mandated by regulation, it should be tailored to the specific context and objectives. Policymakers must carefully weigh the costs and trade-offs associated with different forms of interoperability. These trade-offs will vary by market and depend on economic factors, including the maturity of the mobile money ecosystem – particularly whether it has achieved sufficient scale.[2]

1.2. Objectives of the study

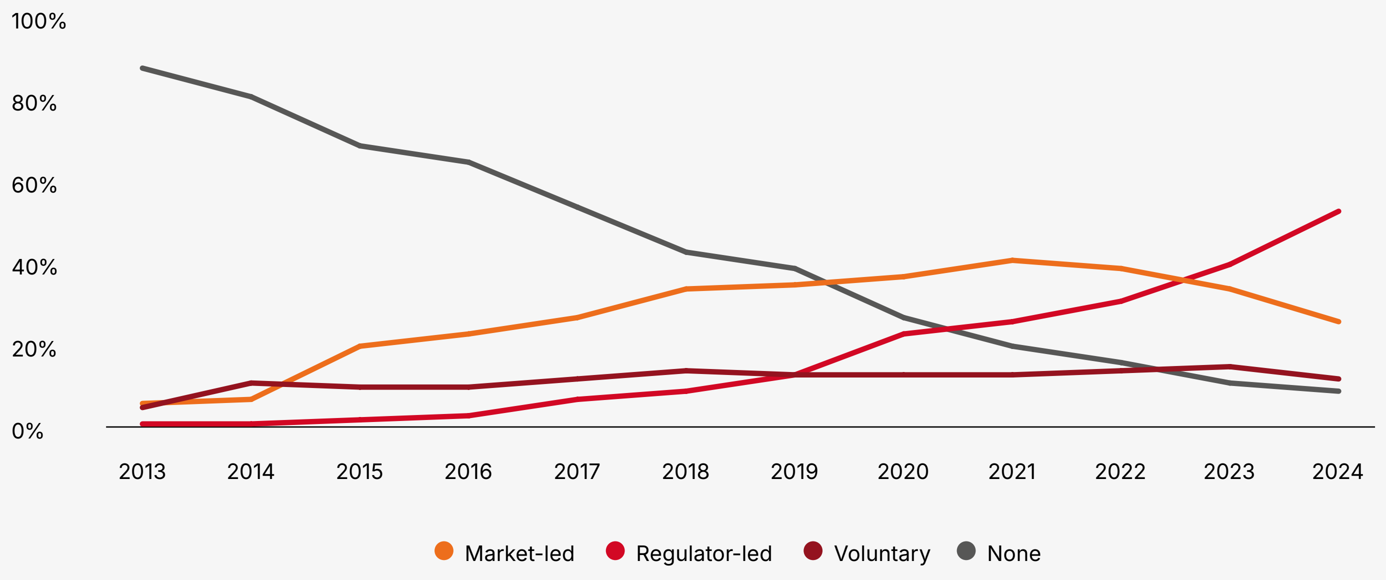
With the continued implementation of mobile money interoperability across countries, this report aims to empirically assess its impact on three core dimensions: adoption, usage and competition. Previous studies often treat interoperability as a binary variable, either present or absent, which oversimplifies its complexity. In practice, interoperability can take multiple forms depending on how and when it is implemented, as well as the governance model under which it operates.

This report moves beyond binary classifications to evaluate the policy design and timing of interoperability initiatives. Specifically, it categorises interoperability into three distinct policy models:

- **Market-led interoperability:** This refers to markets where interoperability is mandated by regulation, but its implementation is led and driven by mobile money providers, either through bilateral or multilateral agreements.
- **Regulator-led interoperability:** This refers to markets where interoperability is mandated by regulation and it is implemented with a prescribed solution set by the regulator (typically via a national switch).
- **Voluntary interoperability:** This refers to markets with arrangements that arise from collaboration between providers without regulatory obligation.

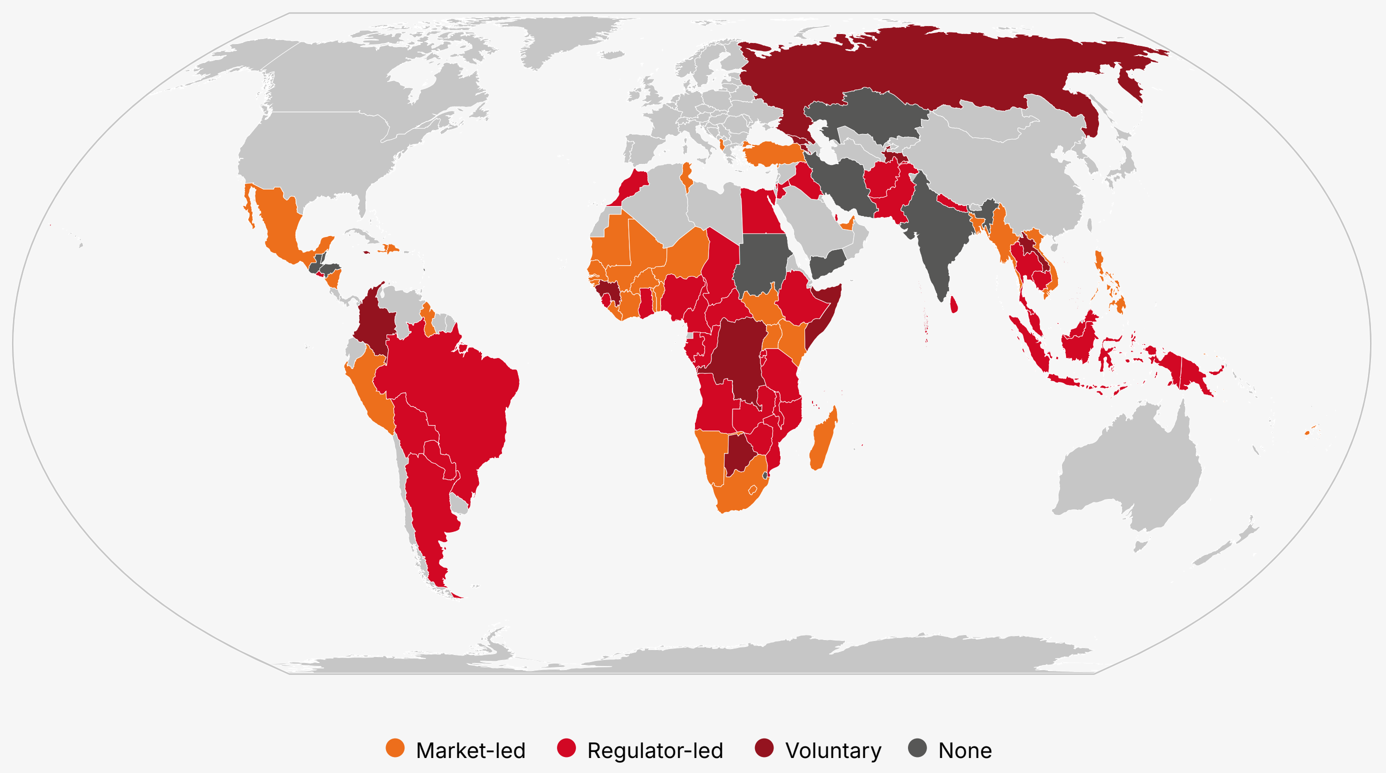
1. For further discussion on this, see The Impact of Mobile Money Interoperability on Financial Inclusion, GSMA, 2024
2. See The impact of mobile money interoperability on financial inclusion, GSMA, 2024; Understanding mobile money interoperability: Its evolution and path to a sustainable future, GSMA, 2023; Interoperability Test Platform, GSMA, 2024; Tracking the journey towards mobile money interoperability, GSMA, 2020; and The commercial sustainability of mobile money providers in interoperability initiatives, GSMA, 2024

Figure 2
Evolution of mobile money interoperability approaches



Source: GSMA Intelligence and GSMA Mobile Money

Figure 3
Mobile money interoperability approaches by country, 2024



Source: GSMA Intelligence and GSMA Mobile Money

Case study: Tanzania

Understanding the different types of interoperability

The three different types of interoperability considered in this study can be seen in Tanzania, one of the most developed mobile money markets globally. Mobile money first launched in Tanzania in April 2008 with the introduction of Vodacom's M-Pesa service. In 2014, there was a market-led voluntary bilateral agreement for P2P established between Airtel, Tigo and Zantel. This was not mandated by the regulator, so it is an example of voluntary interoperability.

In 2015, there was a regulatory requirement for mobile money providers to facilitate P2P interoperability.[3] However, the solution was led by mobile money providers, so this is an example of mandated interoperability that is market-led (i.e. market-led interoperability). In 2016, Vodacom joined the interoperability agreement.

In 2022, all financial institutions (including mobile money providers and banks) in Tanzania were required to connect to the newly launched Tanzania Instant Payment System (TIPS). In 2023, mobile money providers completed onboarding of all approved digital channels. This is an example of mandated interoperability being implemented using a prescribed centralised and regulated solution (i.e. regulator-led interoperability).[4]

A simple descriptive analysis presented in Figures 4 and 5 shows countries that have implemented mobile money interoperability exhibit significantly higher levels of adoption and competition among the total adult population compared to those without interoperability. However, the differences become even more pronounced in terms of adoption when comparing across policy approaches. Specifically, countries that adopted market-led interoperability – where providers agree to establish cross-platform connections – consistently outperform other countries in terms of adoption metrics. It is important to note, however, that this does not imply interoperability causes increased usage. Establishing a causal relationship is a key focus of this study.

Within this context, the report assesses whether mobile money interoperability – and the policy models through which it is implemented – shapes adoption and competition patterns. It evaluates whether the presence of interoperability, and the manner of its introduction, leads to measurable differences in the uptake of mobile money across markets. The analysis considers three dimensions: (i) the extent to which interoperability enhances adoption and fosters competition; (ii) the degree to which different forms of interoperability, introduced under varying market conditions, generate distinct outcomes and indicate the relative effectiveness of alternative policy approaches; and (iii) the role of timing in conditioning the magnitude and direction of these impacts. Note that all metrics for adoption, competition (including HHI) and transaction values refer specifically to mobile money services, and do not include other financial services or providers.

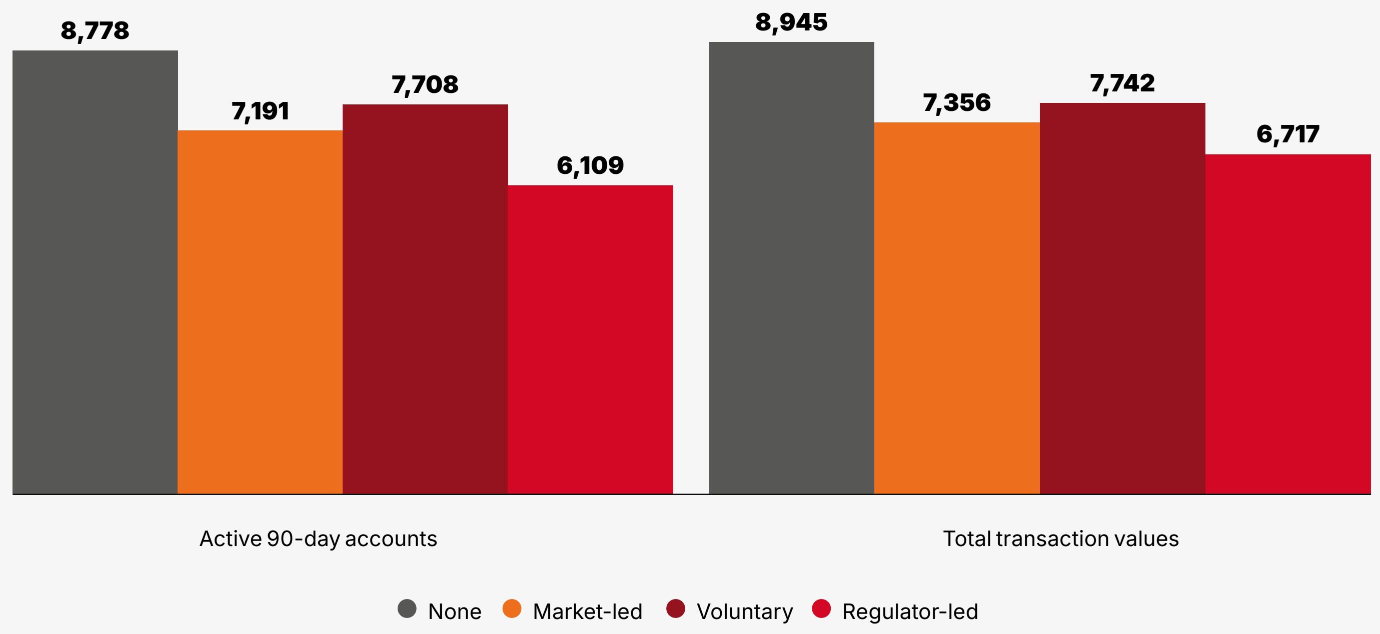
By addressing these topics, the report aims to provide evidence that can inform policy decisions and industry strategies, ensuring that interoperability delivers the greatest possible benefits for financial inclusion and market development.

3. NPS Act 2015: Section 6(1) A payment system that may be eligible to be licensed by the Bank shall have any of the following objects: (f) facilitation of interoperability of payment systems and services between payment systems providers and consumers. (2) For the purposes of this section, the term 'interoperability' means a seamless transfer of payment instructions or funds from an account of one payment system provider or user to another payment system provider's or user's account of a different service provider.
4. For further details on the Tanzanian case study, see The commercial sustainability of mobile money providers in interoperability initiatives, GSMA, 2024.

Figure 4
Proportion of active and registered mobile money accounts by policy type, 2023

Source: GSMA Intelligence and GSMA Mobile Money

Figure 5
Average HHI[5] for active 90-day accounts and total transaction values, 2023



Source: GSMA Intelligence and GSMA Mobile Money

5. We use the Herfindahl-Hirschman Index (HHI), a widely accepted proxy for market concentration and competitive dynamics. The index is calculated as the sum of the squares of the market shares (in percentage terms) of all firms in the market. The HHI ranges from 0 to 10,000, where lower values indicate a more competitive market and higher values reflect greater concentration. A higher HHI value suggests less competition and potentially greater market power held by fewer providers.

1.3. Scope and methodology

Table 1
Outcome variables assessed on the empirical estimations for interoperability

Outcome category	Description
Adoption metrics	Active 30-day accounts (as a percentage of adults)
	Active 90-day accounts (as a percentage of adults)
	Registered accounts (as a percentage of adults)
Competition metrics (HHI)	HHI for active 30-day accounts
	HHI for active 90-day accounts
	HHI for registered accounts
Transaction-level metrics[6]	Value of total transactions per active 90-day account
	Value of P2P transactions per active 90-day account[7]
	Value of total off-net transactions per active 90-day account
	Share (%) of P2P transactions

Source: GSMA Intelligence

Table 1 presents the outcomes evaluated and assessed depending on their category.

The quantitative analysis integrates the following: (i) the GSMA Mobile Global Adoption Survey[8] and related GSMA datasets; and (ii) an Interoperability Policy Tracker gathered by the GSMA. These sources provide consistent, quarterly, multi-year, country-level time series that are needed to observe markets before and after interoperability is introduced and to compare countries that implement interoperability with those that do not over the same period.

A central challenge in policy evaluation is separating the effect of the policy from other changes happening at the same time. For example, mobile money adoption can rise because of macroeconomic conditions, regulatory changes unrelated to interoperability, specific marketing campaigns, handset affordability or broader digital inclusion trends. In addition, other factors such as education, income, mobile phone ownership and access to formal banking, as well as regulatory enablers, have all been shown to significantly influence mobile money usage.[9] To isolate the role of interoperability, this report uses a family of techniques known as difference-in-differences (DiD).

With DiD, the analysis tracks how the outcomes of interest (adoption, usage and competition) evolve in markets after they introduce interoperability and compare those changes to countries that have not introduced interoperability over the same period. If, absent the policy, the two groups would have followed similar paths, any systematic difference after the introduction can be attributed to interoperability.

Interoperability is not introduced everywhere at once; countries adopt interoperability at different times and under different conditions. The study therefore uses modern DiD estimators[10] designed for staggered adoption. In practical terms, these methodologies allow the following: (i) to make fair comparisons even when policies arrive in waves; (ii) to estimate how effects evolve over time after the policy (dynamic effects/event-study); and (iii) to examine how effects differ by policy type and by timing (e.g. whether introduced into mature markets versus nascent markets).

This report makes the following contributions that, to our knowledge, have not been integrated in a single, comparative, cross-country study of mobile money interoperability:

- **Isolating effects by policy type:** Previous work has often treated interoperability as a binary feature (present or not). We explicitly distinguish policy models – market-led, regulator-led and voluntary – and estimate how their impacts differ. This allows decision-makers to move beyond 'interoperability or not' to 'which interoperability model works best under which conditions'.
- **Identifying the role of timing and market maturity:** Interoperability may deliver different outcomes depending on when it is introduced. We leverage the staggered rollout of policies across countries to examine effects when interoperability is implemented into more mature markets (with established user bases and agent networks) versus earlier-stage markets. This is crucial for policy sequencing, as the same policy can have a different impact depending on market readiness.
- **Applying robust, modern empirical methods to staggered adoption:** The report uses modern DiD approaches that address known limitations of older methods when policies are adopted at different times. This strengthens the robustness of the results by (i) controlling for common shocks and time-invariant country characteristics, (ii) preventing bias that can arise in naïve multi-period comparisons and (iii) tracing how effects evolve after implementation (event-study dynamics).

As a result, this is the first study to isolate the effects of interoperability by both policy type and timing using robust empirical methods. For policymakers and industry leaders, this means clearer guidance on which interoperability models are most likely to support adoption and competition and when they are most likely to do so, in a cross-country evidence base comparison, rather than a single-country experience or descriptive trends.

6. Mobile money transaction value aggregates the total value of transactions recorded on mobile money platforms across the following GSMA-defined categories: P2P transfer, international remittance, bill payment, merchant payment, bulk disbursement, airtime top-up, cash-in, cash-outs and bank–wallet/wallet-bank transfers. These categories and their usage in monthly value/volume reporting are set out in GSMA's Mobile Money Metrics and glossary.
7. Interoperability mainly aims to enable A2A transfers between different providers, removing 'on-net' limits and making P2P the core feature that supports wider use.
8. This is an annual survey designed to capture quantitative information about the performance of mobile financial services around the world. All service providers represented in the GSMA's Mobile Money Deployment Tracker are invited to participate in the survey and respondents supply standardised operational metrics about their services in March, June, September and December of each year.
9. Exploring the relation between mobile money regulation and usage, Bahia, K., Sanchez, M. and Taberner, P., 2020
10. Cohort-interacted event study (EventStudyInteract), DID-Imputation (Borusyak–Jaravel–Spiess) and Group-time ATTs with dynamic effects (de Chaisemartin & d'Haultfoeuille)

2

Economics and evidence of interoperability

2.1. Theoretical foundations and economics of interoperability

Interoperability refers to the ability of different mobile money platforms to exchange transactions easily. It is typically achieved through technical standards, information exchange protocols and governance arrangements that allow participants to process and settle transactions across systems while continuing to operate their own platforms.[11] Interoperability is not binary: it can apply to specific use cases (e.g. P2P transfers) or extend to a broader set of services such as merchant payments, bill payments and bulk disbursements. It can also vary in depth, from basic money exchange to full integration of settlement and dispute-resolution mechanisms.

Economic rationale for interoperability in mobile money[12]

Interoperability can generate significant benefits by addressing coordination failures and unlocking network effects. In markets where each provider operates a closed system, users are locked to transacting within their provider's network. This fragmentation limits the value of the service and constrains adoption. By connecting platforms, interoperability creates a larger effective network, increasing convenience for users and reducing frictions for businesses and governments seeking to make digital payments.

From a policy perspective, interoperability is often promoted for the following reasons:

- **Enhance consumer value:** Consumer value can be enhanced by enabling cross-network transactions.
- **Promote competition:** Competition can be promoted by reducing switching costs and lowering barriers to entry
- **Realise economic externalities:** By accelerating the shift from cash to digital payments, this supports financial inclusion and broader economic development.

Similarly, from a business perspective, firms are willing to engage in interoperability for the following reasons:[13]

- **Realise network effects:** Firms can access another platform's customer base and generate value from both new and existing products. This includes direct and indirect network effects:
  - **Direct network effects:** More users increase the utility of the service (e.g. more people to transact with).
  - **Indirect network effects:** Complementary services (e.g. apps or merchant tools) become more valuable as user bases grow.

11. The impact of mobile money interoperability on financial inclusion, GSMA Intelligence, 2024
12. Idem
13. Idem

- **Enhance consumer value:** Interoperability allows firms to offer a more convenient and efficient experience, allowing consumers to access services across platforms without friction.

- **Reduce costs and improve efficiency:** By agreeing on standardised components and processes, firms can streamline operations and reduce duplication across the value chain.

Network effects and adoption dynamics

Mobile money markets exhibit strong direct and indirect network effects. Direct effects arise because the utility of the service increases with the number of users: more users mean more potential transaction partners. Indirect effects occur when a larger user base attracts complementary services such as merchant acceptance, credit and insurance. Interoperability amplifies these effects by connecting previously isolated networks, creating a unified ecosystem that supports higher transaction volumes and more diverse use cases.

Switching costs and market concentration

In the absence of interoperability, users face switching costs when moving to another provider. These include the effort of updating contacts, learning new interfaces and losing accumulated benefits such as loyalty rewards. The most significant cost, however, is the loss of access to an established network of peers and merchants. These frictions create customer lock-in and can entrench market concentration. Interoperability reduces these costs by allowing users to transact across providers, thereby increasing contestability and user choice.

However, the extent to which interoperability is needed also depends on the degree of multi-homing in the market. As noted in a GSMA report,[14] if consumers can easily use multiple platforms – such as having multiple SIM cards or access to different mobile money providers – then competition and contestability may already be strong. In contrast, when multi-homing is costly or impractical, interoperability becomes more critical to ensure consumer benefit and market openness.

Risks and trade-offs: static versus dynamic competition

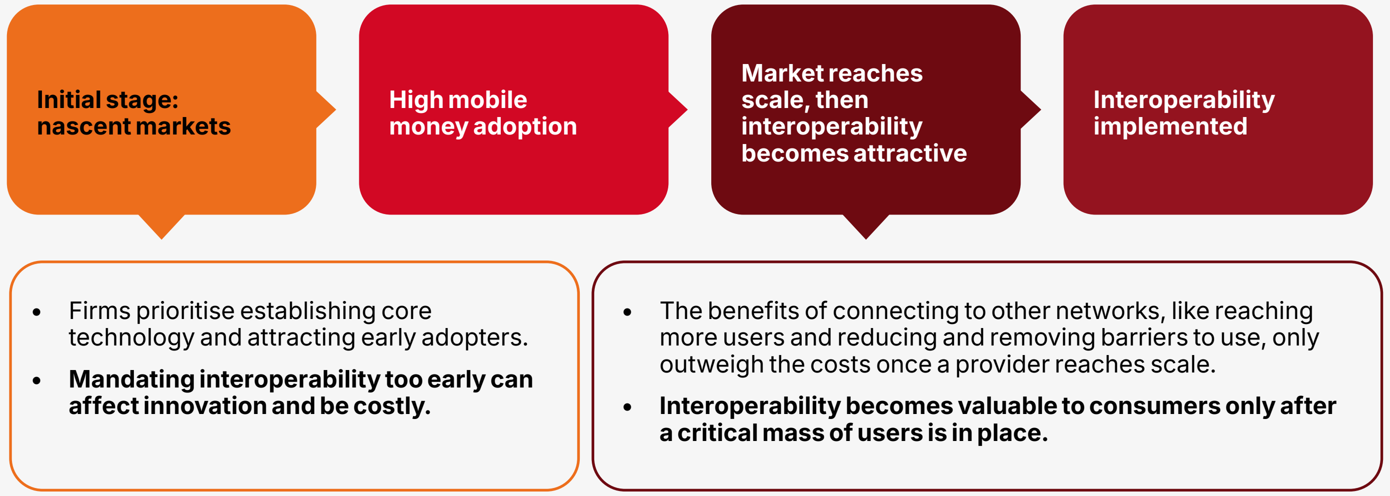
While interoperability can enhance short-term competition by reducing switching costs, it introduces risks that affect long-term market development. Among these is the 'free-rider' problem: when platforms are required to open their systems, competitors can benefit from the network and infrastructure investments of early movers without bearing the equivalent costs or risks. This dynamic can weaken incentives for innovation, product differentiation and investment in network providers or technology upgrades. If providers anticipate that any advantage gained through innovation will be quickly shared with rivals, they may scale back on research and development or delay new features. These effects are particularly concerning in early-stage markets, where sustained investment is critical to achieving scale and financial sustainability. Moreover, interoperability itself can increase costs for providers, which must invest time and resources to design and maintain the technical, organisational and commercial frameworks required to support it – costs that grow with the number of participants and depth of integration.[15]

Timing and sequencing

The timing of interoperability can also be a critical factor in determining its impact. There are theoretical reasons to suggest that interoperability delivers the greatest benefits once a market has reached a certain level of maturity – typically when active usage and agent density are high. At this stage, the benefits of connecting networks outweigh the costs of integration and governance. Introducing mandatory interoperability too early can impose significant costs on providers, reduce incentives to innovate and slow the development of core infrastructure. A practical sequencing logic emerges, as shown in Figure 6.

14. Idem
15. Idem

Figure 6
Mobile money interoperability evolutionary model

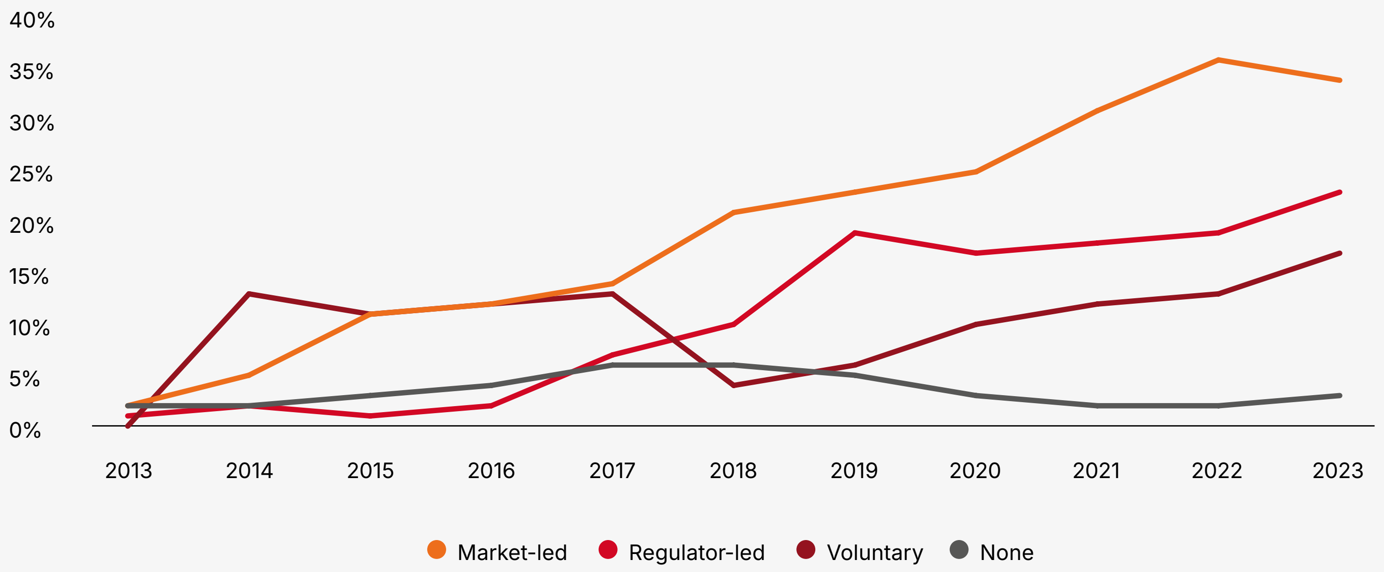


Source: GSMA Intelligence

The decision on how to implement interoperability (market-led, regulator-led and voluntary) should consider market maturity, competition dynamics and policy objectives. Market-led or market-informed approaches tend to preserve innovation incentives while delivering connectivity benefits in mature markets. Prescriptive and regulated mandates, particularly in nascent markets, risk undermining investment and slowing progress towards financial inclusion. This is evident in the trends presented in Figure 7, which show that countries with market-led interoperability have recently and consistently exhibited higher levels of adoption compared to the alternatives.

Figure 7
Mobile money adoption among active accounts by interoperability policy

Percentage of adult population (active 90-day accounts)



Source: GSMA Intelligence and GSMA Mobile Money

2.2. Empirical evidence on interoperability and financial inclusion

Brunnermeier et al (2023) provide the most comprehensive cross-market analysis to date on the impact of mobile money interoperability.[16] The study finds that interoperability is associated with lower transaction fees, particularly for low-value payments, but also with lower adoption and reduced network coverage in rural areas. These findings highlight the trade-off between enhanced static competition and weakened dynamic incentives. The study does not differentiate between policy models or account for timing effects, limiting its relevance for policy design.

A GSMA study in 2024 examined five markets (Ghana, Kenya, Malawi, Rwanda and Tanzania) around interoperability milestones and found three key insights:[17]

- **Market-led interoperability aligns with stronger outcomes.** In Kenya, Tanzania and Rwanda, industry-driven arrangements coincided with higher adoption and increased use of advanced services such as merchant and bill payments. These markets introduced interoperability after achieving significant scale, consistent with the timing hypothesis.
- **Mandated national switches show mixed results.** In Ghana and Malawi, the evidence is inconclusive, partly due to overlapping shocks such as the Covid-19 pandemic and differences in pricing design.
- **Adoption typically precedes interoperability.** In four of the five markets, active account penetration exceeded 50% before interoperability was implemented, reinforcing the importance of sequencing.

However, the study was not able to isolate the causal impact of interoperability; rather, it was based on trend analysis to assess how mobile money outcomes evolved after different interoperability solutions.

The limited evidence to date therefore suggests that interoperability can enhance adoption and competition when introduced under the right conditions – specifically, after markets have scaled up and through models that maintain incentives for innovation. Conversely, early or rigid mandates risk neutral or negative effects on inclusion and may reduce investment in infrastructure and product development.

16. Mobile Money, Interoperability and Financial Inclusion, Brunnermeier, M., Limodio, N. and Spadavecchia, L., 2023

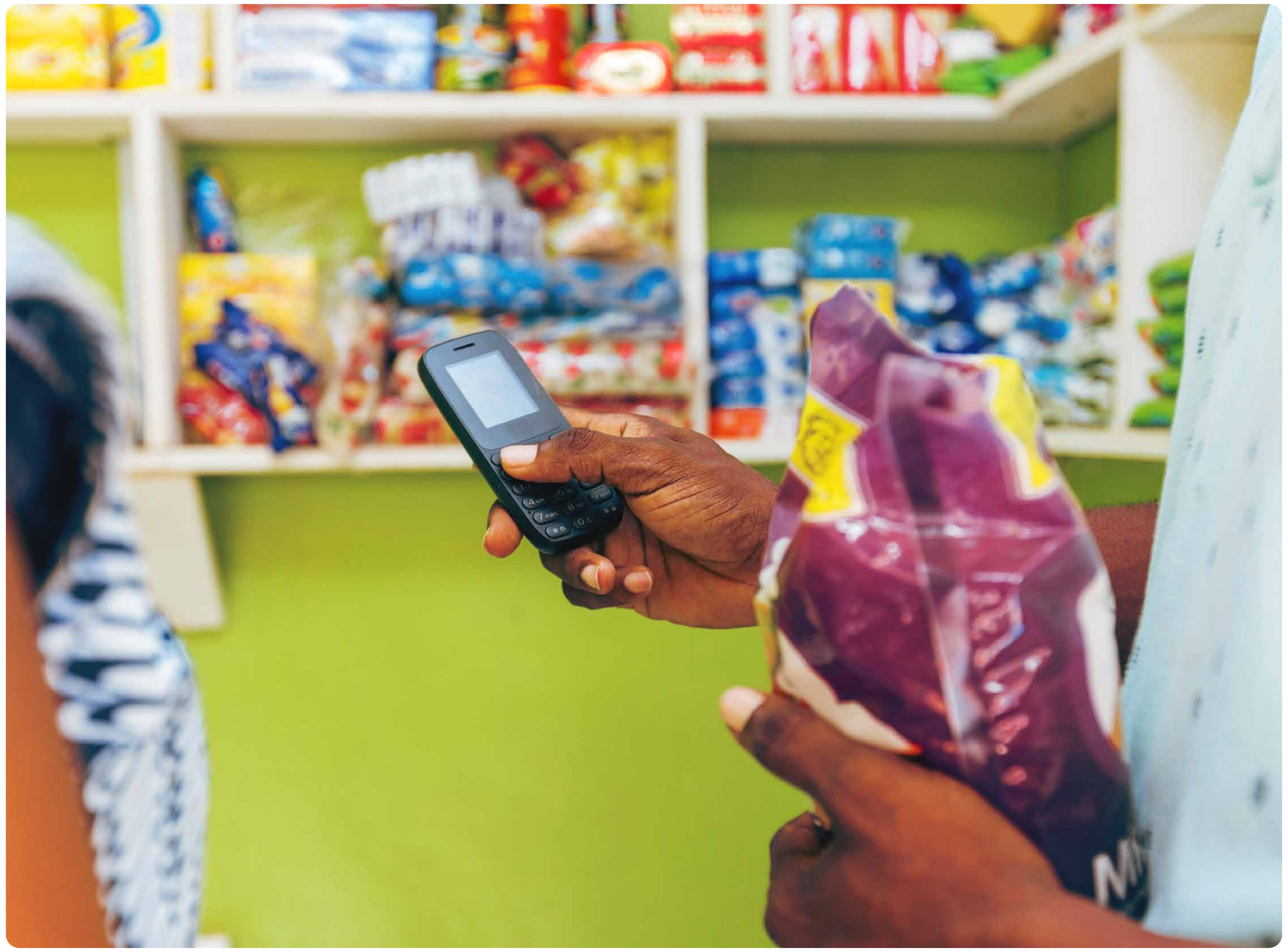
17. The impact of mobile money interoperability on financial inclusion, GSMA Intelligence, 2024

2.3. Gaps in the literature

Despite growing interest in interoperability as a policy tool, the evidence base remains incomplete. Existing studies provide useful insights but fall short in several critical areas, which limits their ability to inform policy decisions. These gaps are summarised below:

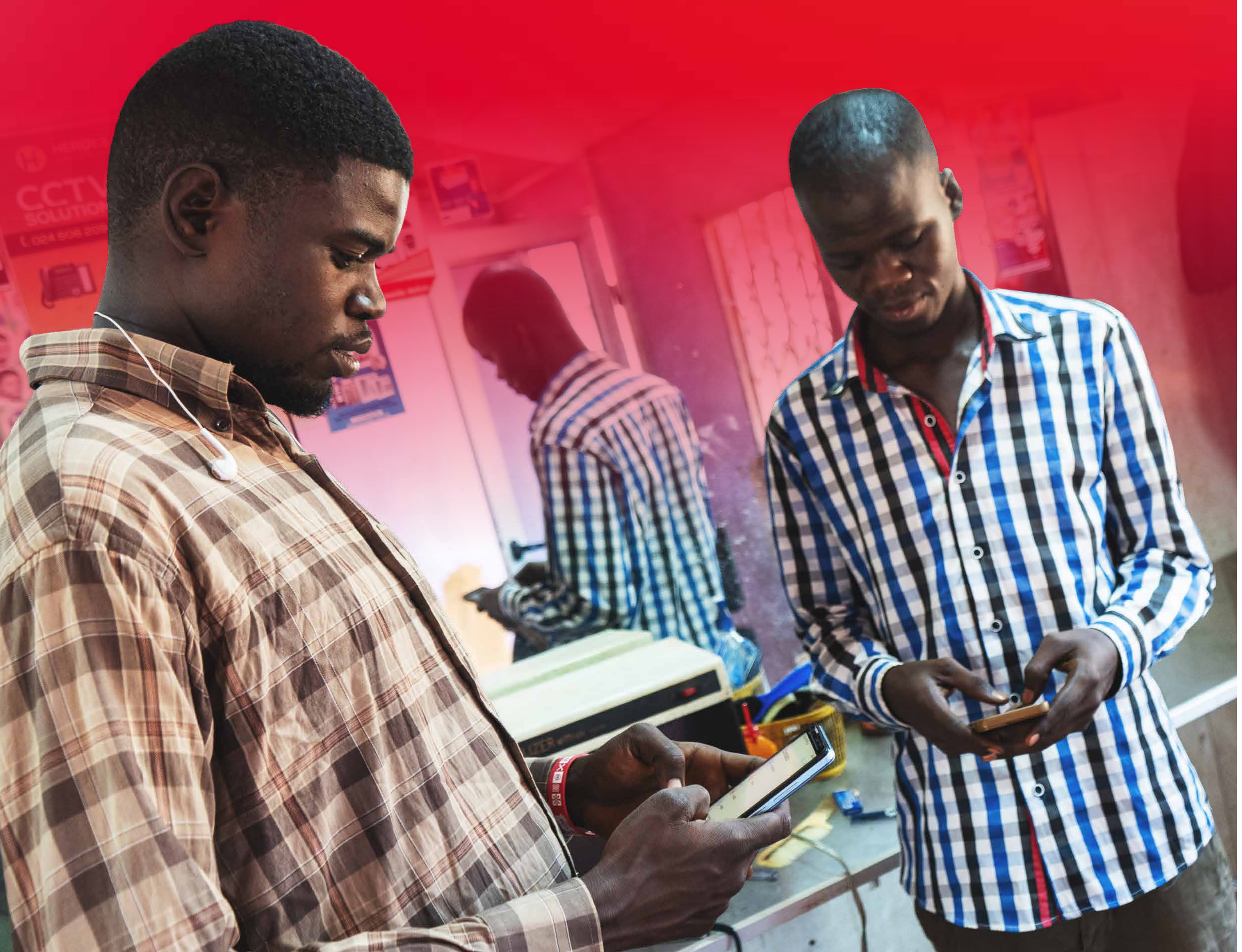
- **Policy design and timing remain underexplored:** Most studies treat interoperability as a binary feature, overlooking differences between different policy models, as well as the role of market maturity.
- **Causal evidence is limited:** Few analyses exploit the staggered rollout of interoperability to identify causal effects or dynamic impacts over time. Without this, it is difficult to separate the effect of interoperability from broader market trends or external shocks.
- **Mechanisms and pricing structures are poorly understood:** Evidence on how fee design, governance rules and settlement arrangements influence adoption and usage is scarce. These elements are critical for ensuring that interoperability delivers benefits without undermining sustainability.

This report addresses these gaps by distinguishing policy models, incorporating timing as a key dimension and applying robust empirical methods to isolate the effects of interoperability on adoption and competition. The objective is to provide evidence that informs policy sequencing and model selection, ensuring that interoperability supports financial inclusion without undermining innovation.



3

Evidence on the impact of mobile money interoperability



This section presents the main results of the econometric analysis on the impact of interoperability on mobile money markets. The analysis draws on a multi-country panel and uses robust statistical techniques to isolate the effect of interoperability from other factors. Full details on the methodology, econometric results and robustness checks are provided in the technical report. The discussion here focuses on the key findings and their policy implications.

The results confirm that interoperability can be an effective enabler of adoption – but only under the right conditions. The evidence shows that timing and policy design matter as much as the decision to implement interoperability itself. When interoperability is introduced after markets have reached scale and through models that align incentives, it delivers measurable gains in adoption and competition. Conversely, early or prescriptive mandates can lead to neutral or even negative outcomes, particularly for usage and transaction values.

These patterns are consistent with economic theory. Interoperability reduces switching costs and expands network effects, making the service more valuable to users. However, if introduced too early, it can create free-rider problems and weaken incentives for investment and innovation.

Interoperability increases adoption, but competition effects are mixed

Interoperability is associated with a clear increase in adoption when all policy models are considered together. Active user penetration – measured for both active 30-day and 90-day accounts – rises following the introduction of interoperability.

This outcome reflects the underlying economic mechanism of network effects: by connecting previously isolated platforms, interoperability expands the effective network, increasing the value of the service for each user. The ability to transact across providers reduces friction and enhances convenience, which encourages more people to register and remain active.

The effect on competition is more complex. While some markets experience a decline in concentration, as measured by the HHI, others show little or no change. This variation is explained by differences in policy design and implementation. Interoperability reduces switching costs, which creates the potential for stronger competitive dynamics. However, if the model is rigid or introduced prematurely, it can weaken these dynamics. Mandated schemes implemented before markets reach scale may impose high compliance costs and reduce incentives for differentiation, leading to uniformity rather than active rivalry. In contrast, models that allow commercial flexibility and align incentives are more likely to translate network connectivity into genuine competitive pressure.

Transaction-level indicators, such as value per active account, do not show consistent improvements in the aggregate. This suggests that while interoperability can boost adoption, its effect on deepening usage depends on complementary factors such as pricing, agent conditions and product innovation.

In summary, interoperability consistently supports adoption by lowering barriers to use and amplifying network effects. Its impact on competition depends on timing and governance: when implemented under conditions that preserve incentives for innovation, interoperability can enhance market contestability and deliver benefits beyond simple connectivity. These differences highlight the importance of distinguishing results by policy type and by the stage of market maturity.

Maturity must precede interoperability for the policy to be effective

The analysis shows that interoperability delivers significant benefits only when introduced after markets have reached a certain level of maturity – proxied by at least 50% penetration of active 90-day accounts. In these conditions, interoperability amplifies existing network effects, making the service more attractive and reducing frictions for users who already transact frequently.

By contrast, introducing interoperability too early – before a critical mass of users and agents is in place – produces neutral effects on adoption and no clear gains in competition. In some cases, early mandates coincide with negative impacts on usage metrics. This reflects the cost-benefit trade-off: when the user base is small, the costs of integration and governance outweigh the benefits, and free-rider risks discourage further investment.

Interoperability is most valuable when there is something to connect. Before scale, the marginal benefit of linking small, fragmented networks is low, while the fixed costs and coordination challenges are high. After scale is reached, the benefits dominate and interoperability becomes a catalyst for further growth.

Market-led interoperability is the only approach with consistent and positive impacts

Market-led interoperability, where providers agree on technical and commercial arrangements, shows the strongest and most consistent results. Adoption increases significantly and market concentration declines, indicating a more competitive structure. In particular, the effect of implementing this policy is associated with an increase of 2–18 pp in active 90-day user adoption. Importantly, there is no evidence of negative effects on transaction values or usage depth.

The reason why this particular approach works is because it combines a clear business case with shared governance and operational flexibility. Providers agree on terms that reflect their cost structures, technical standards are robust and consumer experience remains simple and affordable.[18]

18. See Tracking the journey towards mobile money interoperability: Emerging evidence from six markets, GSMA, 2020 and The commercial sustainability of mobile money providers in interoperability initiatives, GSMA, 2024

Providers choose to interoperate when the business case is clear, usually after they have reached scale. This avoids free-rider problems and keeps innovation incentives strong, as terms are agreed rather than imposed. In practice, shared governance and provider-led decisions ensure fees and rules match the mobile money model, while fair interchange and reasonable hub pricing protect margins and customer trust, helping usage grow. By contrast, if interoperability starts too early or on terms that favour specific or limited players, costs rise and revenues fall, reducing providers' motivation and limiting usage. When incentives are aligned, interoperability makes services easier, which drives adoption and supports more advanced use cases.

Prescriptive approaches to interoperability have an inconclusive impact on adoption and competition, with negative effects on usage in some cases

National switches, often introduced through regulation, do not show consistent gains in adoption or competition. In several cases, transaction values per active account decline after implementation. With this, empirical estimations reflect that national switch policies are associated with up to a 30% reduction in transaction value. If countries with mandated interoperability had not implemented this approach, total transactions in 2023 in those markets could have been up to $800 billion, a difference of almost $250 billion. This may reflect design and governance challenges: rigid schemes can impose high costs, reduce differentiation and create free-rider problems, discouraging providers from investing in product innovation or agent networks.

A previous study explores these particular models of interoperability.[19] For example, in Ghana, transaction failures following the introduction of the national switch undermined customer trust and slowed usage growth. In Tanzania, the transition to a centralised hub created complexity and introduced a single point of failure, which disrupted services and negatively affected provider operations. Similarly, TIPS in West Africa,[20] while offering standardisation and a single connection to all financial service providers, has faced barriers such as transition complexity and the risks of centralised failure – issues that have harmed customer experience and increased operational risk for providers.

Mandated models can level the playing field in theory, but if introduced too early or without cost-sharing mechanisms, they risk undermining the very incentives that drive market development. On this, for example, GSMA (2020)[21] notes that governance and pricing structures matter: when mobile money providers lack representation in decision-making, or when pricing models favour banks, the result is reduced commercial viability and weaker incentives to promote interoperable services. Conversely, where governance is inclusive and pricing reflects the mobile money business model, interoperability is more likely to support adoption and usage rather than hinder it.

19. The commercial sustainability of mobile money providers in interoperability initiatives, GSMA, 2024
20. TIPS refers to the Transfert Interbancaire et de Paiement Instantané system, a regional real-time payment switch implemented by the Central Bank of West African States (BCEAO) to connect banks and mobile money providers across the West African Economic and Monetary Union (WAEMU) region.
21. Tracking the journey towards mobile money interoperability: Emerging evidence from six markets, GSMA, 2020

Market-led interoperability and market maturity policy represents the maximum impact for mobile money adoption

The analysis shows that the combination of market-led interoperability and implementation after markets have reached maturity produces the most significant and consistent improvements in mobile money performance. When interoperability is introduced in markets where active usage is already high – measured by at least 50% penetration of active 90-day accounts – adoption increases by over 6 pp. This is the largest effect observed across all policy models and timing scenarios.

> "When adoption for active 90-day accounts exceeds 50%, market-led interoperability increases adoption by more than 6 percentage points."

Why does this combination deliver the strongest results?

The combination of market-led interoperability and implementation after markets have reached maturity delivers the most significant improvement due to a number of factors:

- **Network effects at scale:** Once a market has achieved critical mass, the value of connecting networks rises sharply. Interoperability at this stage multiplies the utility of each account by enabling transactions across the entire ecosystem of users, merchants and services.
- **Aligned incentives and sustained innovation:** Market-led models are introduced when providers recognise a commercial rationale for interoperability. This alignment ensures that integration costs are shared fairly and that providers maintain incentives to invest in product development and agent networks. Unlike rigid mandates, these arrangements preserve scope for differentiation, which supports ongoing innovation.
- **Positive impact on competition:** Evidence indicates that this combination not only accelerates adoption but also reduces market concentration, as measured by the HHI. By lowering switching costs while maintaining incentives for service improvement, market-led interoperability introduced at scale fosters a more competitive environment without undermining market sustainability.

This finding underscores the importance of sequencing and design. Introducing interoperability too early or through prescriptive models can impose costs that outweigh benefits and weaken investment incentives. In contrast, a market-led approach implemented after scale has been achieved leverages existing momentum to deliver measurable gains in adoption and competition while avoiding the risks associated with premature mandates.

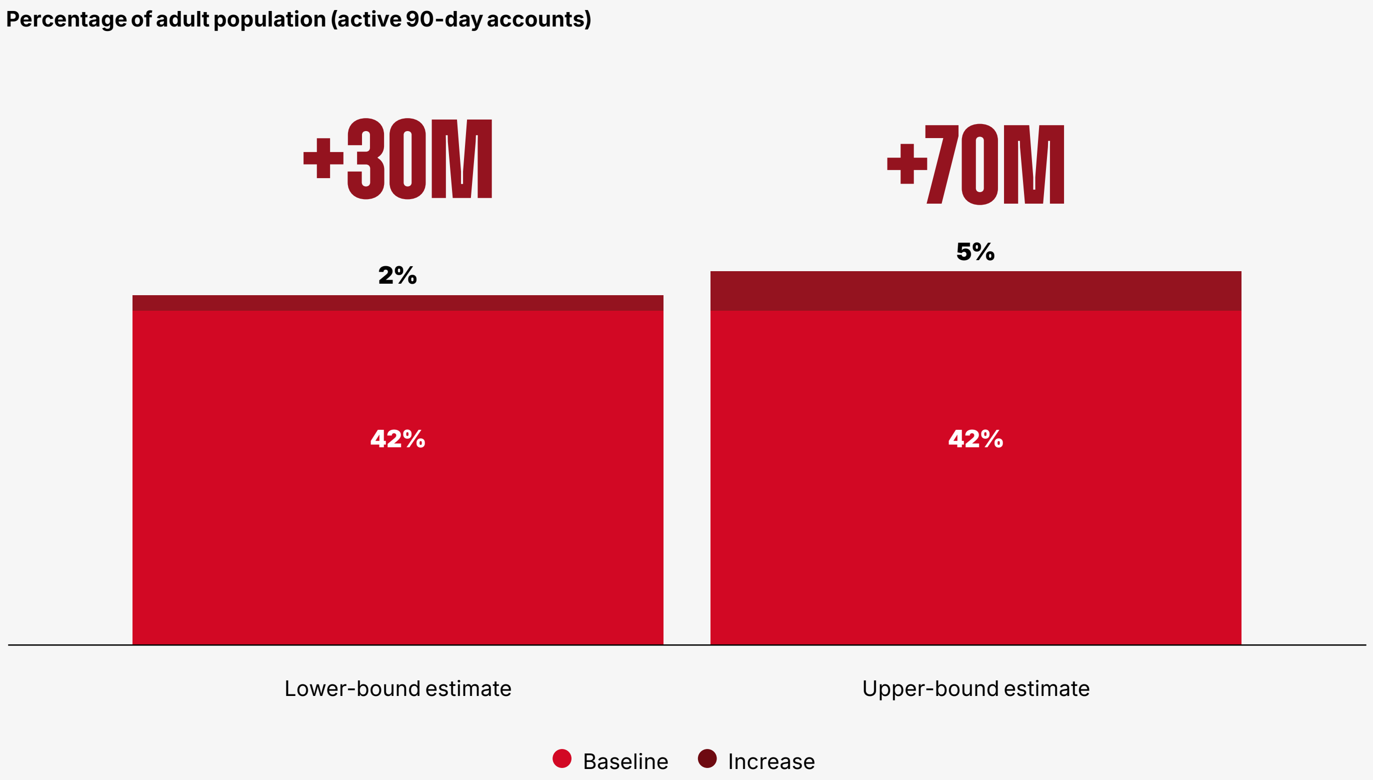
The empirical results suggest that mobile money interoperability is more consistent and effective when it is implemented after a market reaches maturity and through market-led approaches. Figure 8 illustrates the estimated increase in active 90-day accounts under this scenario compared to a baseline without interoperability. The results show that in 2023, if countries had implemented market-led approaches of interoperability when the market was sufficiently mature, and avoided mandating interoperability when the market was in its early stages, there could have been 30–70 million more active 90-day accounts of mobile money, equivalent to an absolute increase in adoption of 2–5 pp. This quantification highlights the policy significance of timing and model choice: when interoperability is both market-led and introduced after a market has achieved scale, it becomes a powerful driver of financial inclusion and competitive market outcomes.

Table 2
Summary of interoperability empirical impacts by policy type and market conditions[22]

Policy type/condition	Effect on adoption	Effect on competition	Effect on usage (value per active account)
Interoperability: all models combined	Increase	Neutral[23]	Neutral
Market-led	Increase	Increase	Neutral
Regulator-led	Neutral	Neutral	Decrease
Market-led after market maturity	Increase	Increase	Neutral

Source: GSMA Intelligence and GSMA Global Adoption Survey

Figure 8
Simulated impact of mobile money adoption of active 90-day accounts by interoperability under a market-led scenario after maturity, 2023



Source: GSMA Intelligence and GSMA Global Adoption Survey

22. Due to limited variation in the sample, the analysis does not allow for a robust estimate of the impact of voluntary interoperability. Results for this category should therefore be considered inconclusive.
23. Neutral refers to cases where the results did not show a statistically significant effect or where findings were mixed across methodologies. This classification indicates that the evidence does not consistently support either a positive or negative impact.

4

Conclusions and policy implications

The analysis carried out in this study confirms that interoperability can significantly increase mobile money adoption. However, its impact on competition and usage depends on how and when it is implemented. Interoperability delivers measurable benefits when introduced after markets have reached scale and through models that combine commercial viability with robust governance and fair pricing. Conversely, early or restrictive mandates can lead to neutral or negative outcomes, particularly for transaction values.

Below are the key findings from the study:

1. Interoperability consistently supports adoption, but competition effects vary: By reducing switching costs and expanding network effects, interoperability makes mobile money more valuable to users. This drives higher adoption across markets. However, the effect on competition is mixed when all policy models are combined. While some markets show reduced concentration, others remain unchanged, reflecting differences in timing and between approaches.

2. Maturity must precede interoperability: Introducing interoperability before a market achieves sufficient scale offers limited benefits and can even harm adoption and usage. When implemented too early, integration costs and free-rider risks outweigh the gains, discouraging investment and innovation. After scale is reached, the benefits dominate and interoperability strengthens both adoption and competition.

3. Market-led models outperform alternatives: Market-led interoperability delivers the most consistent positive outcomes: adoption rises significantly and market concentration declines without negative effects on usage. These models work because they combine commercial alignment with other enablers, such as shared governance, sustainable pricing and transparent operational rules. These elements reduce risk, protect investment incentives and deliver a better user experience.

4. National switches show no measurable effect on adoption or competition and can harm usage: Empirical results indicate that mandated national switches do not produce consistent gains in adoption or competition. In several cases, they are associated with declines in transaction values per active account. This suggests that rigid, centralised models can undermine incentives for innovation and reduce service quality when introduced without regard to market readiness.

5. Market-led interoperability combined with market maturity delivers maximum impact: This combination produces the strongest and most reliable results. When interoperability is introduced after markets have reached scale, adoption increases by over 6 pp relative to the baseline and market concentration falls. This approach leverages network effects at full strength while maintaining incentives for investment and innovation.

Interoperability should be implemented in a way that maximises benefits while minimising risks. This requires the following:

- **Prioritise timing:** Interoperability should not be mandated in nascent markets. The focus should first be on enabling conditions for scale, such as agent networks, liquidity and consumer trust.

- **Favour market-led or market-informed models:** These approaches combine commercial viability with operational safeguards, reduce free-rider risks and maintain incentives for innovation. They also allow providers to shape governance and pricing frameworks, which is essential for sustainability.

- **Design governance frameworks that support competition:** Rules should ensure fair access while maintaining incentives for service improvement and product differentiation.

When implemented under these principles, interoperability becomes a strategic lever for expanding financial inclusion and fostering competition, without compromising sustainability or innovation.

GSMA Head Office
1 Angel Lane
London EC4R 3AB
United Kingdom

gsma.com

GSMA
Mobile for Development

M4D