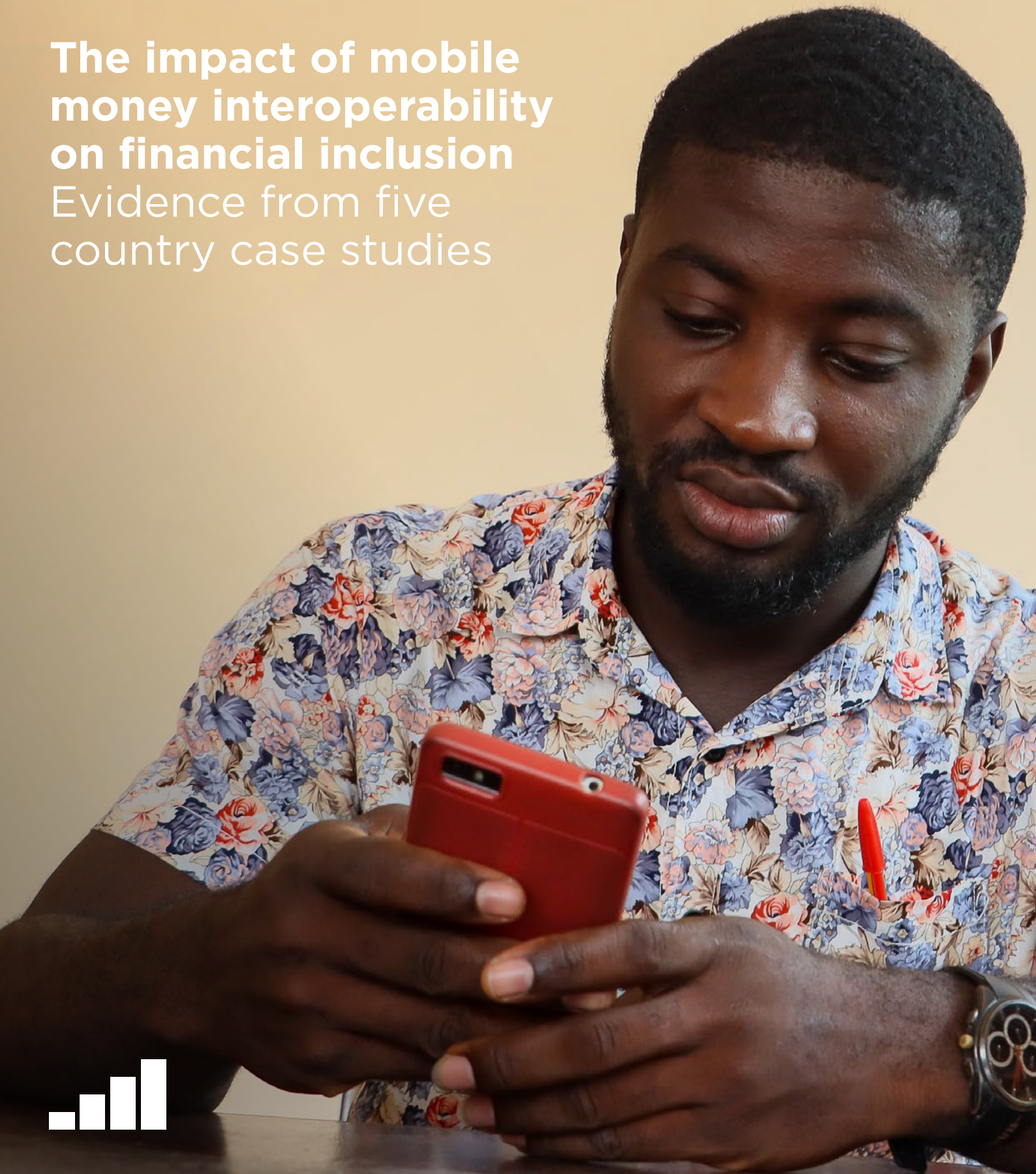


**The impact of mobile
money interoperability
on financial inclusion**
Evidence from five
country case studies



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Executive summary



Interoperability describes the process of different products, services or systems working together in a way that creates value for firms and/or consumers. There has been an increased focus on this in mobile money markets, with interoperability existing in around half of the 100 countries that now 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 the technical solutions. However, little evidence exists on the impact of interoperability on outcomes such as financial inclusion, which is a key objective of policymakers.

This report assesses the regulatory impact of mobile money interoperability by considering the economic literature on interoperability more generally and utilising a case study approach in five mobile money countries: Ghana, Kenya, Malawi, Rwanda and Tanzania. In each market, we assess how mobile money adoption and usage evolved after different interoperability solutions took effect. While there are a number of complexities and nuances involved in determining the regulatory impact of mobile money interoperability, we have been able to draw some general conclusions.

In four of the countries assessed, mobile money adoption had already achieved large scale before interoperability took effect. This is consistent with the economic literature, which states that given the dynamic nature of digital financial services, incentives to become interoperable often occur after mobile money has reached scale. Therefore, any analysis showing a positive correlation between the existence of interoperability and high mobile money adoption across countries should consider the fact that increased financial inclusion often precedes providers becoming interoperable, rather than interoperability leading to greater financial inclusion.

Considering the trends in each market over time, our analysis shows that in three countries (Kenya, Tanzania and Rwanda), the existence of interoperability solutions that were designed and led by mobile money providers was accompanied with increased mobile money adoption and greater usage in terms of average transaction values. This applies to total transactions as well as more 'advanced' ecosystem transactions such as bill, bulk and merchant payments and international remittances.

Meanwhile, the impact of interoperability on mobile money adoption and usage via a national switch is unclear. It is too early to assess whether national switches in Rwanda (eKash) and Tanzania (TIPS) have had any impact since they are too recent, while the analyses for Ghana and Malawi are currently inconclusive, as most of the growth observed in adoption and usage was during the Covid-19 outbreak (rather than following the operation of the switch).

As demonstrated in the wider literature on interoperability, firms often engage in voluntary interoperability to expand their customer base, create value from new and existing products and provide extra value to consumers by enabling a more convenient and efficient platform. This is what happened in Kenya and Tanzania once mobile money had reached sufficient scale.

While governments are often keen to leverage interoperability as a tool to address potential competition concerns or to realise the benefits of economic externalities, it is important to consider the trade-offs involved. In particular, interoperability increases costs to firms and can discourage innovation and reduce product differentiation in dynamic, fast-moving markets.

Dynamic competition, investment and innovation have been important drivers of consumer welfare in mobile money, which has fuelled a significant expansion in financial inclusion in countries that previously had large populations that were unbanked and underserved by traditional institutions.

Policymakers should therefore consider the evolution and dynamics of the markets in which they are considering intervention. The timing of interoperability is particularly important. Mobile money providers may find it beneficial to become interoperable once they have reached a certain scale and there is sufficient value to consumers to have interoperable services. Imposing ex-ante mandatory interoperability too early might lead to regulatory failure that could impede the development of both the technology and market, particularly if it is unclear which bottleneck interoperability is required to address.

If there is a rationale to mandate interoperability, then the manner in which it is implemented should also be carefully considered. It should be focused on the specific context and objective, with due consideration of the costs and benefits involved in different forms of interoperability. There are different architecture models for mobile money that have different technical and commercial implications for providers.

Much of the focus on interoperability, both in the literature and in practical implementation, has been on the technical aspects, with less attention on the other elements that are equally as important, particularly governance and business models. It is important to ensure that interoperability is established in a manner that is agreeable to all participants, who may have different business interests and incentives.

Going forward, there remains further scope for future research on this topic. This study has considered the interoperability of person-to-person (P2P) payments, given that these have been most common in mobile money markets. However, as interoperability begins to evolve to other use cases such as merchant payments, it will be important to assess the impact of those.

Furthermore, while the trend analysis carried out in this report is instructive in assessing how mobile money market outcomes evolved after different interoperability solutions took effect, it is not sufficient to isolate the causal impact of interoperability. This requires analysing a larger sample of countries as well as more sophisticated causal inference methods. This is an area that would benefit from further research.

1 Mobile money and 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.¹

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 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. This is in large part due to the feature of digital markets that involve gathering and processing significant amounts of data, which is used to provide a range of services.²

There has also been an increased focus on interoperability in mobile money markets. More than 100 countries now have at least one mobile money service in place, and interoperability exists in around half of these countries.³

Initially, mobile money interoperability was marketed and driven by the commercial incentives of providers. 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). Plenty of literature has set out the different approaches to implementing interoperability for mobile money, particularly the technical solutions. However, little evidence exists on the impact of interoperability on the market, particularly on outcomes such as financial inclusion, which is ultimately the key objective of policymakers. The purpose of this study is to help address part of that evidence gap.

¹ See for example Bianchi et al (2023), Frontier Economics (2022), CERRE (2022) and Ofcom (2023)

² See for example Scott-Morton et al (2021) and CERRE (2022)

³ See GSMA (2020)

1.1

Economics of interoperability

There are several different elements to interoperability: the technical standards and specifications; the content and format of information exchange; the governance model; payment flows; commercial agreements; and the approach to privacy and security.⁴ There are also different degrees of interoperability, in that it is not binary and can instead encompass specific parts or features of a service. An example of this is for a social media platform to establish interoperability for 'standard functionalities' such as exchange of text, images and videos with other social media platforms, but not for other functionalities.⁵ In the case of mobile money, an example would be where P2P payments are interoperable but other payments (e.g. bill, bulk and merchant payments) remain exclusively on-net. Furthermore, interoperability can be one-way or reciprocal between participating firms, and it can be symmetric or asymmetric.

An important distinction is between horizontal and vertical interoperability. Horizontal interoperability occurs between firms providing competing products (e.g. mobile money providers), while vertical interoperability occurs between firms that provide complementary products (e.g. mobile app developers and app stores, or between app stores and operating systems) and allows consumers to mix and match components. An example of vertical interoperability in the mobile money market is merchant interoperability, which allows consumers to make payments to businesses irrespective of their provider.

Vertical interoperability can be further distinguished between within-platform interoperability (which allows third-party providers to supply complements

for a specific platform) and cross-platform interoperability (which allows third-party providers to offer services on a range of different platforms).⁶ An example of cross-platform interoperability in the case of digital financial services would be between mobile money wallets and bank accounts.

Interoperability can either be market-led or government-led. Below are reasons why firms are willing to engage in voluntary interoperability:

- **They can realise the benefits of direct and indirect network effects** by accessing another platform's customer base and creating value from new and existing products. Direct network effects occur in a market where the benefits to consumers grow with the number of users. In the case of mobile money, more users means that individuals can make more transactions and payments with each other. Direct network effects typically occur with horizontal interoperability. Indirect network effects occur when the value of a product increases with the number of users of a complementary product (e.g. a mobile app store with more users attracts more developers to develop applications for those stores, increasing their value). Indirect network effects typically occur with vertical interoperability.
- **They can provide extra value to consumers** by enabling a more convenient and efficient platform that allows consumers to access products and services that interoperate with the platforms they use.
- **They can reduce costs and increase productive efficiency** by agreeing on a set of standardised components in a production value chain.

⁴ This section provides a brief summary. For more details on the definition of interoperability, the economic theory behind it as well as examples and policy considerations, please refer to the studies cited in References.

⁵ See Scott-Morton et al (2021)

⁶ For further discussion, see CERRE (2022)

In some markets, another solution to interoperability is the development of ‘adapters’ and ‘converters’, which ensure a product can be used on another platform.⁷ In the context of mobile money, the use of over-the-counter (OTC) transactions and vouchers would be a type of ‘converter’.⁸

From a public policy and regulatory perspective, governments typically enable or mandate interoperability for one or more of the following reasons:

- **Overcoming coordination problems:** Interoperability can help overcome coordination issues in cases where firms and consumers benefit from interoperability but firms’ incentives are not aligned and they are unable to agree on the form or implementation of interoperability. Two examples of addressing coordination issues include IP licensing⁹ or involving standard-setting organisations to lead the agreement of technical specifications and interoperability rules. This standardisation of interoperability enables all market players to be interoperable.
- **Realising the benefits of economic externalities:** For example, interoperability and interconnection between mobile telephone systems enhances the economic impact of mobile as a general purpose technology, as well as the social benefits of enabling easier communication. In the case of mobile money and digital financial services, governments may have an objective to reduce the use of cash and promote digital payments to drive financial inclusion and wider economic growth. Interoperability can help drive this if it enhances the convenience of digital payments.
- **Promoting effective competition:** Interoperability can reduce entry barriers for new firms, allowing firms to share direct and indirect network effects and lowering switching costs for consumers. Depending on the market, competition concerns could be driven by market features or the conduct of specific participants. Vertical interoperability is sometimes used as a tool to mitigate the market power of digital firms that are vertically integrated, as they may have an incentive to discriminate against or foreclose complementors that compete with their downstream products. In this case, it can strengthen competition in complementary markets and foster innovation.
- **Other public policy objectives:** This includes, for example, consumer protection.

However, while there are a number of potential benefits of promoting interoperability, there are also trade-offs to consider, including the following:

- **Increased costs:** There is an increased cost to firms in terms of the time and resources needed to design and maintain the technical, organisational and commercial requirements of interoperability. The costs typically increase with the number of parties involved and with deeper levels of interoperability. This is because participating companies need to agree on a range of elements and then implement them, including technical specifications, the content and format of data flows, privacy and security functionalities, governance, dispute-resolution mechanisms and pricing and commercial terms.
- **Less product differentiation in the market:** Interoperability reduces product differentiation, as firms are only able to compete on certain aspects of the product that are not interoperable. This removes competition on the core platform or standards and can strengthen the position of incumbents.
- **Discouraging innovation and the potential for a disruptive new entrant:** This is particularly true if interoperability reduces the returns on investment by allowing firms to ‘free ride’ and benefit from other firms’ investments. Some have argued that while interoperability can promote competition within the market, potentially enhancing static competition, it inhibits dynamic competition for the market. The latter has been an important driver of consumer welfare in digital markets over the past two decades, including mobile money, which has driven a significant expansion in financial inclusion in countries that previously had large populations that were unbanked and underserved by traditional institutions (particularly in Sub-Saharan Africa).¹⁰ Conversely, in markets where innovation is slow-paced and product functionalities have been similar over a long period of time, then consumers are more likely to benefit from the promotion of static competition.
- **Higher prices in the case of vertical interoperability:** Firms could have less incentive to compete on price because the benefits of reducing upstream prices can be captured by other firms in the downstream market. Vertical interoperability could also decrease the differentiation between different digital platforms because the same complementary services are available on each platform, which may soften the intensity of competition between the platforms.
- **Potential data privacy and security risks:** These are dependant on the design and implementation of the interoperability standard.

7 For further discussion on this, see Kerber and Schweitzer (2017).

8 OTC is a process where a mobile money agent performs a transaction on behalf of a customer paying them in cash, often because the customer is not registered to a mobile money provider. Vouchers are a mechanism through which a text message and code are sent to a receiver, who then withdraws cash at an agent in the sender’s network.

9 Examples of this include a market leader offering free access to an IP licence or through a patent pool where relevant patents can be offered and shared by all parties involved in the interoperability agreement.

10 See Demirgüç-Kunt et al (2022).



A key consideration around the need for (and impact of) interoperability is the extent of multi-homing (where consumers use multiple competing platforms). If multi-homing is costly and consumers are unable to use more than one platform, then interoperability will be more beneficial for consumers. However, if consumers can multi-home across platforms, then there can be more effective competition and contestability than if the platforms need to be interoperable. As noted in the economic literature,¹¹ multi-homing allows both for competition in the market and competition for the market.

This is a relevant consideration for mobile money, as consumers often have multiple SIM cards on different mobile networks, allowing them access to competing mobile money providers simultaneously. At the end of 2022, the average mobile subscriber in Africa had two SIMs, with this number ranging between 1.2 to 3.5, depending on the market.¹² Furthermore, recent innovations around eSIM make it even easier for consumers to access multiple networks and switch between them on a single device.¹³

The timing of interoperability is also key. Firms may find it beneficial to become interoperable once they have reached a certain scale and there is sufficient value to consumers to have interoperable services. Therefore, imposing ex-ante mandatory interoperability too early might lead to regulatory failure that could impede the development of both the technology and market, particularly if it is unclear as to which bottleneck interoperability is required to address. For example, imposing an interoperability solution that is costly to implement and does not align with the commercial incentives of participating mobile money providers could result in fewer providers and lower consumer adoption than would otherwise be the case.

It can also take time to establish interoperability in a manner that is agreeable to all participants, who may have different business interests and incentives. At the point of agreement, the standard or solution may become outdated or redundant in a fast-moving market.

It is therefore important that policymakers are clear on the rationale for intervention, as this will drive the form of interoperability. As highlighted in several studies on interoperability,¹⁴ to the extent that interoperability is imposed it should be focused on a specific context and objective, and policymakers should carefully consider the costs and trade-offs involved in different forms of interoperability. These trade-offs will be context-specific and will depend on the economic and technological features and maturity of the market.

11 See for example CERRE (2022)

12 Source: GSMA Intelligence

13 See for example [Accelerating eSIM globally: state of the consumer market, user behaviour and adoption growth scenarios](#), GSMA Intelligence, 2023

14 See for example Frontier Economics (2020)

1.2

Interoperability in mobile money markets

Interoperability in mobile money can take on several dimensions, as shown in Figure 1. The focus of this study is on horizontal platform interoperability between mobile money providers and also other financial service providers, including banks, as this has been the principle dimension of interoperability across mobile money markets to date.

Figure 1

Dimensions of mobile money interoperability

Source: GSMA Intelligence

Dimension	Horizontal or vertical	Description
Network interoperability	Vertical	The ability of any mobile money service to be provided on a mobile operator's network. This type of interoperability is currently yet to be implemented in mobile money markets.
Platform interoperability	Horizontal	The ability of consumers of one mobile money service to make transfers or payments to another mobile money service (also referred to as account-to-account (A2A) interoperability). This is the most common type of interoperability for mobile money. It can be applied within countries and across borders. ¹⁵ It can be applied between mobile money providers or to other financial service providers (e.g. bank accounts). It can also apply to a specific set of payment use cases (e.g. P2P) or to a broader set (e.g. P2B, P2G, bill and bulk payments).
Agent interoperability	Horizontal	The ability of agents to serve customers of multiple mobile money providers with a single shared float. This is often used interchangeably with agent non-exclusivity, but the two are slightly different. Agent non-exclusivity can happen without agent interoperability when an agent represents several mobile money providers but requires multiple accounts with each provider (rather than using a shared float). ¹⁶ For example, in Kenya and Tanzania, an agent can represent several mobile money providers and requires multiple accounts with each provider.

¹⁵ For further discussion, see Boar et al (2021)

¹⁶ For further details on agent interoperability and its potential market effects, see GSMA (2020)

Dimension	Horizontal or vertical	Description
Merchant interoperability	Vertical	The ability of consumers to transact with a retailer's mobile money provider, regardless of the account held by the merchant. Consumers can make payments using a different mobile money providers without requiring further KYC processes. This type of interoperability is rare in mobile money markets, though it commenced in Kenya in 2022.
Data interoperability	Can be both (between competing and complementary providers)	The ability of data and information generated by one service provider to be transferred and used by one or more other service providers. For example, the existence of data interoperability can be used by providers to assess the risks in providing complementary products such as credit or insurance. Consumers' ownership and rights around their data is an important consideration for data interoperability. ¹⁷ It is not currently widespread in mobile money markets.

There are different architecture models for A2A mobile interoperability, as shown in Figure 2, though they all have five core building blocks, which are presented in Figure 3. Much of the focus on interoperability, both in the literature and in practical implementation, has been on the technical aspects (e.g. connection and settlement), with less attention on the other elements that are equally as important, particularly governance and business models.





The choice of interoperability model has a number of technical and commercial implications for mobile money providers, in terms of API design and protocols, account identification, transaction processing, breakdown risk, capex, opex, liquidity requirements, revenue and scalability.¹⁸

As is the case in other markets, interoperability for mobile money is not binary. It can involve two or more participants, and it can involve a limited or large number of use cases, such as the types of payment (P2P, merchant payments, bill or bulk payments). There can also be multiple arrangements within an interoperability solution. For example, there may be a common set of operating rules for connection, settlement and governance, but the commercial and business agreements are handled bilaterally between providers. There could also be multiple interoperability arrangements within a country, such as a national switch for P2P and an aggregator or bilateral model for other use cases. Lastly, interoperability can encompass a limited or broad range of payment channels, including USSD, ATM, POS, NFC, mobile banking apps and internet banking.

Figure 2

Technical models for mobile money interoperability

Source: GSMA (2020)

Model	Description
 Bilateral model	Interoperable participants connect via one-to-one connections. This can be extended to more than two participants to form a multilateral agreement.
 Aggregator model	A third party already integrated with multiple ecosystem players in a market establishes payment interoperability between participants.
 Mobile money hub	Mobile operators set up a central entity to act as a hub to connect them and other digital financial service providers.
 Global payments hub	An entity that is not a mobile operator sets up a central hub, enabling interoperability among digital financial services providers. This includes cases where governments impose interoperability by requiring providers to connect to a national switch.

¹⁷ For further discussion on data interoperability, see Bianchi et al (2023)

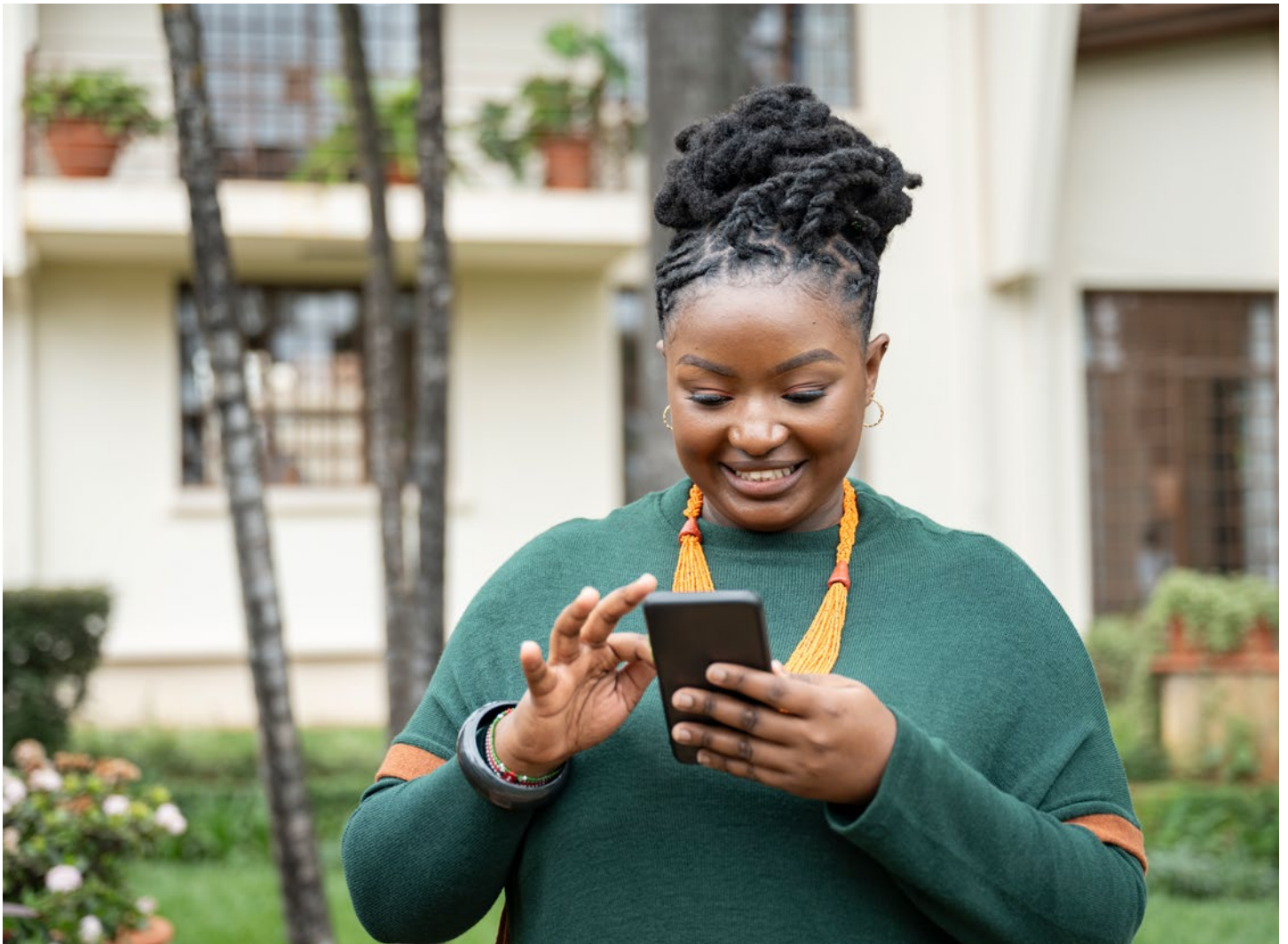
¹⁸ Further details of the implications of different approaches to interoperability can be found in GSMA (2020)

Figure 3

Core components for mobile money interoperability

Source: GSMA (2020)

Component	Description
Connection	The interconnection allows digital financial service providers to exchange information, initiate and receive transactions, accept or reject them and debit or credit end-user accounts. The main connection models are bilateral and a hub.
Settlement	The settlement mechanism is what allows the flow of 'real' money between participant organisations. Settlement can be completed in two ways: pre-funding-based or clearing-based. Pre-funding typically applies to bilateral and aggregator models, while clearing-based typically applies to hub models.
Governance	<p>Governance refers to the way participants (including owners, management and members) of an interoperability solution make decisions as defined in the scheme rules. The scheme rules set out the participant's control over the technical solution and business model.</p> <p>In the instance of bilateral or multilateral interoperability, this will be set out in the agreements between the respective parties.</p>
Pricing and business model	Pricing and business model encompasses the key determinants of an interoperability solution's profitability and sustainability. These generally revolve around processing or transaction fees, interchange fees and client surcharges.
Dispute resolution mechanisms	Interoperability requires specific dispute resolution mechanisms, as enabling customers to perform cross-net transactions requires the ability to reach a consensus with other digital financial service providers. There can be a consensus through scheme rules and service level agreements.



1.3

Mobile money interoperability and financial inclusion

While there has been an extensive amount of literature on the technical implementation of different models of interoperability in mobile money, there has been very little evidence regarding the impact on the outcomes that are of most interest to governments and policymakers, specifically how this has driven financial inclusion of digital financial products and services. Ultimately, this is the main objective for governments, given the extensive social and economic benefits that mobile money can enable.¹⁹

Figure 4 illustrates the adoption of mobile money across countries, categorised by the state of interoperability. While average adoption is slightly higher in countries with interoperability, there is no strong evidence of a clear link – there are countries with interoperability that have very low levels of mobile money usage and those with very high levels.

This is primarily due to the fact that other factors also influence adoption, including other enabling regulations, demand factors (e.g. income, availability of traditional financial services, financial literacy, trust) and supply factors.²⁰ Furthermore, as highlighted above, interoperability can take several dimensions and can be implemented in many ways.

Countries have also taken different approaches on the timing of interoperability, with some pursuing it as digital financial services are mature and others before they have reached any scale. This means that, in many markets, interoperability comes after financial inclusion, when providers have reached sufficient scale, rather than being a driver of financial inclusion.

¹⁹ See for example [Mobile money: How digital payments have impacted economic growth](#), GSMA, 2023

²⁰ See for example Bahia et al (2020) and GSMA (2016)

Figure 4

Mobile money adoption of countries with and without interoperability

Percentage of adults (15 years old and above)

Source: GSMA Intelligence analysis of World Bank Findex Survey, 2021 and 2022.

80% —

70% —

60% —

50% —

40% —

30% —

20% —

10% —

0% —

Countries with mobile money interoperability

Countries without mobile money interoperability

Analysis is based on 77 countries with mobile money deployments and where data is available in the latest Findex surveys.

In terms of the existing literature, the only empirical study that has investigated the impact of mobile money interoperability is Brunnermeier et al (2023), which assessed a range of mobile market outcomes for more than 120 mobile operators across Africa from 2010 to 2020. The study found that the presence of interoperability reduces mobile money fees, particularly for small-value payments, but that it also reduces mobile money adoption and network coverage, particularly in rural areas. This highlights the trade-offs that policymakers need to consider, namely the potential for interoperability to enhance static competition but at the expense of reduced dynamic competition, which impedes financial inclusion. However, the study does not assess the impact of different dimensions or implementation methods of interoperability, which is currently at the forefront of many governments' considerations.

Another study, by CGAP (2016), reviewed the state of interoperability in 20 markets. It did not find any conclusive evidence regarding the impact of interoperability on financial inclusion or the use of digital financial services. Off-net transactions were found to increase significantly in Tanzania when mobile money providers entered into bilateral arrangements after 2014, while in Pakistan, there was minimal impact of an interoperability arrangement between 34 banks. One challenge in the latter scenario was that the interoperability scheme pricing was not designed for small-value, mass-market-oriented accounts and transactions. The experience in Tanzania was also assessed in a study by BFA (2018), which found that interoperability in the country led to an increase in cross-net transactions and improved user experience (i.e. improved quality and use of mobile payments), though the impact on financial inclusion was not clear.

This report therefore seeks to expand the evidence base on the impact of mobile money interoperability by considering the topic in more detail. Specifically, using a case study approach in five countries, we assess the impact of different forms of interoperability on financial inclusion and mobile money use cases.

2 Methodology



2.1

Case study approach

Given the complexity of mobile money interoperability and the different dimensions and approaches it can take, for this study we have selected five countries that have followed different approaches (Kenya, Rwanda, Ghana, Tanzania and Malawi) in order to understand better the potential impacts of each interoperability model on financial inclusion. Figure 5 shows that mobile money adoption across all five markets is at or above the level in Sub-Saharan Africa more widely, ranging from 34% in Malawi to almost 70% in Kenya.

Figure 6 sets out the evolution of mobile money interoperability in the five markets. In Kenya, interoperability has been in place since 2018 and has been entirely market-led. In the other four markets, interoperability is now a regulatory requirement via a national switch, which has been implemented along different timelines in the market maturity journey (see Figure 7). Furthermore, the models of interoperability are not the same in each market.

Figure 5

Mobile money account adoption in five case study countries, 2020-2022

Percentage of adults (15 years old and above)

Source: GSMA Intelligence analysis of World Bank Findex Survey 2021/2022 and Rwanda FinScope Survey 2020

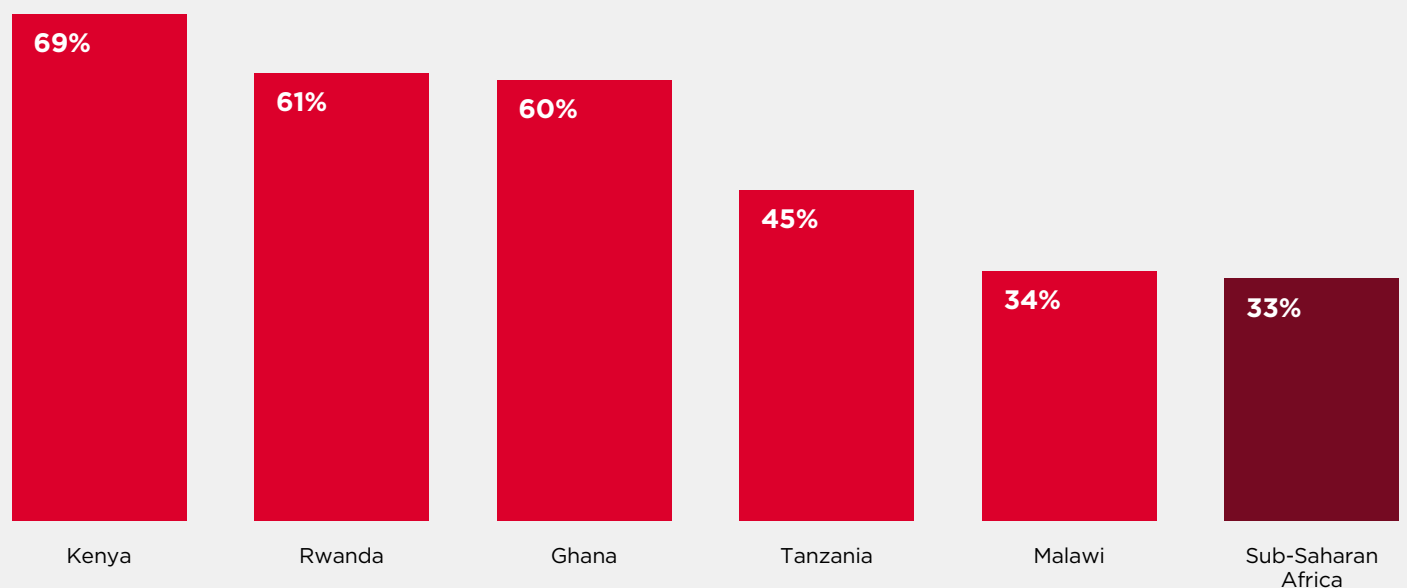


Figure 6

Evolution of interoperability in five case study countries

Source: GSMA

	Ghana Mobile money providers: MTN, AirtelTigo, Vodafone	Kenya Safaricom, Airtel, Telkom	Malawi TNM, Airtel	Rwanda MTN, Airtel	Tanzania Vodacom, Airtel, Tigo, Halotel, TTCL, Zantel
2014		Regulatory requirement for payment service providers to use systems that are capable of becoming interoperable for P2P. ²² However, interoperability was not mandated.			Market-led bilateral agreements for P2P established between Airtel, Tigo and Zantel
2015	Establishment of GhIPPS Instant Payment (GIP)			Central bank authorised interoperability	Regulatory requirement for mobile money providers to facilitate P2P interoperability ²⁷
2016			Regulatory requirement for mobile money providers to establish P2P interoperability and connect to the national switch ²³		Vodacom joined the interoperability agreement
2017					
2018	Mobile money interoperability incorporated into GIP	Market-led interoperability went live through bilateral agreements	National switch platform launched for mobile money providers	Regulatory requirement for mobile money providers to establish P2P interoperability. ²⁵ The industry blueprint for interoperability was approved.	
2019	Payment service providers required to interoperate (A2A) with other providers ²¹				
2020			Payment service providers are obligated to connect their infrastructure that supports interoperability to NatSwitch ²⁴		
2021				Regulatory requirement for mobile money providers to connect to the national switch for P2P (R-Switch) ²⁶	
2022		Market-led interoperability launched, allowing customers to make payments at retailers and with utilities, schools and other service providers, regardless of the network		Mobile money providers integrated to the national switch eKash	All operators went live on the Tanzania Instant Payment System (TIPS) platform
2023					Mobile money providers completed onboarding of all approved digital channels through the TIPS platform by 30 July. Circular on customer experience guideline on merchant payments effective from 1 September ²⁸

21 Payment systems and services act of 2019. Section 20 (1) A payment service provider shall have: (c) a system which is capable of interoperating with other payment systems in the country when required.

22 NPS 2014, Regulation: 21 (1) A payment service provider shall use systems capable of becoming interoperable with other payment systems in the country and internationally. (2) A payment service provider may, amongst other arrangement, enter interoperable arrangements.

23 Payment Systems Act (Act No.15 of 2016) and Payment Systems (interoperability of retail payment system) directive 2017 regulation 6: (1) Any authorised or licensed payment service provider offering payment services on auto-teller machines, point-of-sale devices, mobile payment systems, internet-based payments and all other related payment channels as approved by the Bank, shall connect its infrastructure that supports interoperability to the National Switch. (3) a newly licensed or authorised payment service provider shall connect to the National Switch or the automated clearing house in the Malawi Interbank Transfers and Settlement.

24 Article 2.2 Eligibility and membership of NatSwitch: A payment service provider, licensed or authorised by RBM, offering services on auto-teller machines, point-of-sale devices, mobile payment systems etc. is obligated to connect its infrastructure that supports interoperability to NatSwitch.

25 Regulation 05/2018 of 27/03/2018 governing payment service providers. Defines interoperability as a set of arrangements, procedures and standards that allow participants in different payment schemes to conduct and settle payments across systems while continuing to operate in their own respective systems. Article 7 (1) license applications for PIS providers, among other requirements, should have access to any relevant scheme or system and interoperability. Article 38 states the payment service providers shall be able to interoperate with other payment service providers in accordance with the requirements determined by the Central Bank directives.

26 Law No 061/2021 of 14/10.2021 Governing the Payment System. Mandatory requirement to be connected to the R-Switch. Article 25 Interoperability of payment accounts. The National Bank of Rwanda establishes regulations determining procedures by which payment service providers enter into an arrangement with the operators to achieve interoperability of payment accounts with the payment system. In determining the interoperability of payment accounts, the National Bank of Rwanda considers the following: whether the interoperability of payment accounts is in the interests of the public; the interests of the current participants and the operator; the interests of persons who may be required to be a participant in the payment system; such other factors as the National Bank of Rwanda considers to be relevant.





27 NPS Act 2015: Section 6 (1) A payment system that may be eligible to be licenced 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.

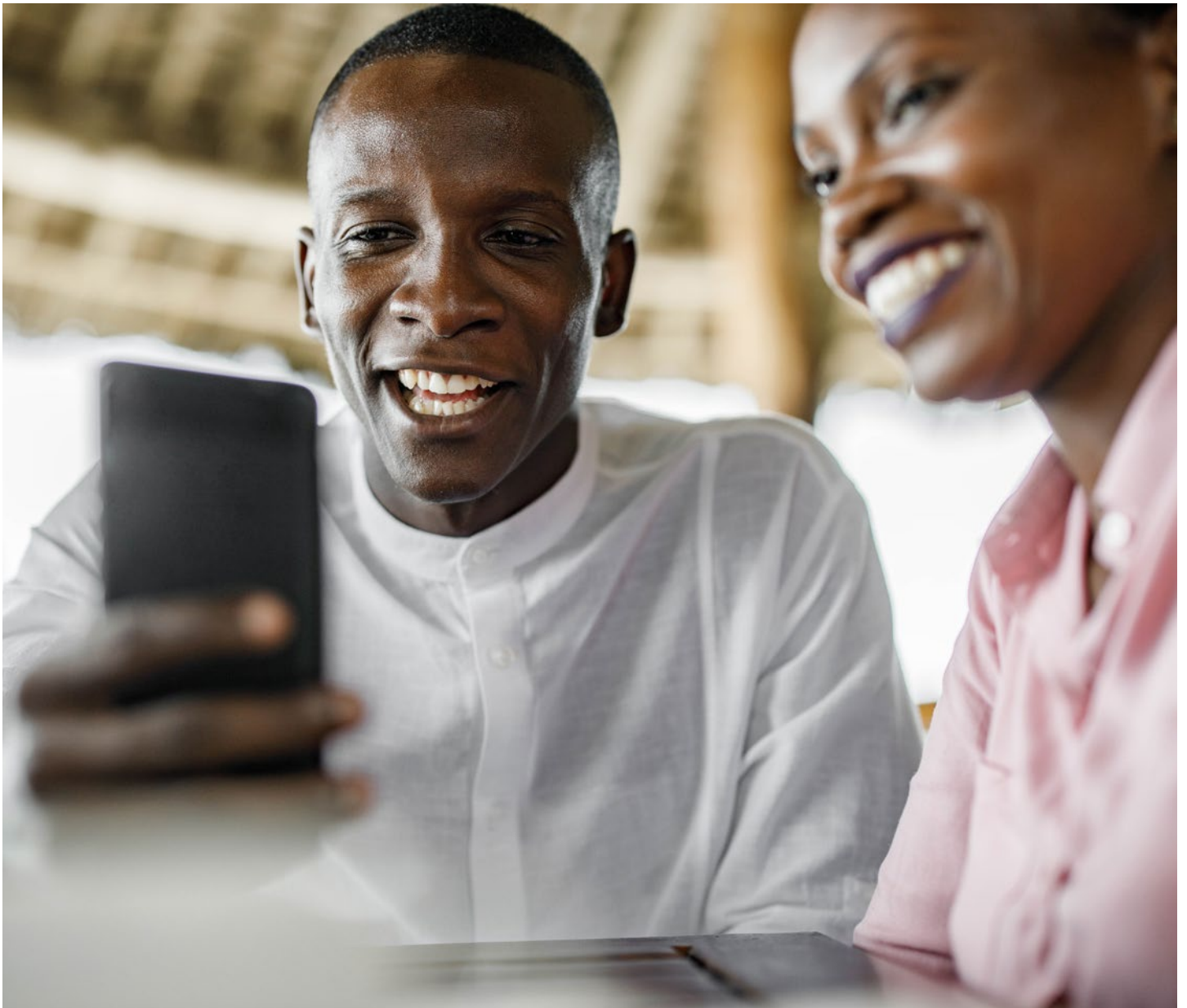
28 All FSPs offering USSD and mobile app payments to merchants need to adapt to the new guidelines for TAN QR-related merchant payments.

Figure 7

National switch details for Ghana, Malawi, Rwanda and Tanzania²⁹

Source: GSMA

Country	National switch	Ownership	Engagement with mobile money providers
 Ghana	GIP	Bank of Ghana	Has 5 mobile money providers ■ ■ ■ ■ ■
 Malawi	NatSwitch	Reserve Bank of Malawi	Has 2 mobile money providers ■ ■ ■ ■ ■
 Rwanda	eKash	Participants	Has 2 mobile money providers ■ ■ ■ ■ ■
 Tanzania	TIPS	Bank of Tanzania	Has 5 mobile money providers ■ ■ ■ ■ ■



²⁹ <https://www.africanenda.org/en/map>

2.2 Analytical approach

The analysis involves the comparison of key metrics over time before and after mobile money interoperability milestones. This allows us to consider how different mobile money market outcomes were potentially impacted by interoperability in each of the five markets.

We do not aim to establish a causal link between interoperability and financial inclusion, which would require other factors to be controlled for, as well as an empirical strategy to address the endogenous relationship between interoperability and mobile money usage. Instead, given the complexity and nuance of mobile money interoperability, we take a deep dive into five markets to discern the potential relationship between interoperability, mobile money adoption and usage. More sophisticated approaches could be applied in a future study if it is possible to capture the different interoperability solutions appropriately in an empirical setting.

The following key metrics are analysed:

- **Financial inclusion (adoption):** This comprises the number of registered and active mobile money accounts as a percentage of the adult population (15 years old and above). The positive social and economic impacts that mobile money enables for individuals, households and businesses have been demonstrated by a large body of research and empirical evidence, while a recent study also highlights the wider macroeconomic benefits.³⁰ It is therefore important to understand the link between interoperability and mobile money adoption.

- **Financial inclusion (usage):** This comprises transaction values per account, both in total and for 'advanced' transactions that exclude P2P, cash-in and cash-out (i.e. they comprise of other products such as P2B/B2P, P2G, G2P and international remittances). The use of a wide range of mobile money products results in greater financial deepening and a stronger digital financial ecosystem. One of the objectives of interoperability (for providers as well as for governments) is to make it easier for consumers to engage in a wider set of use cases.
- Where data available, we also assess the percentage and value of off-net P2P and bank-to-mobile/mobile-to-bank transactions. One of the objectives of interoperability is also to make it easier for consumers to make payments to and from mobile money providers that are not on their network, as well as with other (non-mobile money) financial service providers.

The data used in the study is based on publicly available information from central banks and national regulatory authorities for telecommunications and mobile money providers. We also issued data requests to each of these stakeholders in the five markets, and where responses were received we utilise that data. For some indicators, we do not have sufficient data for all countries and so we only present trend analyses where data is available. We also present comparisons with mobile money outcomes in Sub-Saharan Africa more widely, the data for which is sourced from the GSMA Global Adoption Survey 2022.³¹

³⁰ See GSMA (2023)

³¹ See <https://www.gsma.com/mobilemoneymetrics/>

3 Analysis and findings



The analysis in this chapter is structured into three parts: we first look at adoption, followed by usage and lastly interoperable transactions.

3.1 Adoption

To assess financial inclusion in each country, Figures 8 to 12 present registered and active accounts as a percentage of adults (15 years old and above) in each of the five countries, covering the period where data was available. Both metrics can be above 100% because consumers often have multiple mobile money accounts, meaning the analysis does not reflect unique mobile money subscribers. Each chart includes adoption in the relevant country as well as in Sub-Saharan Africa more generally in order to enable a comparison in trends.

Taking each of the countries in turn, we note the following trends:

- In **Ghana**, there was no discernible impact of interoperability on adoption; rather, it continued a similar trend that was seen prior to 2019. There was an acceleration from 2020, but that was more likely to have been caused by the Covid-19 pandemic, which drove an increase in mobile money adoption and usage, as governments strove to digitise payments.³²
- In **Kenya**, there was a steady increase in the growth of mobile money adoption prior to the implementation of interoperability. The penetration of registered accounts continued to increase more quickly compared to Sub-Saharan Africa after bilateral interoperability agreements were in place, while the penetration of active accounts followed a similar trend from 2016 (the point at which data is available).
- In **Malawi**, mobile money adoption was lower than in most other Sub-Saharan countries when interoperability was made operational, but it eventually closed the gap in registered account penetration after the Covid-19 pandemic. There was also a notable increase in active account penetration following the operationalisation of interoperability, which then accelerated during the pandemic.
- In **Rwanda**, registered account penetration increased much more quickly than in most other Sub-Saharan African countries prior to the interoperability regulation in 2018. This was followed by a sharp increase in registered accounts in 2019, but this was due to a change in how one provider registered new customers.³³ Looking at active accounts, penetration also increased more quickly than in other Sub-Saharan countries prior to the interoperability requirement on P2P and the trend continued afterwards. Between 2018 and 2022, mobile money providers met the requirements by initiating industry-led interoperability through multilateral agreements.
- In **Tanzania**, both registered and active account penetration grew more quickly than in Sub-Saharan Africa both before and after interoperability was required in 2015. While it was mandated by regulation, interoperability was initially met by multilateral industry-led agreements until 2022, when TIPS went live for mobile money providers.

³² See GSMA (2021), Assessing mobile money consumer trends in the wake of the COVID-19 pandemic and GSMA (2021), The Impact of COVID-19 Regulatory Measures on Mobile Money Services

³³ From Q4 2019, anyone buying a SIM card from one of the providers was automatically registered for mobile money.

One of the main findings from this analysis is that in four markets (Kenya, Tanzania, Rwanda and Ghana), mobile money adoption had already achieved large scale before interoperability took effect. In each country, active mobile money penetration was close to or above 50% when the first interoperability solution was implemented and above the penetration rate of Sub-Saharan Africa more widely. The exception is Malawi, which mandated interoperability via a national switch at an early stage of market development. Once imposed, mobile money adoption increased, though it has not yet reached the higher levels achieved in the other markets.

Another notable result is that, based on the cases of Kenya, Tanzania and Rwanda, the adoption of mobile money increased faster than in the rest of the region when interoperability was implemented through an industry-led approach.³⁴ Whether this would have

happened in the absence of any interoperability is unclear, given there was already an increasing adoption trend prior to the interoperability schemes. The impact of prescribing an interoperability solution via a switch is, however, inconclusive based on the analysis. In the case of Rwanda and Tanzania, eKash and TIPS have not been operational for long enough to see if there has been any notable impact. In Ghana, the adoption of mobile money followed a similar trend prior to mobile money providers being incorporated into GIP and only accelerated during the Covid-19 pandemic. Malawi provides a possible example of adoption (based on active accounts) increasing following the imposition of interoperability through a national switch, though it is not possible to fully attribute the increase using a trend analysis, given that most of the growth in financial inclusion coincided with the pandemic.

Figure 8

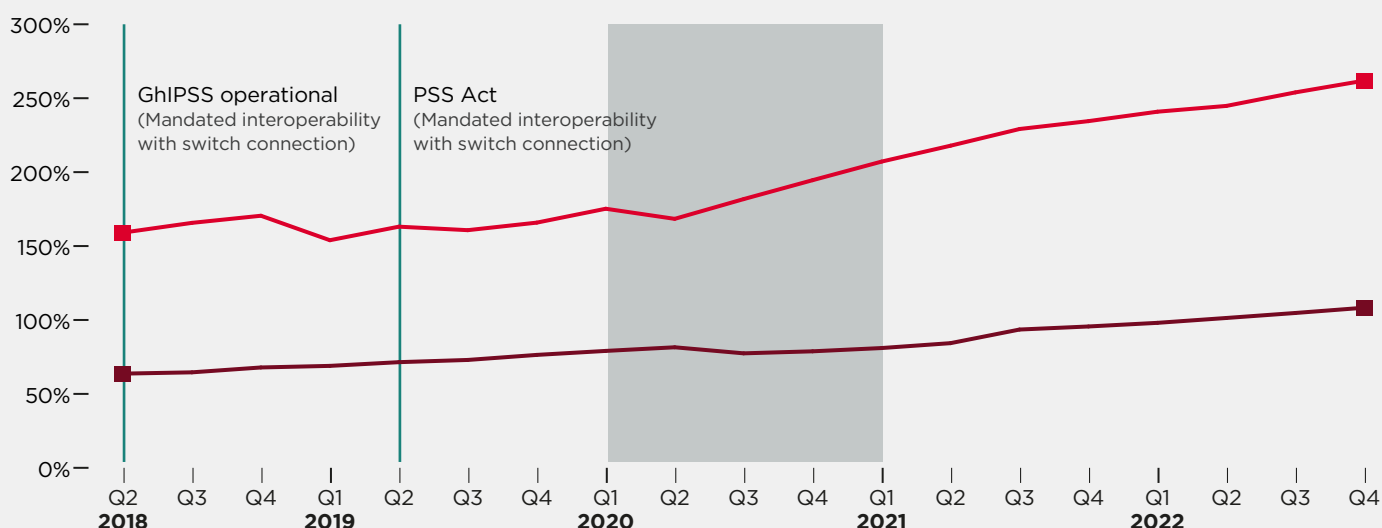
Ghana: registered and active accounts

Percentage of adults (15 years old and above)

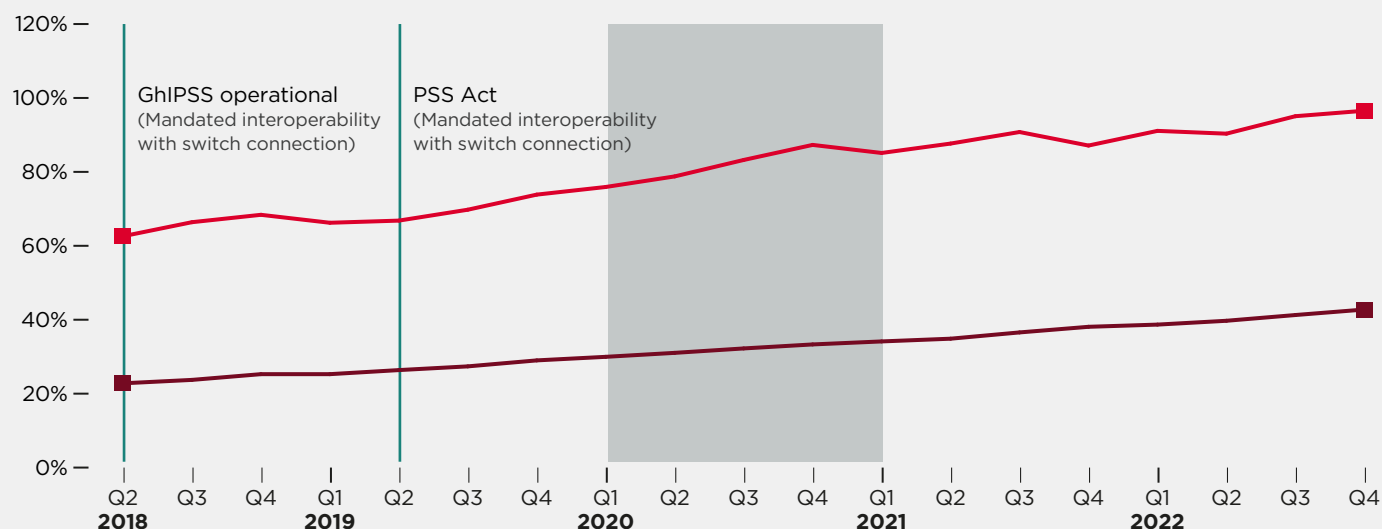
Source: Bank of Ghana and GSMA

■ Ghana ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Registered accounts



Active accounts



34 As noted above, interoperability became a regulatory requirement in Tanzania the year after the first market-led agreements, while in Rwanda the mandatory requirement was met by industry rather than prescribing a specific solution. In Kenya, there was no regulatory mandate for operators to be interoperable.

Figure 9

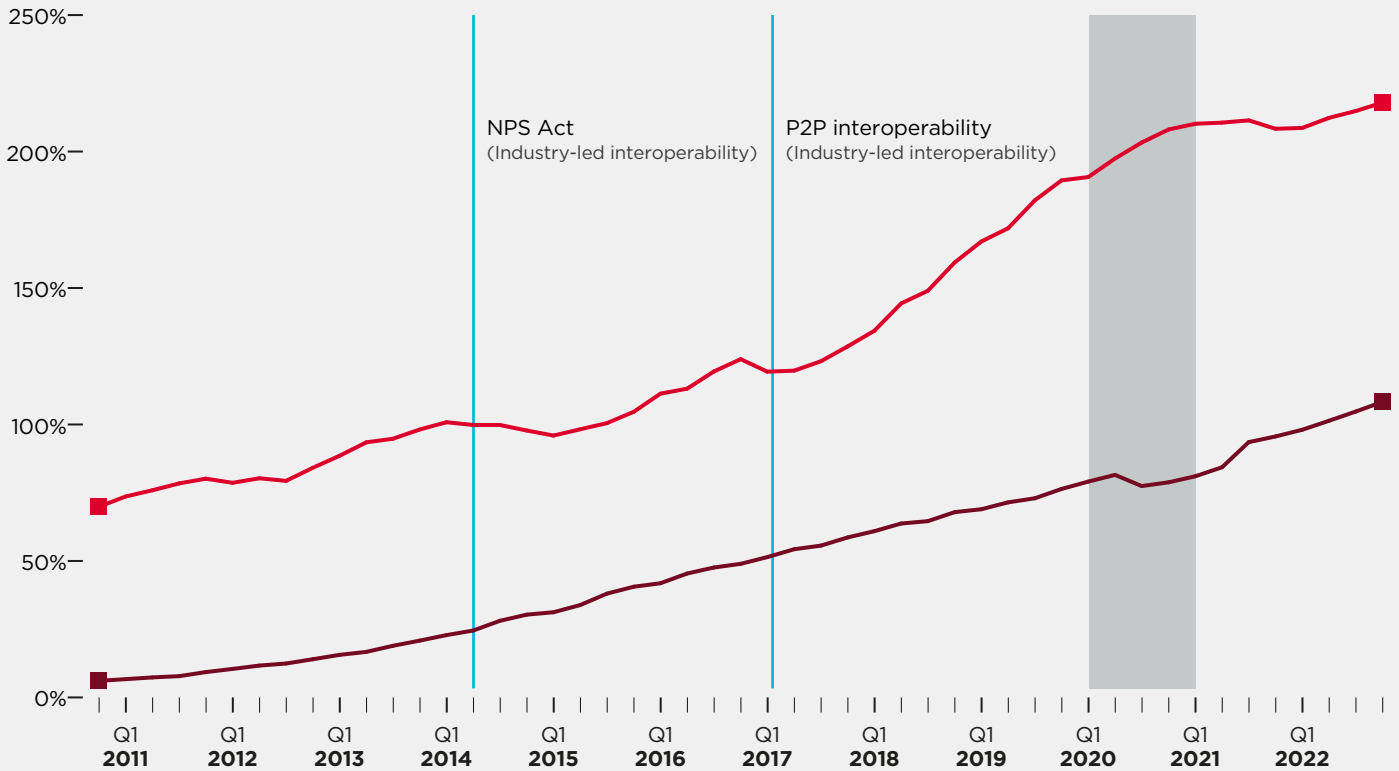
Kenya: registered and active accounts

Percentage of adults (15 years old and above)

Source: Communications Authority of Kenya and GSMA

■ Kenya ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Registered accounts



Active accounts

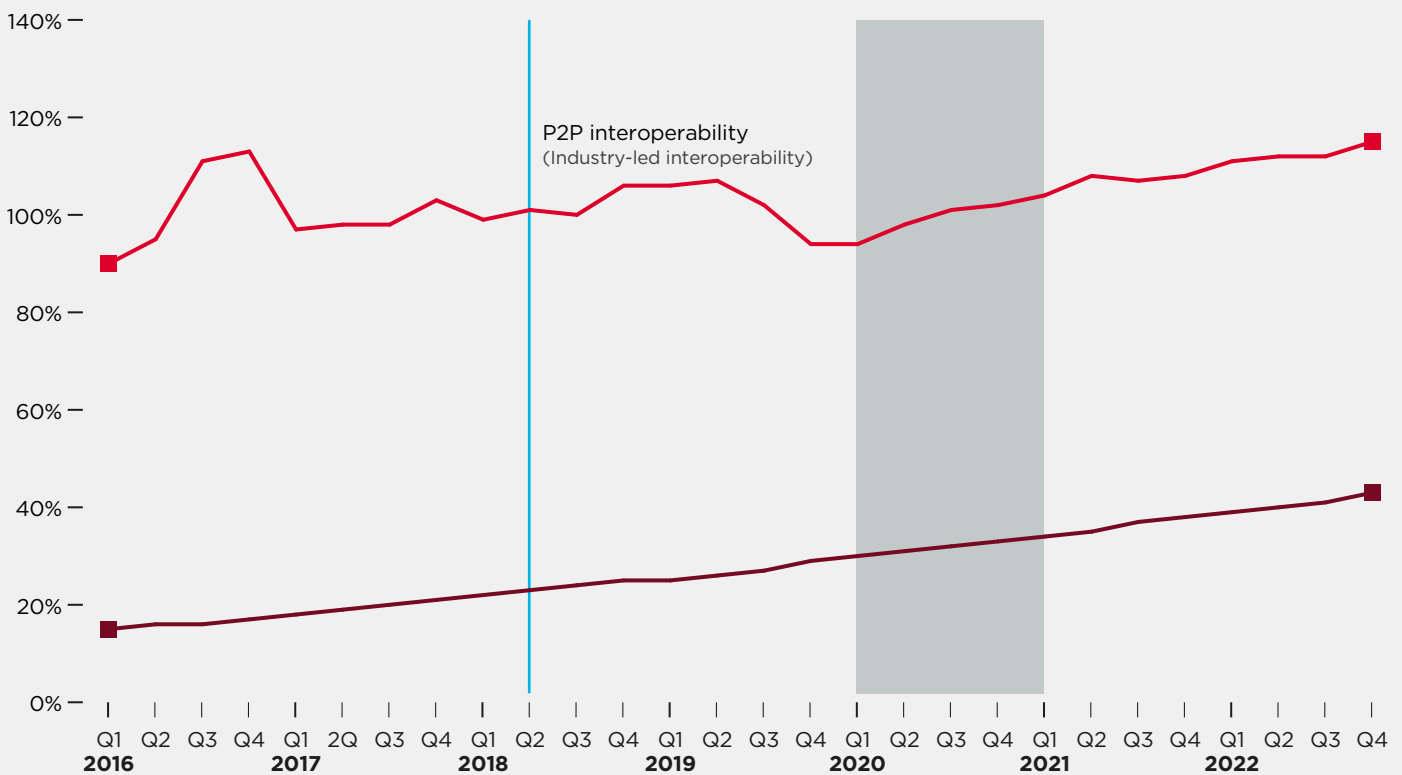


Figure 10

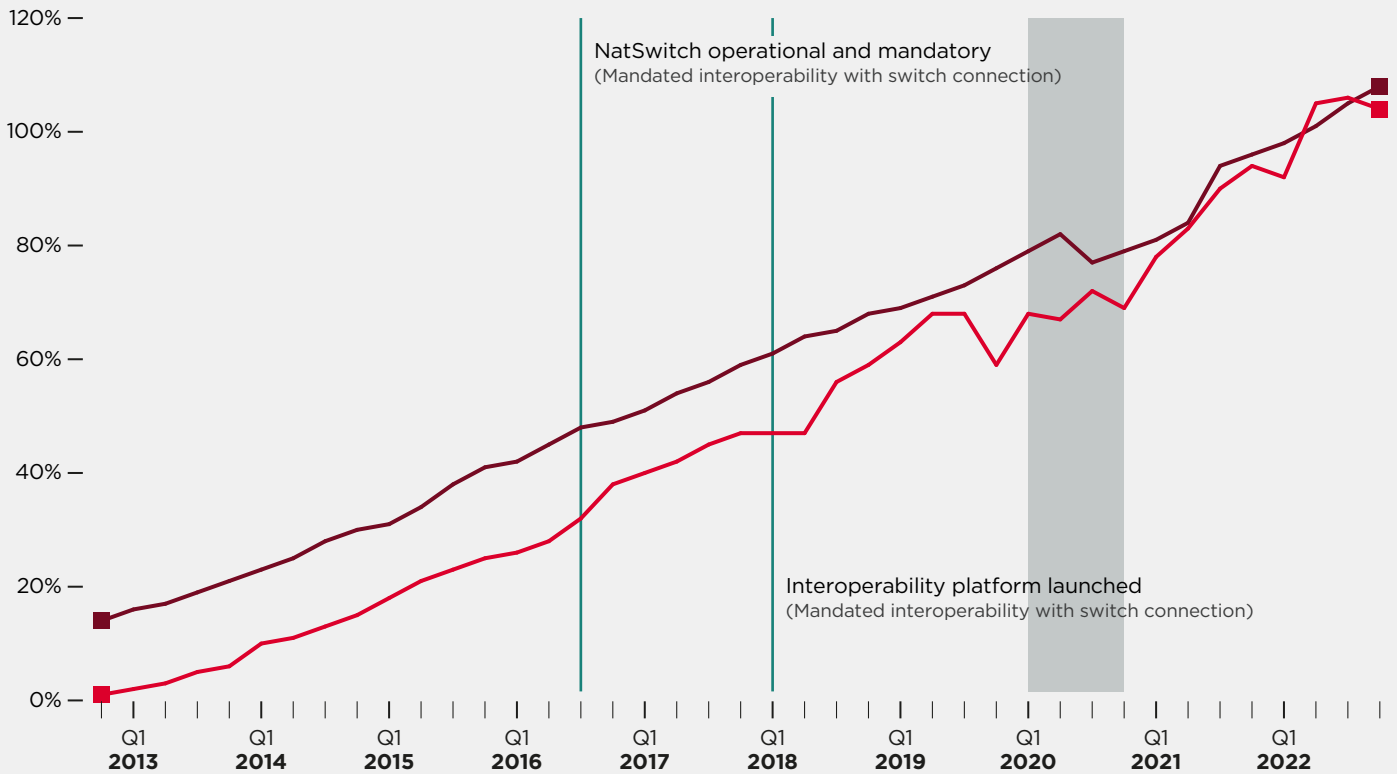
Malawi: registered and active accounts

Percentage of adults (15 years old and above)

Source: Reserve Bank of Malawi and GSMA

■ Malawi ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Registered accounts



Active accounts

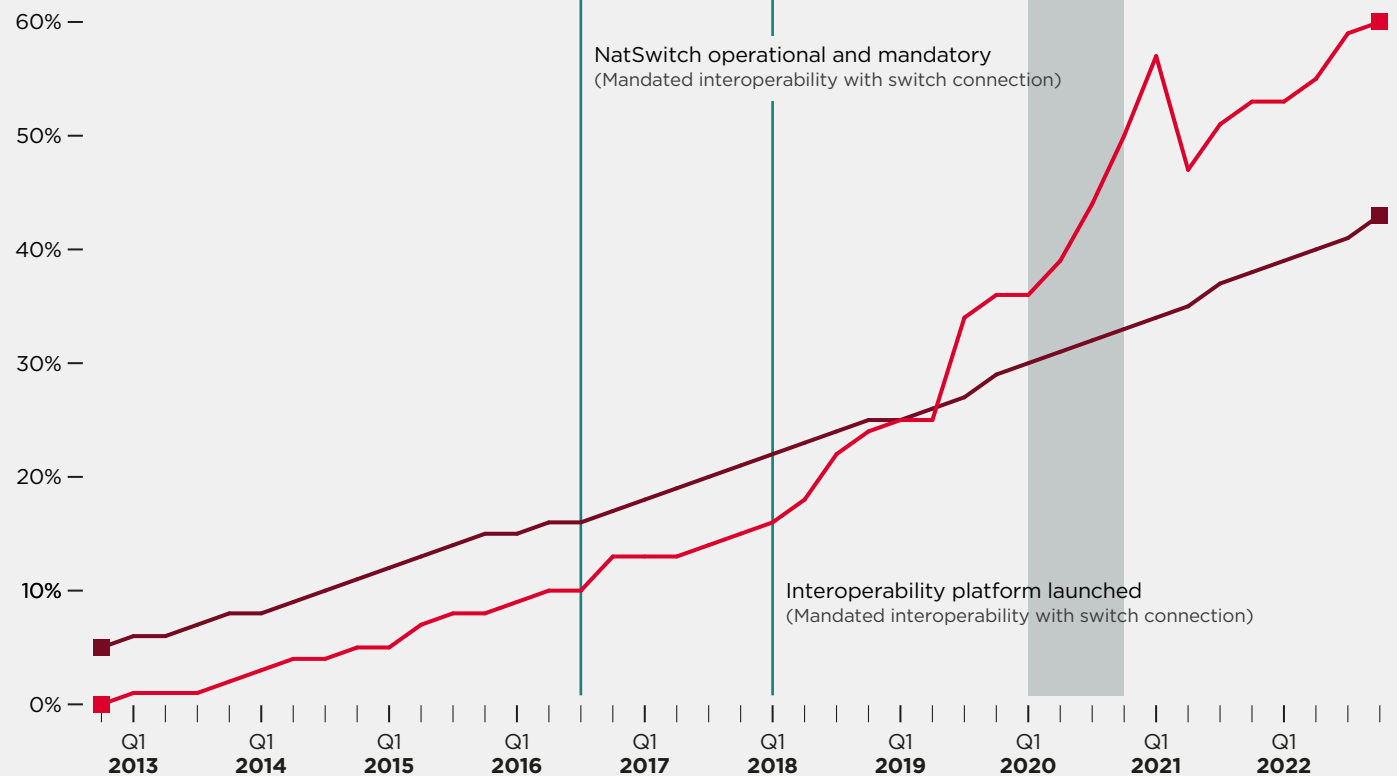


Figure 11

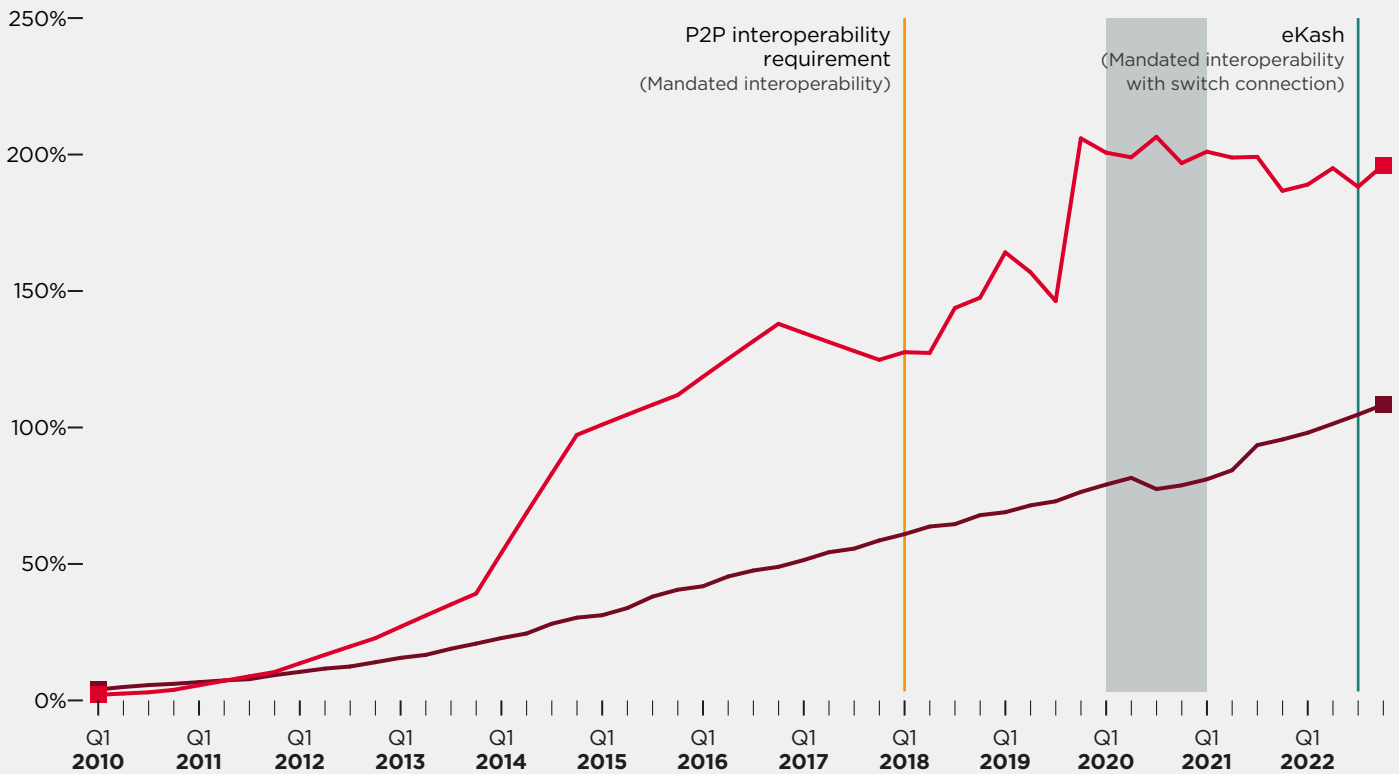
Rwanda: registered and active accounts

Percentage of adults (15 years old and above)

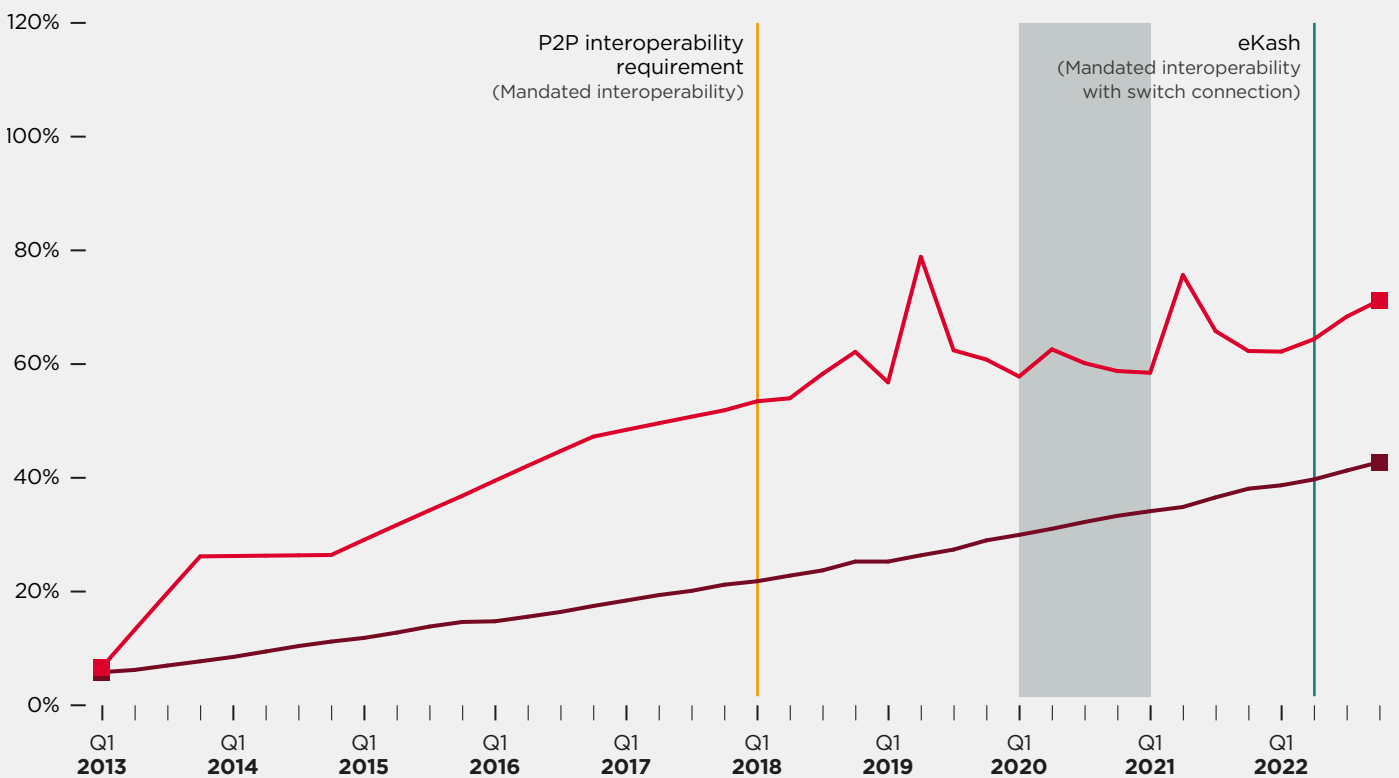
Source: National Bank of Rwanda and GSMA

■ Rwanda ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Registered accounts



Active accounts



Note: The sharp increase in registered account penetration in Q4 2019 was due to one e-money issuer changing its methodology used to register customers. From that point, anyone buying a SIM card was automatically registered for mobile money.

Figure 12

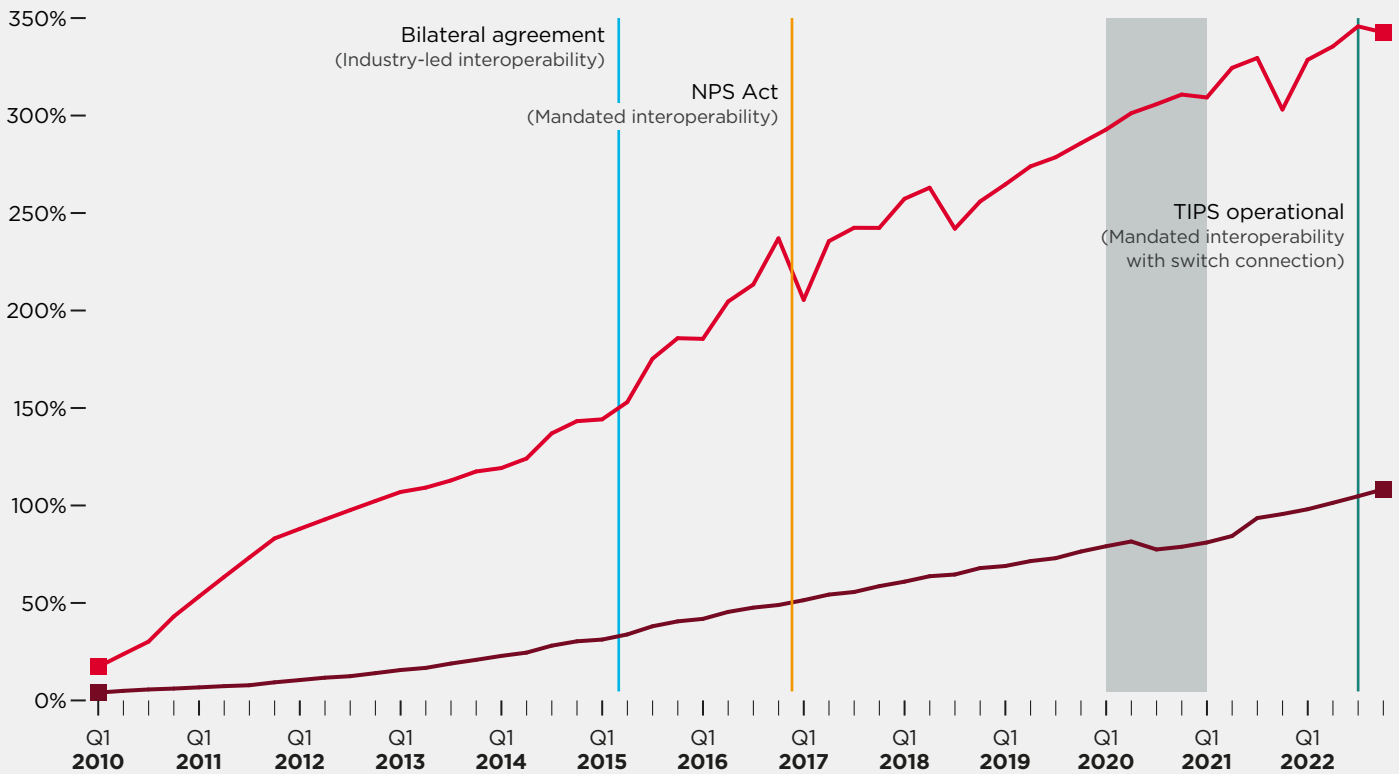
Tanzania: registered and active accounts

Percentage of adults (15 years old and above)

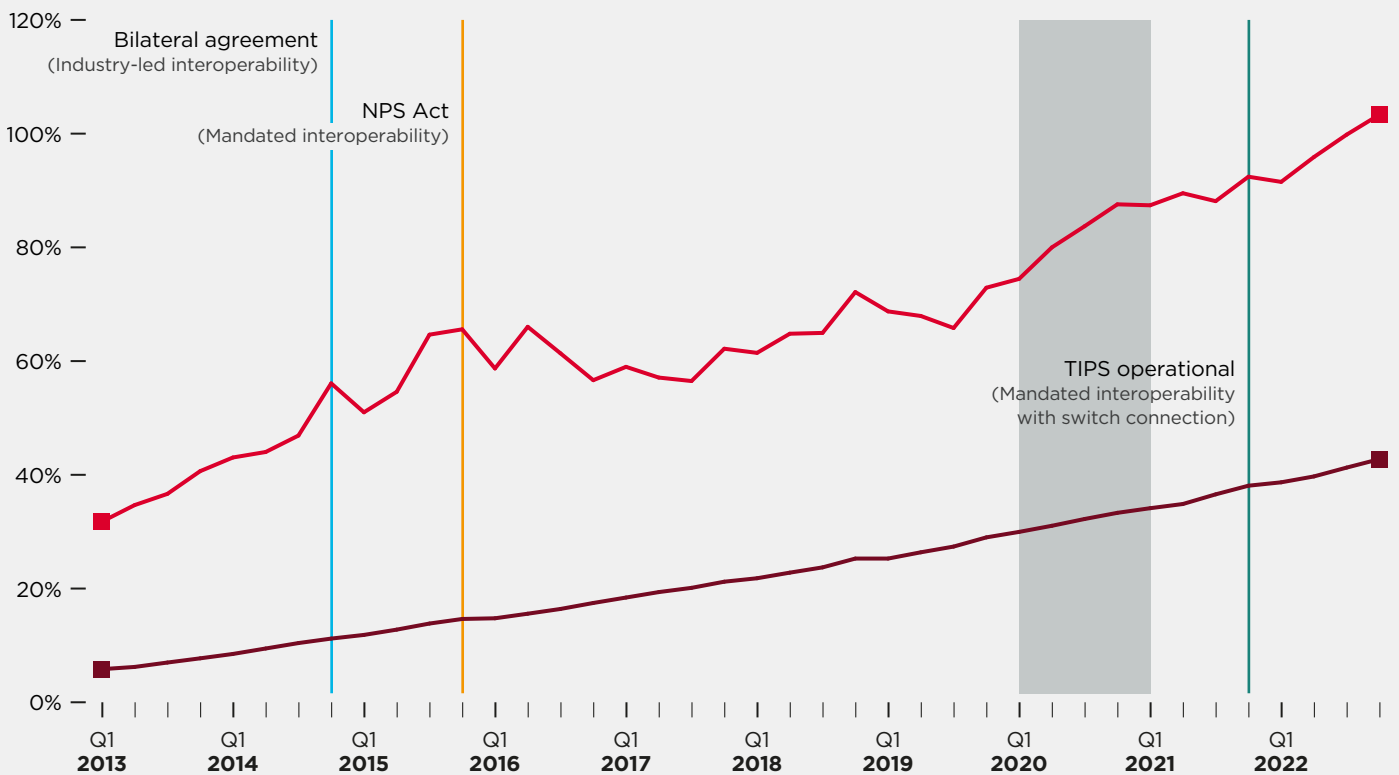
Source: Bank of Tanzania and GSMA

■ Tanzania ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Registered accounts



Active accounts



3.2 Usage

Figures 13–17 show the evolution of total transactions values and, where data is available, ‘advanced’ transaction values (i.e. those excluding airtime, cash-in, cash-out and P2P) per active account in each market (with the exception of Kenya, where we show transaction values per registered account due to missing active account data before 2016).³⁵ Taking each of the countries in turn, we note the following trends:

- In **Ghana**, there was an increase in total and advanced transaction values following the incorporation of mobile money providers into GIP and the rate of growth was faster than in Sub-Saharan Africa more generally. Most of the increase coincided with the Covid-19 pandemic and this subsequently declined from 2021 before increasing again at the end of 2022. This may be attributed to the introduction of the e-levy on mobile money transactions and the subsequent reduction in the beginning of 2023.
- In **Kenya**, the period of bilateral and market-led interoperability was associated with growing usage of both total and advanced mobile money products, and this growth was faster than the average in Sub-Saharan Africa.³⁶ Following a temporary decline, transaction values then accelerated during the Covid-19 pandemic, as the Central Bank of Kenya imposed a number of emergency measures to increase the use of mobile money instead of cash, and increased thereafter, even after some of the emergency measures were lifted.³⁷

- In **Malawi**, there was no obvious change in average transaction values following the implementation of interoperability through the national switch. They had generally been on a rising trend before and after, but remained below the regional average.
- In **Rwanda**, average transaction values per account increased slowly until the Covid-19 pandemic, when they rapidly increased. The same also applies to advanced transactions, though once the pandemic restrictions were lifted, these declined until 2022, at which point they picked up at a level much higher than before 2020.
- In **Tanzania**, after an initial decline in 2014, average transaction values gradually increased following the implementation of interoperability by all the main mobile money providers in 2015. There was not a notable increase during the Covid-19 pandemic compared with the other four study countries, which may have been driven in part by the fact that the government did not impose the same level of social and workplace restrictions as other countries.³⁸ Average transaction values declined after 2021, though this was likely to have been driven by the imposition of a new mobile money levy.³⁹

Similar to adoption, the analysis shows that in three markets (Kenya, Tanzania and Rwanda), interoperability that was led by mobile money providers was linked with an increase in usage, both overall and – in the case of Kenya and Rwanda – of more advanced payment use cases such as merchant, bill and bulk payments. In the case of Kenya and Rwanda, even when considering the impact of Covid-19, it is notable that mobile money

³⁵ All values shown in this report are in current USD.

³⁶ The analysis for advanced transactions starts from 2015 as the relevant data is not available before then.

³⁷ The measures included a waiver of charges for mobile money transactions up to KES1,000, eliminating charges for transfers between mobile money wallets and bank accounts, and increasing transaction limits, daily limits and monthly limits.

³⁸ See <https://www.bsg.ox.ac.uk/research/covid-19-government-response-tracker>

³⁹ See [Tanzania Mobile Money Levy Impact Assessment](#), GSMA, 2023

usage increased more strongly than in other Sub-Saharan Africa countries. In Tanzania and Rwanda, interoperability was mandated by the regulatory framework while the solution was led by mobile money providers until 2022, at which point a switch solution was implemented. It is too early to tell what impact the latter has had on usage.

The impacts of the national switches in Ghana and Malawi are unclear. In Ghana, this was unclear because most of the increased usage in Ghana was during Covid-19 and while it was faster than in other Sub-Saharan countries, there was a subsequent decline in usage after restrictions were lifted that did not occur in most other markets. In Malawi, there was no visible impact of interoperability on usage following the operation of the switch.

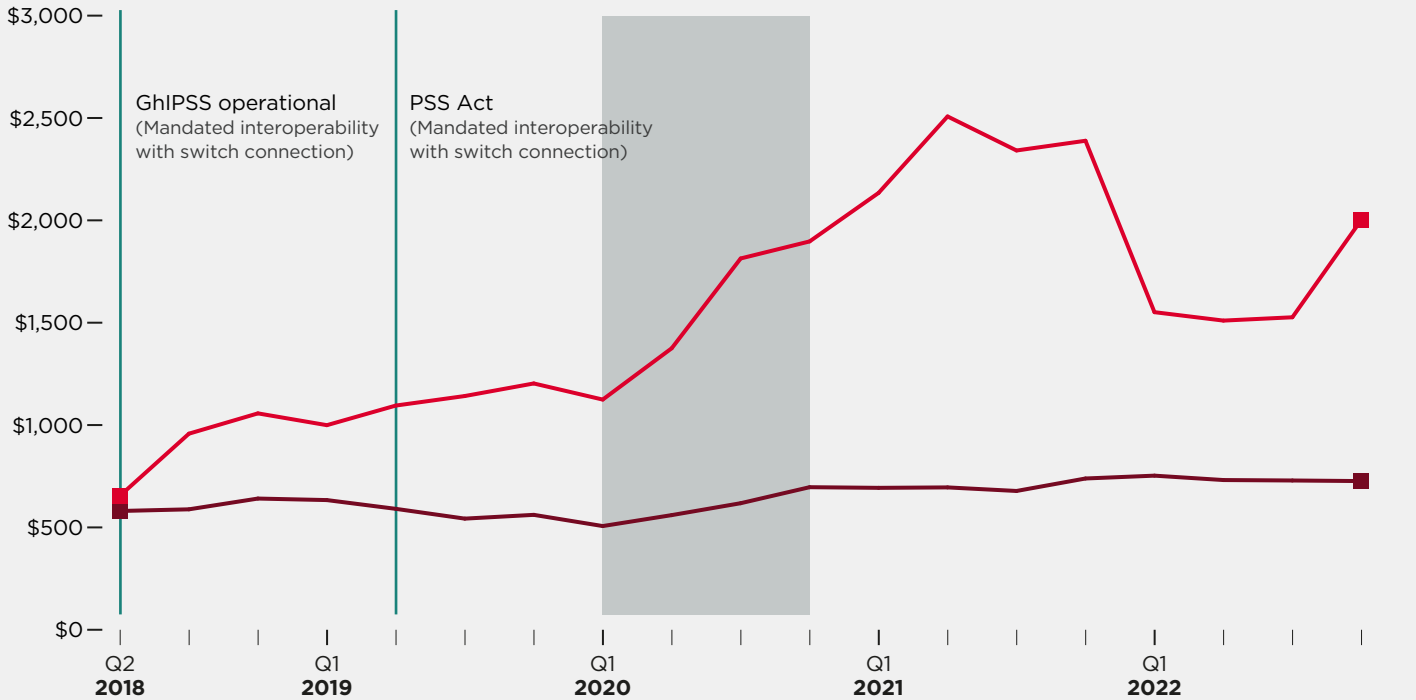
Figure 13

Ghana: total and advanced transaction values per active account

Source: Bank of Ghana and GSMA

■ Ghana ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Total transactions value per active account



Advanced transactions value per active account

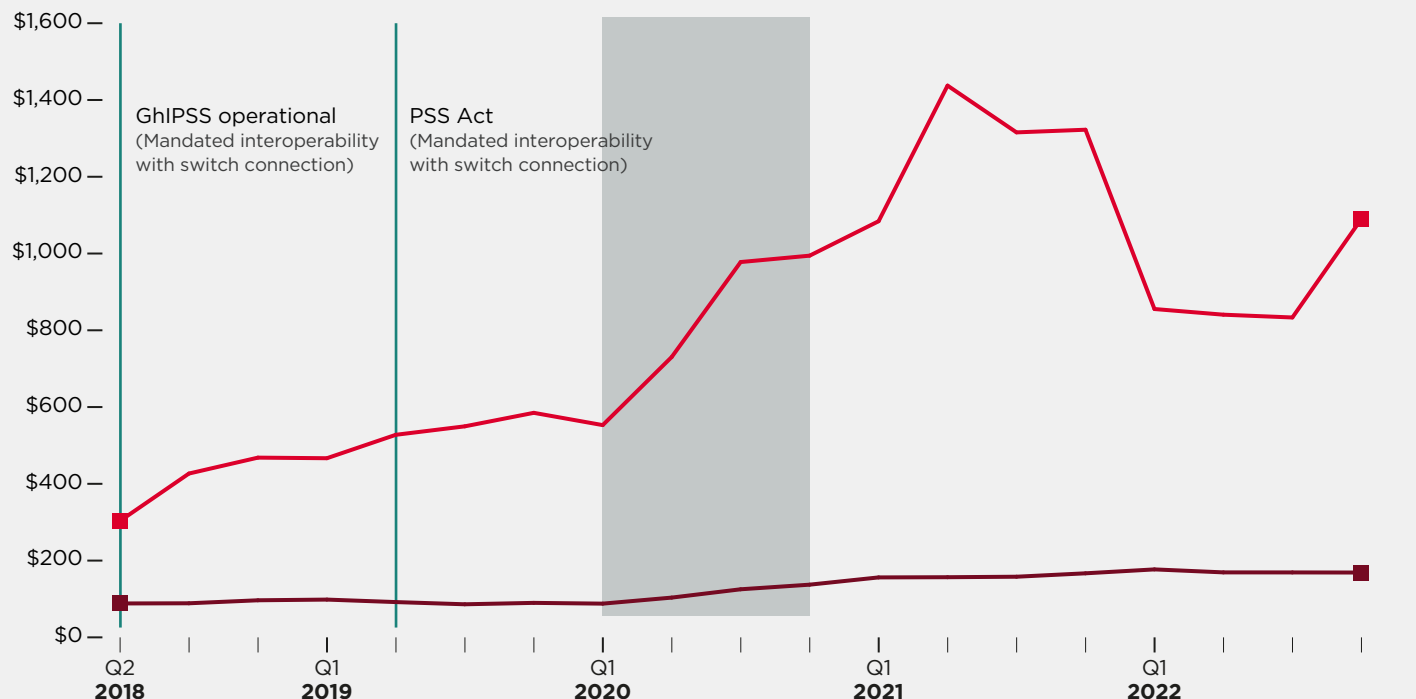


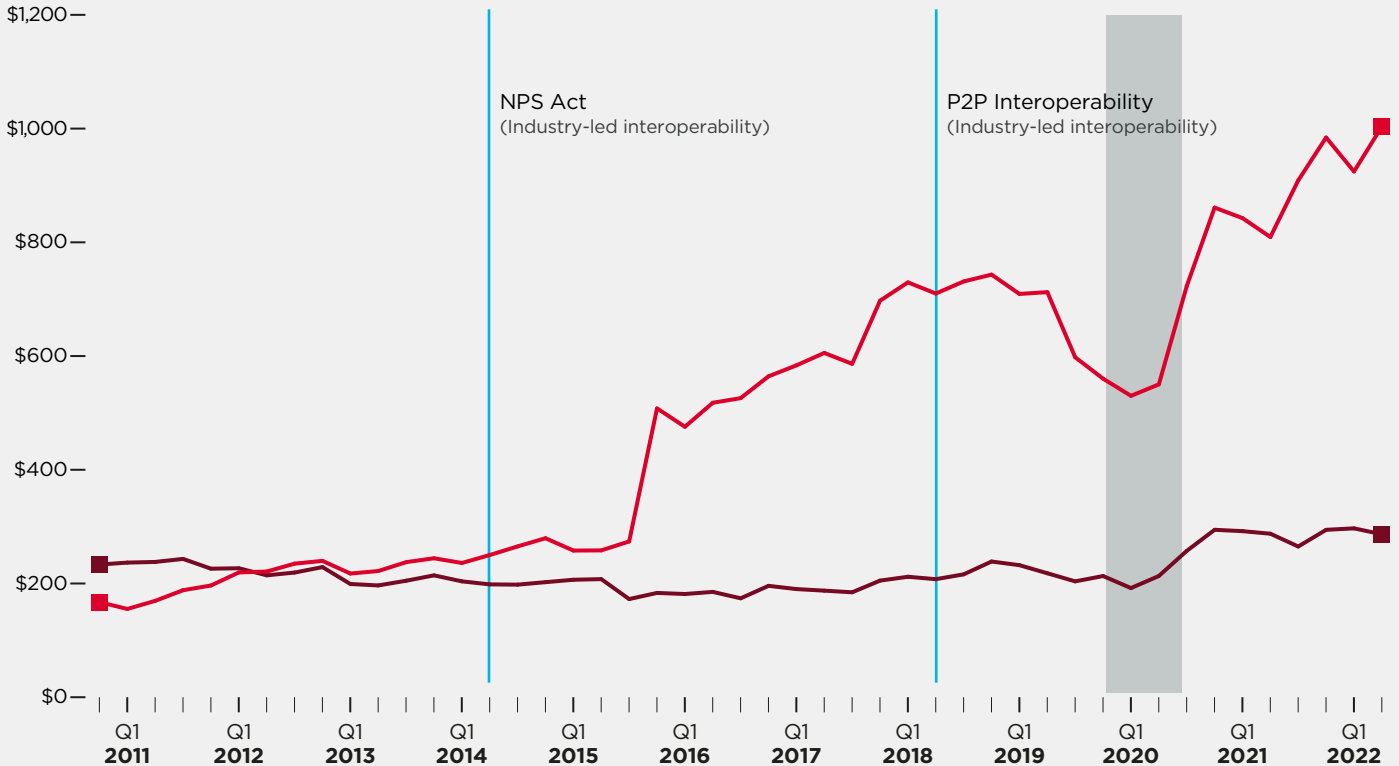
Figure 14

Kenya: total and advanced transaction values per registered account

Source: Communications Authority of Kenya and GSMA

■ Kenya ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Total transactions value per active account



Advanced transactions value per active account

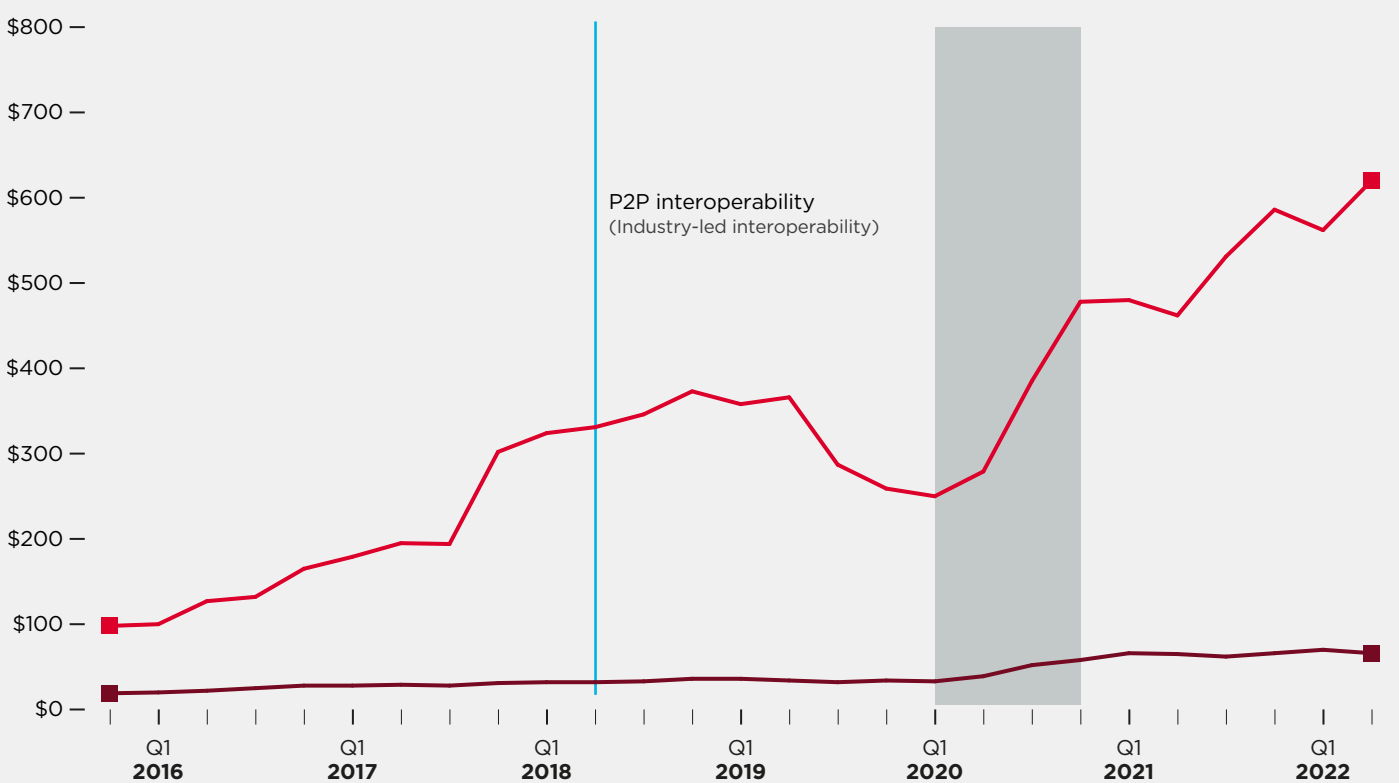


Figure 15

Malawi: total and advanced transaction values per registered account

Source: Reserve Bank of Malawi and GSMA

■ Malawi ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Total transactions value per active account

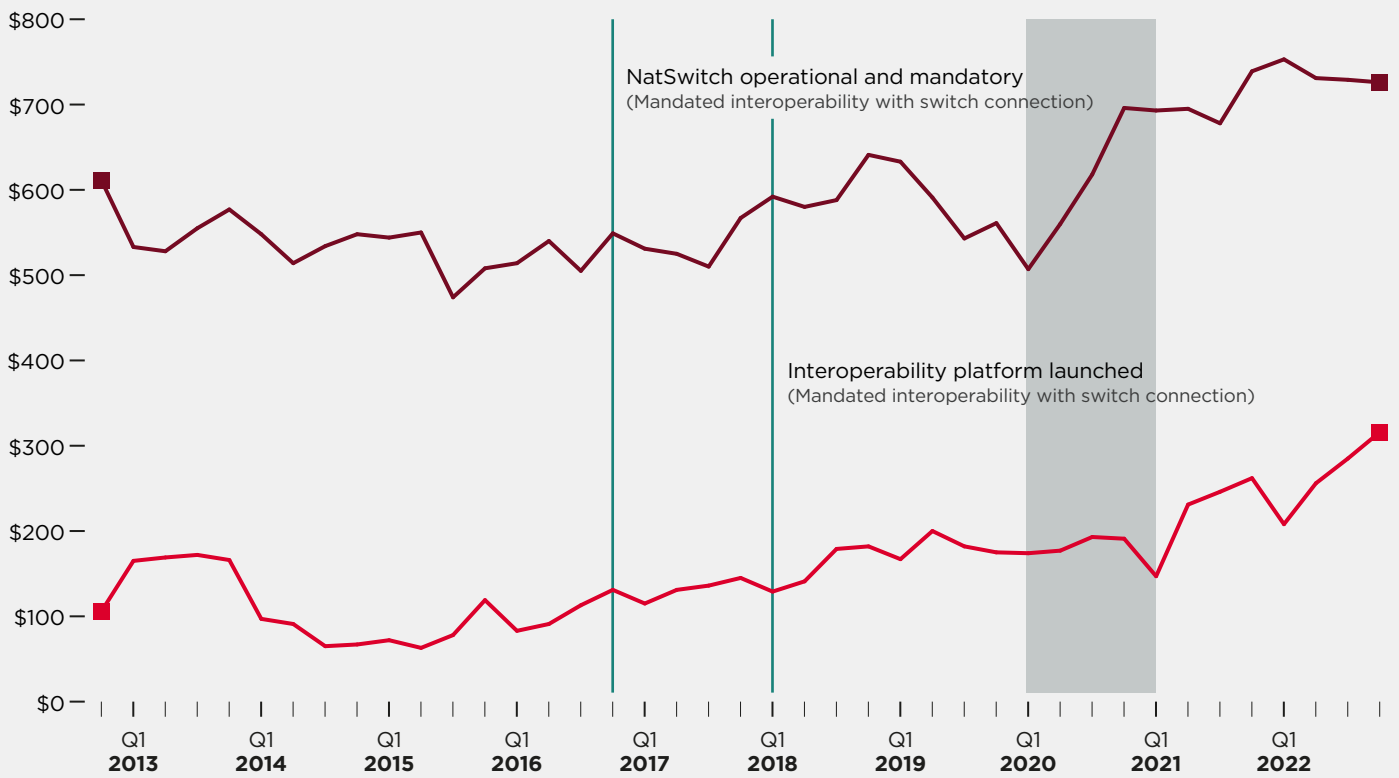


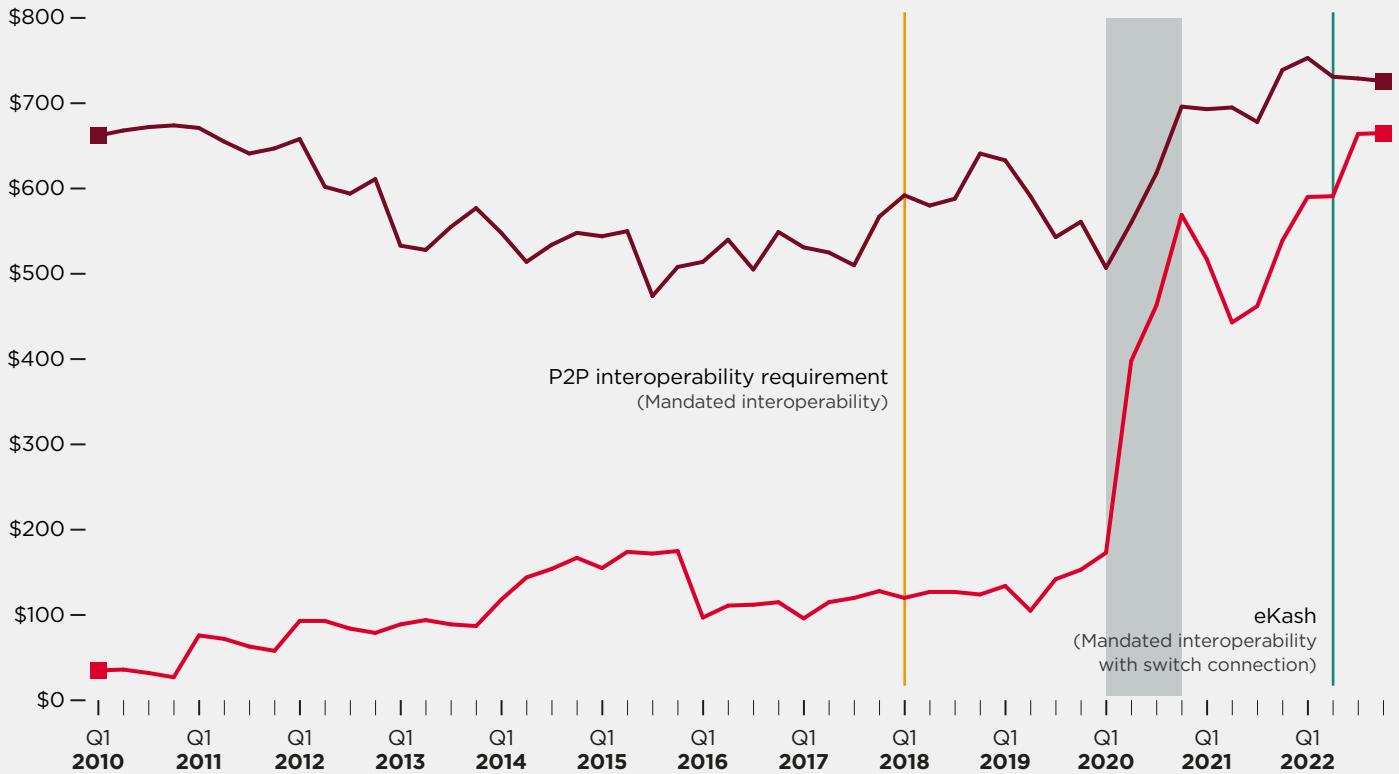
Figure 16

Rwanda: total and advanced transaction values per registered account

Source: National Bank of Rwanda and GSMA

■ Rwanda ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Total transactions value per active account



Advanced transactions value per active account

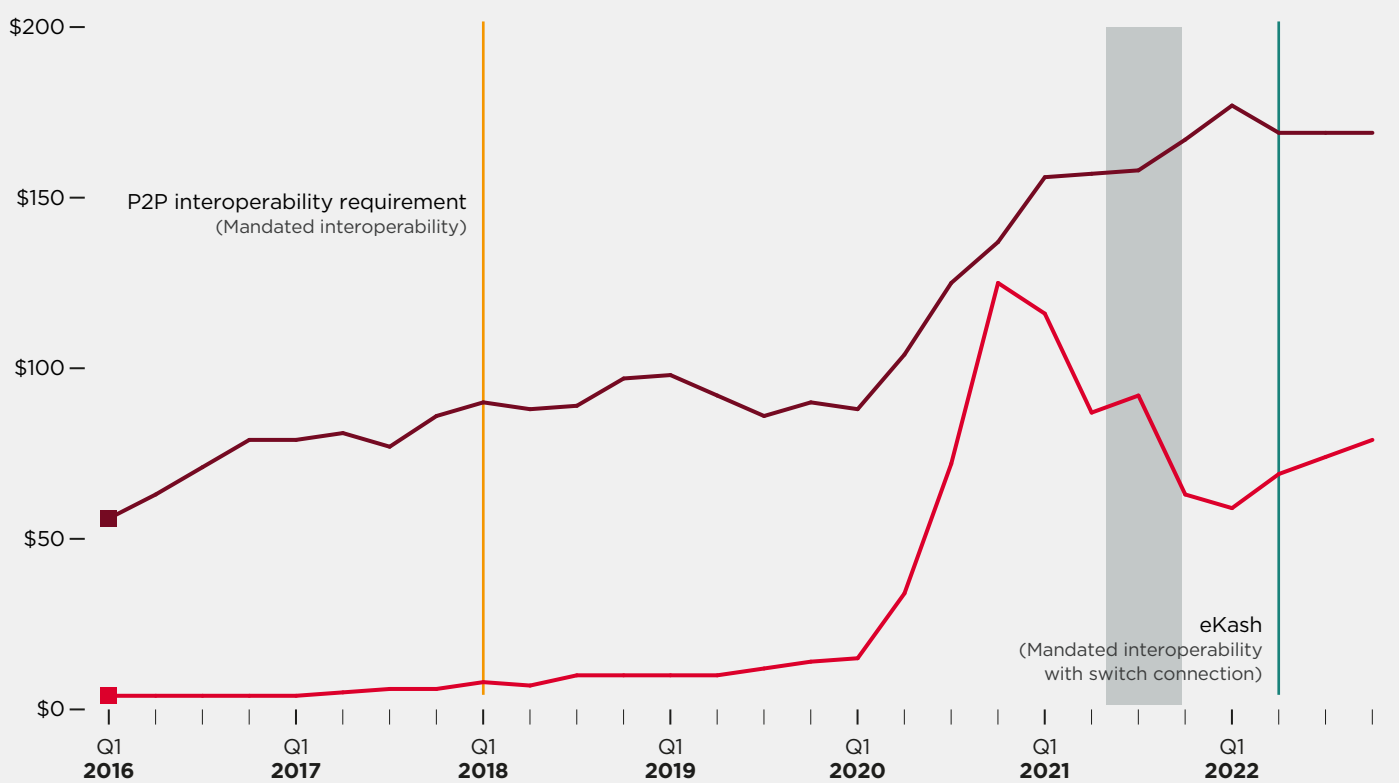


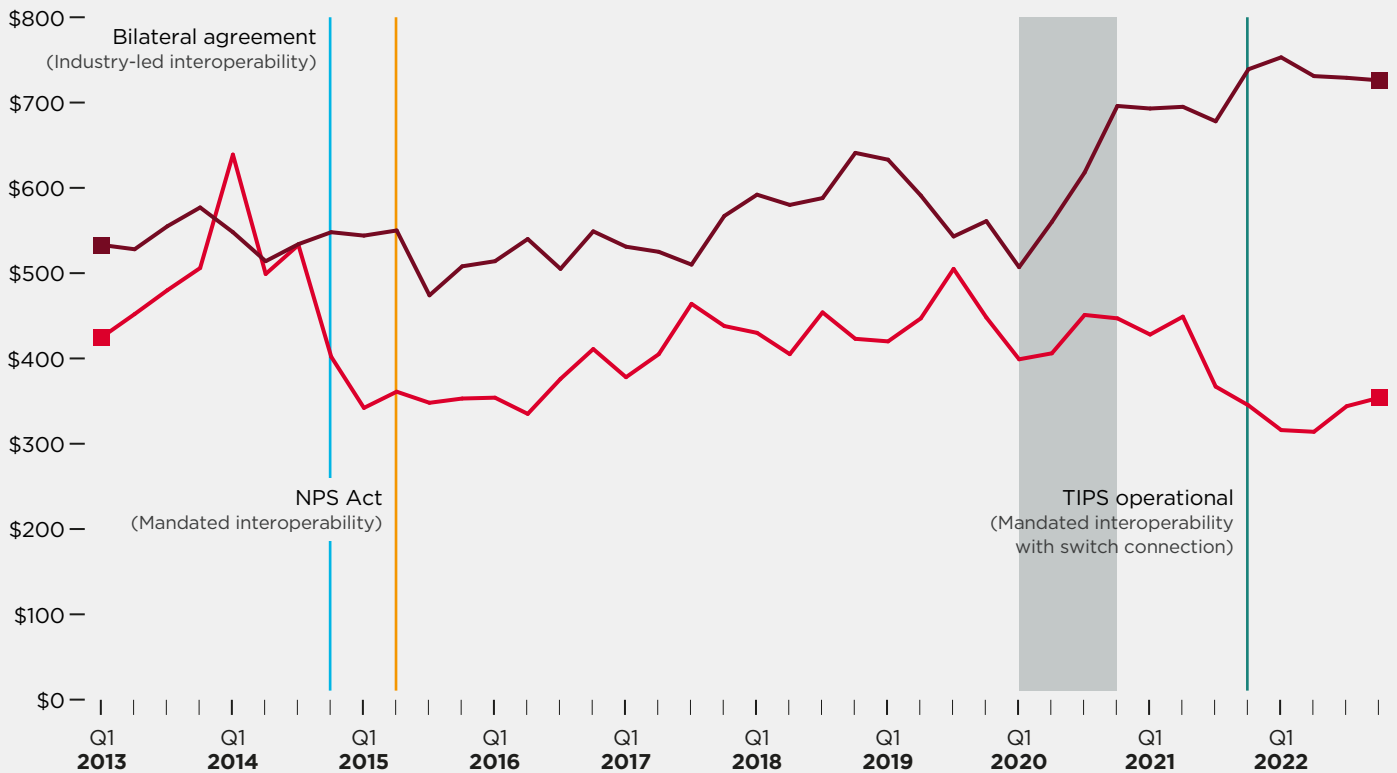
Figure 17

Tanzania: total and advanced transaction values per registered account

Source: Bank of Tanzania and GSMA

■ Tanzania ■ Sub-Saharan Africa ■ Covid-19 lockdown and social restrictions

Total transactions value per active account



3.3 Interoperable transactions

Of the five countries included in the study, we have sufficient data over an extended period of time on bank-to-mobile/mobile-to-bank (B2M/M2B) and off-net P2P transactions in Ghana, Malawi and Rwanda.⁴⁰

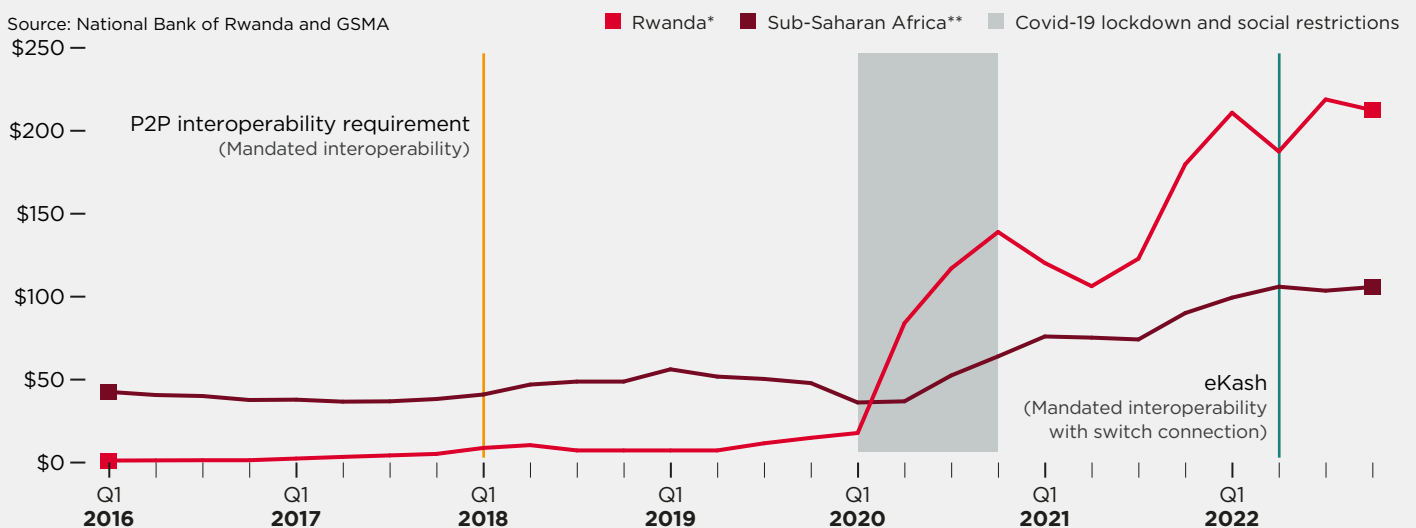
Figure 18 shows that in Rwanda, there was a significant increase in these transactions (driven by B2M and M2B) during the Covid-19 pandemic, much faster than in Sub-Saharan Africa more generally. Most of this growth occurred prior to the implementation of eKash in 2022. Figure 19 shows that in Ghana, there was significant growth in B2M/M2B and off-net transactions following the incorporation of mobile payments in GIP. Figure 20

shows that in Malawi, off-net and B2M/M2B transfers on the national switch were available from 2018 and that while these have increased, they remain significantly below the average value of interoperable transactions seen in the region more widely.

These examples show that interoperability leads to an increase in off-net and cross-platform transactions, as one would expect, and we observe strong growth when interoperability is led by the market (in the case of Rwanda before 2022). We also see this when a national switch is used in the case of Ghana, though the growth has been more limited following the switch going live in Malawi.

Figure 18
Rwanda: M2B/B2M and off-net mobile P2P transaction value per active account

Source: National Bank of Rwanda and GSMA
\$250 –



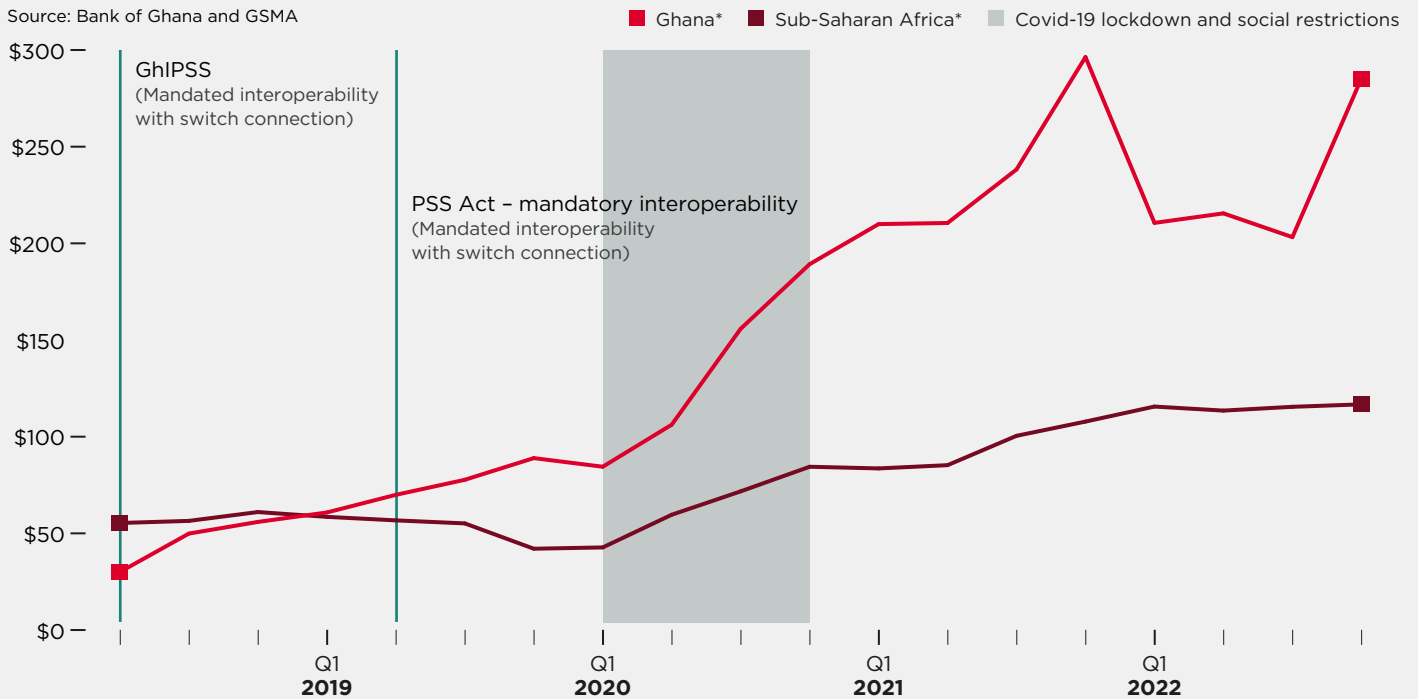
* Includes off-net A2A and M2B/B2M A2A transactions over national switch
** Includes off-net and M2B/B2M A2A transactions

40 This is based on the data provided to us by central banks.

Figure 19

Ghana: M2B/B2M and off-net mobile P2P transaction value per active account

Source: Bank of Ghana and GSMA

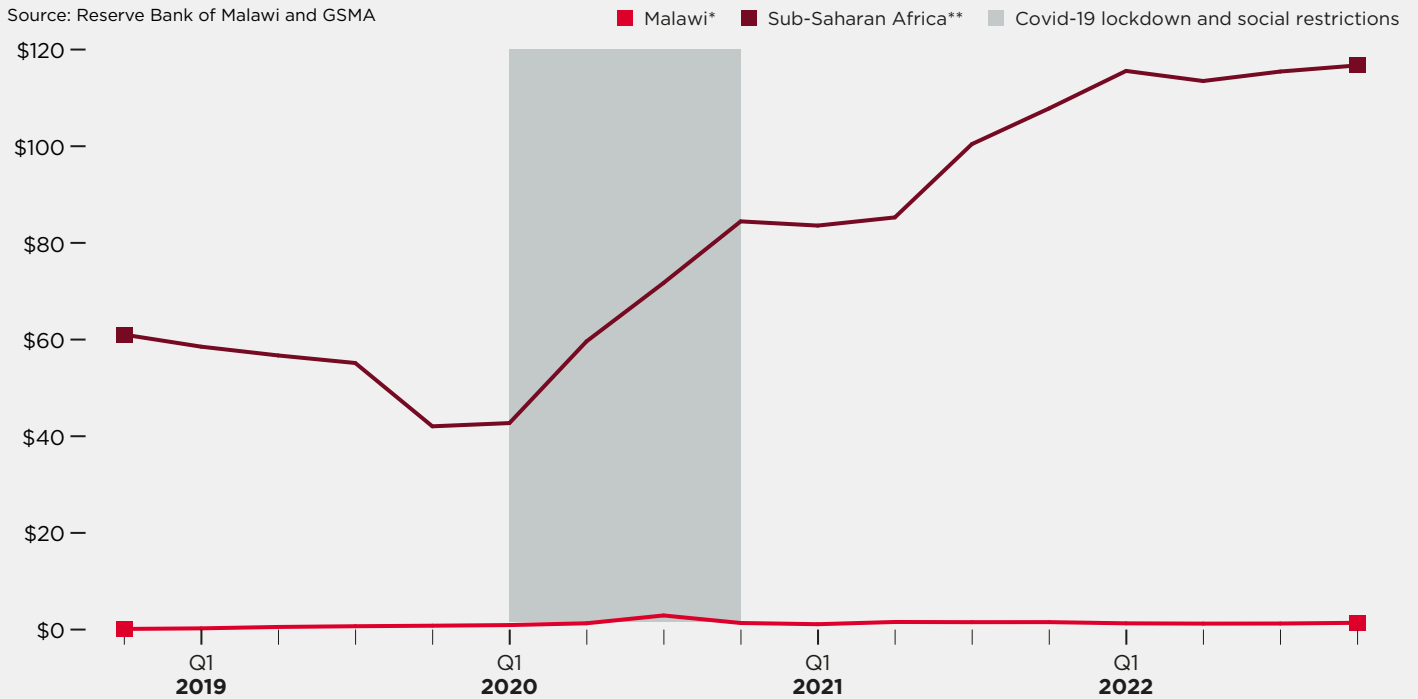


* Includes off-net A2A and M2B/B2M

Figure 20

Malawi: M2B/B2M and off-net mobile P2P transaction value per active account

Source: Reserve Bank of Malawi and GSMA



* Includes off-net A2A and M2B/B2M A2A transactions over national switch

** Includes off-net and M2B/B2M A2A transactions

4 Conclusion



The analysis in this study demonstrates the complexities and nuances of assessing the impact of mobile money interoperability. Even when looking at only five markets, interoperability has evolved in different ways both across markets and even within markets.

The example of Tanzania encapsulates this, having started with market-led bilateral agreements, followed by mandatory interoperability that was still led by industry until the eventual operation of a national switch. This makes it challenging to determine the impact of different interoperability solutions on financial inclusion. However, some general conclusions can be drawn from the case studies considered.

First, the analysis shows that in three countries (Kenya, Tanzania and Rwanda), the existence of interoperability solutions that were designed and led by mobile money providers was associated with increased adoption and usage. In the case of Rwanda, we also see very strong growth in off-net and cross-platform transactions.

Second, the impact of interoperability on mobile money adoption and usage via a national switch is unclear. It is too early to assess whether eKash in Rwanda and TIPS in Tanzania has had any impact, while the analysis for Ghana and Malawi are inconclusive, as most of the growth observed was during the Covid-19 outbreak.

Third, in four of the countries assessed, mobile money adoption had already achieved large scale before interoperability took effect. This is consistent

with the economic literature, which suggests that given the dynamic nature of digital financial services, incentives to become interoperable often occur after mobile money has reached scale. Therefore, any analysis showing a positive correlation between the existence of interoperability and high mobile money adoption across countries should consider the fact that increased financial inclusion often precedes providers becoming interoperable (rather than interoperability leading to greater financial inclusion).

Going forward, there remains further scope for future research. This study has considered interoperability of P2P payments, given that these have been most common in mobile money markets. However, as interoperability beings to evolve to other use cases such as merchant payments and agent interoperability, it will be important to assess the impact of those. Furthermore, while the trend analysis carried out in this report is instructive in assessing how mobile money market outcomes evolved after different interoperability solutions, it is not sufficient to isolate the causal impact of interoperability. This requires consideration of a larger sample of countries as well as more sophisticated causal inference methods. This is an area that would benefit from further research.

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