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The use cases of central bank digital currency for financial inclusion: A case for mobile money

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UKaid
from the British people

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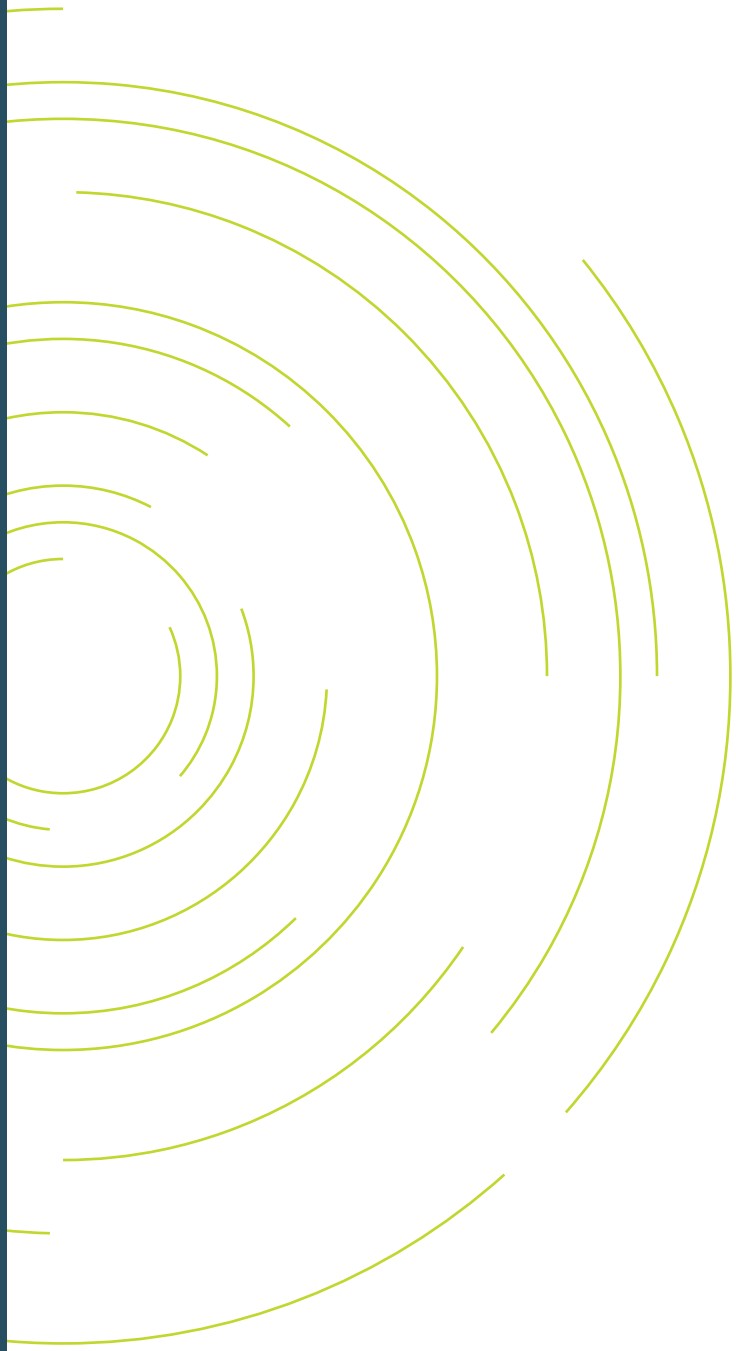

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List of acronyms and abbreviations

ACH	automated clearing house
AML/CFT	anti-money laundering and countering the financing of terrorism
CBDC	central bank digital currency
CDD	customer due diligence
DFC	digital fiat currency
FATF	Financial Action Task Force
FSP	financial service provider
FT	financing terrorism
GPS	global positioning system
ITU	International Telecommunication Union
KYC	know-your-customer
ML	money laundering
MMO	mobile-money operator
MNO	mobile-network operator
P2P	peer-to-peer
RTGS	Real-time gross settlement
SSA	sub-Saharan Africa
USSD	unstructured supplementary service data

Executive summary

Central bank digital currency (CBDC) has begun to take root among central banks as an important concept for economic development and financial stability.
At the end of 2018, Christine Lagarde, the Managing Director and Chairwoman of the International Monetary Fund, identified central bank digital currency CBDC as having the potential to "supply money to the digital economy" and "satisfy public policy goals" (Lagarde, 2018). While this statement comes off the back of growing interest in cryptocurrencies and other more efficient digital currencies, central banks around the world have started to actively recognise the benefits that a central bank digital currency could provide for national economies. These purported benefits range from its capability to enhance the effectiveness of monetary policy and promote cashless societies to facilitating financial sector deepening and greater financial inclusion by enabling more affordable and efficient financial services.

Despite the hype, links between CBDC and financial inclusion remain broad and undefined. One of the major drivers for the popularity of CBDC is its ability to foster greater financial inclusion in emerging markets. In most instances, this argument is supported by CBDC's ability to streamline payment systems by removing unnecessary third-party intermediaries from payment procedures and thereby the complexity they respectively impose on payment settlement and clearance. By doing so, CBDC is argued to enhance the speed, affordability and convenience of both domestic and, potentially, cross-border remittances. While these benefits may be true, thus far little investigation has been performed to directly assess:

- how CBDC tangibly changes the provision of payment products in emerging markets, and
- whether the application of CBDC truly has the positive effects on the use and value of financial services that proponents claim as fact.

This report investigates the potential effects of CBDC on financial inclusion through the lens of mobile money. Although CBDC may have a role in financial inclusion, it is not necessarily clear what it is or whether this effect will be good, bad or neutral. This report seeks to answer this question by analysing the potential impact of retail CBDC on mobile money – a powerful and well-acknowledged tool for financial inclusion in emerging economies, such as those from sub-Saharan Africa (SSA).

Key findings suggest that mobile money may be a positive use case for CBDC but not without its potential risks. The application of retail CBDC to mobile money has the potential to:

- foster greater interoperability
- improve payment efficiency
- facilitate cost-saving gains by minimising reconciliation complexity and notional costs
- reduce the key payment risks that are typically associated with mobile money

Furthermore, if implemented appropriately, CBDC can encourage trust in mobile financial services and ease the liquidity constraints of mobile-money agents. If implemented incorrectly, CBDC risks not only exacerbating contextual inequalities like digital, financial and economic disparities, but also intensifying the perceived complexity of mobile money and expose certain unstructured supplementary service data (USSD) providers to cyber-security threats.

A mobile-money use case for CBDC and financial inclusion is only as strong as a country's acknowledgement and investment into key prerequisites. To optimise the potential economic and financial inclusion gains of CBDC through mobile money, national authorities need to be cognisant of the array of prerequisites that will need to be catered for before implementation. Depending on the contextual factors of a country, these prerequisites may range from ensuring appropriate legal tender and anti-money laundering and countering the financing of terrorism (AML/CFT) regulation to implementing sufficiently robust consumer protection laws and national cyber-security defences. Furthermore, for CBDC-linked mobile money to be both accessible and utilised effectively, both context-specific supply conditions and context-specific demand conditions that affect mobile money need to be considered. By doing so, national economies can both strengthen their payment systems with a more robust, cost-saving and efficient payment instrument and, more importantly, optimise the capability of mobile money to financially include and serve the needs of previously excluded populations.

1 Introduction

Central banks around the world are increasingly looking to leverage the benefits of cryptocurrencies while limiting their potential risks. The ability of private cryptocurrencies to replace third-party payment intermediaries with distributed ledger technologies, such as blockchain technologies, is thought to offer benefits that could radically change national payment ecosystems. More specifically, this replacement is intended to enable near instantaneous peer-to-peer (P2P) transactions at a fraction of the cost and with a purportedly greater degree of data privacy through the encryption of financial information. Despite these claims, regulators tasked with ensuring monetary and financial stability lament that these benefits are often coupled with high levels of price volatility, the absence of both regulatory supervision and universal acceptance, and their potential to be used for illegal activity such as money laundering (ML) and financing of terrorism (FT) (Ali, et al., 2014). As private cryptocurrencies become increasingly popular as mediums of exchange, central banks are increasingly pushing to understand not only their implications for the digitisation of contemporary payment systems but also what and how potential trade-offs from their introduction can be contained to ensure and optimise consumer value.

CBDC represents a potential regulated alternative to private cryptocurrencies. CBDCs, otherwise known as digital fiat currencies (DFCs), are traditional sovereign currencies that exist in a digital or algorithmic format (2018)[1]. Though similar to private cryptocurrencies in digital appearance, CBDCs represent a lawfully mandated means of payment as universally accepted legal tender that is backed and regulated by a central bank (2018). Their one-to-one denomination with existing sovereign paper currency implies that CBDC would be subject to only national currency exchange-rate fluctuations and would be capable of acting as both a stable unit of account and store of value (Cooper & Allen, 2018). CBDCs are therefore conceived as better complements or substitutes to physical cash than private cryptocurrencies (Raskin & Yermack, 2016).

Improved financial inclusion and heightened financial integrity are potential outcomes of CBDC.
As a means of payment exchanged through a mobile or electronic device, CBDC has the potential to enable domestic and cross-border P2P money transfers that are faster, more affordable and more convenient than the traditional formal channels or instruments (Raskin & Yermack, 2016). This increases the value of financial services for consumers, with the potential to increase the rate of financial inclusion. CBDC usage can further stimulate greater credit intermediation by encouraging increased liquidity flows within the formal financial system (Bordo & Levin, 2017). Furthermore, it may incentivise the digitisation of merchant and agricultural value chains through more efficient person-to-business and business-to-business transactions. The traceability of CBDC can further lend itself to enhancing the ability of national authorities to identify and mitigate illicit financial flows as well as track potential ML and FT leads for improved financial integrity and AML/CFT compliance.

Mobile money is an important use case to investigate the true effects of CBDC on financial inclusion. Despite the hype and predictions regarding the benefits of CBDC for financial inclusion, limited research exists to understand the why and how of it. In other words, why is the effect of CBDC on financial inclusion necessarily

1 The terms "digital fiat currency" (CBDC) and "central bank digital currency" (CBDC) are equivalent in both definition and specification. The former term is favoured in this paper when referring to a central bank digital currency, as it explicitly speaks to the fiat nature of national currency as a critical component of its universality, i.e. currency characterised by its lack of intrinsic value and declaration as legal tender by a government decree. "CBDC is the preferred term by popular media outlets and has become a common term referred to in consultation documents.

positive? And how is value specifically unlocked by CBDC within existing channels to support greater access and meaningful use of financial services? The application of CBDC to mobile money provides a tangible use case to understand these effects given that, while mobile money may be a leader in banking the unbanked in developing countries, it continues to endure constraints that undermine its provision, uptake and use (GSMA, 2018). The extent to which CBDC has a neutral, negative or positive effect on these constraints can consequently provide insights into not only the potential role of CBDC to further financial inclusion but also its limitations and the preconditions necessary for successful implementation.

The report is structured as follows:

- Section 2 provides an overview of CBDC and mobile money by defining the characteristics of each and their relevance for financial inclusion.
- Section 3 describes the barriers endured by providers when supporting the uptake and use of mobile money in SSA. This section also outlines the obstacles faced by SSA consumers in the adoption and effective use of mobile money.
- Section 4 explores the potential positive, neutral and negative effects that CBDC may present for mobile money in terms of financial inclusion.
- Section 5 outlines key prerequisites and CBDC design imperatives to optimise the value of CBDC for mobile money and minimise any negative implications for financial inclusion.
- Section 6 provides concluding remarks on the potential use case of CBDC for mobile money and financial inclusion.

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2 Conceptual overview

This section briefly explains the concept of CBDC and provides an overview of the potential benefits it claims to offer to various market participants. A brief description of mobile money is provided, as well as a look into its current role in the financial inclusion in SSA.

2.1. CBDC

CBDC is a digital representation of sovereign currency. CBDC is issued under the auspices of a central bank and possesses the same legal status as physical cash. Like physical fiat currency or cash, CBDC has three characteristics of a national currency (money):

- It is universally accepted as a medium of exchange, meaning that it is recognised by all individuals and merchants within a national geographic boundary as a valid payment instrument (Reiss, 2018). This official recognition by the State would in turn imply the officially labelling of a country's CBDC as an e-ZAR or e-Dollar, for example.
- It can act as a store of value with which to transfer purchasing power from the present day to the future (Ali, et al., 2014).
- It represents a unit of account, or standardised unit of value, that can be used to value any given item and facilitate price comparisons between items (Ali, et al., 2014).

The primary difference between CBDC and physical cash is that the former exclusively exists in digital or algorithmic format. Furthermore, CBDC is underpinned by technologies[2] that allow for seamless transactions to take place across one integrated payment system that uses a single standardised payment instrument (Raskin & Yermack, 2016). Despite the array of technologies that could support CBDC, common to each of them is the key ability to eliminate the role of unnecessary third-party payment intermediaries in settlement procedures (Accenture Consulting, 2017).

CBDC presents significant cost-savings to key economic actors relative to cash. CBDC can reduce the cost of issuing, circulating and accessing cash as either its complement or substitute (Fung & Halaburda, 2016). For financial service providers (FSPs), this can imply lowered costs associated with bookkeeping and operational processes, as well as reduced payment reconciliation costs (Mainelle & Milne, 2016). Regulators may save through lower production and distribution costs associated with physical currency (Berger, 2017). Value chain actors may also reduce expenses related to cash logistics. These expenses can include cash distribution, accounting between destinations and the security associated with cash in transit between actors in a given value chain. The culmination of these costs can undermine the profitability of merchants. It can also indirectly contribute to higher costs that are passed on to consumers and reduced economic welfare (Zetterli, 2017). Through the use of CBDC, consumers may also be able to enjoy the minimised costs associated with ATM cash withdrawals, transport costs to encashment points and high transaction fees related to both domestic and international P2P transfers (Fung & Halaburda, 2016).

CBDC deployment can trigger additional system-wide efficiencies, growth and payment security. CBDC-based monetary policy can become better informed and targeted through greater oversight of liquidity flows offered via the traceability of CBDC (Berger, 2017).

2 CBDC can be implemented in various ways and underpinned by a number of different technologies. Technologies commonly suggested include ledger technologies that are open and distributed, open distributed and/or decentralised, closed and centralised, and centralised but decentralised in use. For more information on the exact nature and operation of each of these systems, please see Accenture Consulting, 2017. As most national payment systems already make use of some form of ledger technology, CBDC has the potential to run on existing payment rails or on updated technology systems that are identified as both necessary to achieve the benefits of CBDC and appropriate for a given country's context by government authorities. Currency algorithmic tagging is an additional method in which CBDC may reside on and off ledger technologies but allows for integrated use across various systems. The concept of CBDC in this case is therefore technologically agnostic. The choice of technology application is dependent only on how well it can facilitate the successful implementation of a desired CBDC and achieve its potential benefits.

Fiscal authorities may enjoy larger pools of revenue for social programmes. National payment systems can be made more resilient against counterparty and liquidity risks typically associated with the multiple-day settlement lags synonymous with traditional legacy systems (Bech & Garratt, 2017). By using CBDC, settlements can become near instantaneous, given its necessary interoperability with all devices, platforms, schemes and institutions as a universally accepted medium of exchange. Although certain designs of CBDC may challenge consumer privacy[3], AML/CFT efforts can be optimised through the traceability of CBDC transactions across ledgers, devices and schemes (Berger, 2017).

This report refers to the application and use of CBDC in its retail form. CBDC can be constructed as either a wholesale[4] or a retail currency. CBDC in its retail form is most similar to physical cash, given its design to reside within either a wallet or an account and to be utilised for frequent and relatively low-to-medium-value transactions (Bech & Garratt, 2017). The retail specification of CBDC therefore enables practical use for all consumers who conduct retail transactions through either cash or electronic alternatives such as mobile money, cheques, credit transfers, direct debits and card payments. For these reasons, retail CBDC (henceforth simply referred to as CBDC) is primarily considered in this report to assess the impact of CBDC on mobile money for financial inclusion.

2.2. Mobile money

Mobile money is a digital financial service delivered through a mobile device. Unlike mobile-banking services, mobile-money services do not require consumers to have a formal account at a financial institution as a prerequisite for transactions (Maina, 2018). Mobile-money platforms, instead, enable the transfer of value via the issuance and distribution of e-money tokens as the digital representation of sovereign currency[5]. Mobile-money services are therefore enabled by the usage of electronic wallets, offered by mobile-money operators (MMOs), such as a mobile-network operator (MNO), which hold specific amounts of mobile-money tokens that can be digitally transacted between consumers who are predominantly on the same mobile-money platform. Mobile-money tokens are simply the digitalisation of physical cash deposited by consumers at physical transaction points (Maina, 2018). These deposited funds are held in trust accounts with banks on behalf of MMOs. They remain in escrow arrangements as untouchable pools of consumer legal tender that can only be accessed by consumers when they choose to tap into their mobile-money wallets for transactions (Lal & Sachdev, 2015)[6]. Available transaction services typically include P2P money transfers, remittances (domestic and/or international), bill payments or receipt, salary disbursement or receipt, retail payments and money storage or savings (Lal & Sachdev, 2015).

3 For a brief overview of the potential risks that certain variations of distributed-ledger technology-based CBDC may pose for financial systems, please read Cenfri's CBDC research paper entitled "The benefits and potential risks of digital fiat currencies".

4 In its wholesale form, CBDC represents central bank money that is used to facilitate wholesale payments on national payment systems such as the current Real real-time gross settlement system (RTGS) (Bech & Garratt, 2017). The application of wholesale CBDC to national payments in this sense would represent the attempt by central banks to update or rejuvenate outdated legacy-based wholesale payment systems through the application of ledger technology.

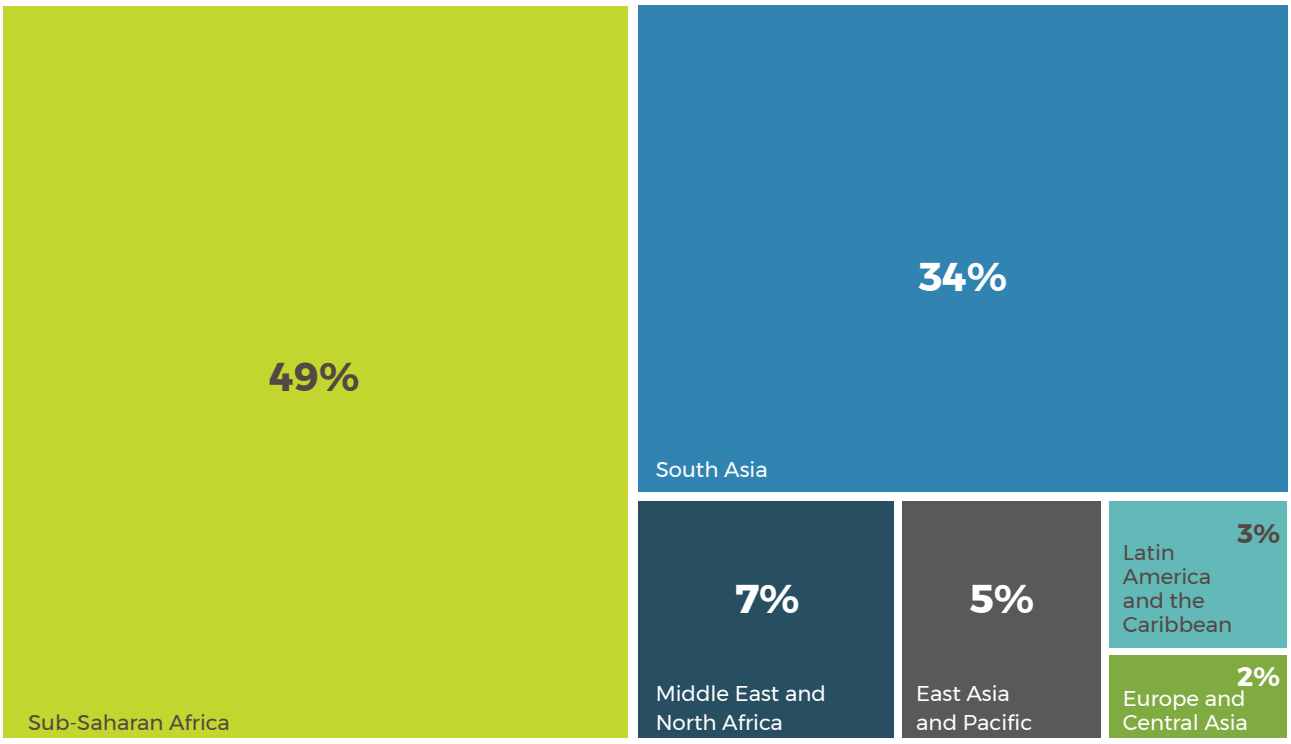
5 E-money is defined as "a digital representation of sovereign currency distributed by a private entity, which is under state regulation. The record of funds or value is stored on an electronic payment device such as chip, prepaid cards or mobile phones as a non-traditional account with a banking or non-banking entity. Although it is typically granted convertibility in cash or bank deposits at par by law, e-money does not constitute legal tender itself." (Reiss, 2018).

6 This type of legal tender holding arrangement stems from the fact that mobile-money services are often restricted from using the national payment rails of a country given their transfer of e-money rather than legal tender. While legal tender can be freely transferred on existing national payment rails, e-money is often required to use its owner payment rails, or in many cases, rails provided by regulated commercial banks as the back-end provider or custodian of mobile-money consumer deposits in respective escrow accounts (Lal & Sachdev, 2015). The additional value of escrow accounts is that they ensure the security of stored customer legal lender from its illegal use by MMOs to fund its own interest and operations (Lal & Sachdev, 2015).

Mobile-money uptake and use are particularly impressive in SSA. In 2017, the total number of mobile-money accounts amounted to nearly 700 million worldwide, up from only 136 million in 2012 (GSMA, 2017). This value has since grown to over 850 million in 2018 (GSMA, 2018). In 2017, 4% of the global population owned a mobile-money account. Mobile-money penetration growth has been notably impressive for SSA in particular, growing from 12% in 2014 to over 20% in 2017 (World Bank, 2018). According to Figure 1, this represented the registration of nearly 340 million mobile-money accounts in SSA or 49% of the total registered accounts worldwide (GSMA, 2017). These findings suggest that, in a region such as SSA where only 33% of the adult population have a formal bank account, mobile money is a major driver of financial inclusion (World Bank, 2018).

Mobile money is steadily growing as a critical use case for financial inclusion. Between 2016 and 2017, active 90-day mobile-money accounts grew in SSA by over 18% (GSMA, 2018), and the use of a mobile phone to send or receive value grew by 19% and 20% over the same period, respectively (World Bank, 2018). Additional growth in the use of mobile phones to pay utility bills and receive wages further underscores both the rising value extracted by Africans from mobile financial services to meet their financial needs, and the growing recognition of their ability to do so (World Bank, 2018). This recognition is particularly high among the youth and more tech-savvy segments of SSA, one of the largest and fastest-growing population groups in the region (World Bank, 2018)[7].

Figure 1: Global share of registered mobile-money customers in 2017



Source: Adapted from GSMA, 2017

7 Ownership of a mobile-money account grew among young adults from 9.9% in 2014 to 20.3% in 2017 (World Bank, 2018). This reflects an adoption growth rate of 10.4 percentage points and the most significant change among key demographic groups including rural, female, primary-school educated and low-income citizens.

3 Barriers to mobile money in SSA

This section provides a brief summary of select cost drivers that providers experience in issuing mobile money and that consumers endure to use mobile money in SSA.

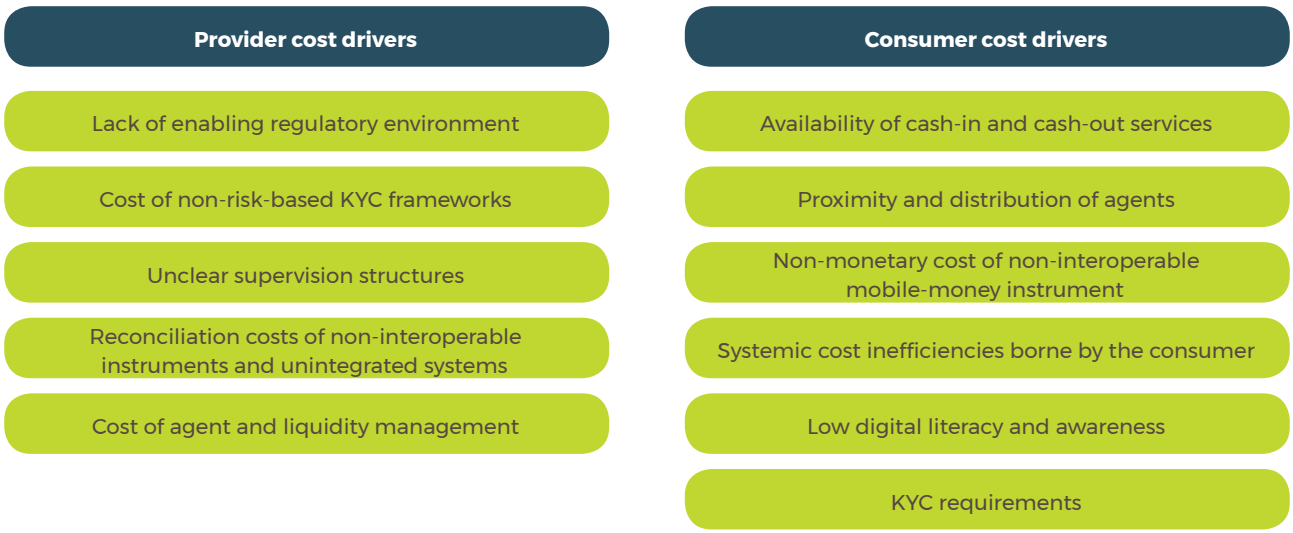
Challenges to the uptake and usage of mobile money remain in SSA. This section focuses on the major cost drivers experienced by both providers and consumers of mobile money in SSA. Figure 2 summaries selected drivers collected from research in SSA.

3.1 Provider cost drivers

Regulatory environments, prudential oversight and security risks raise the indirect costs of supplying e-money instruments.

- **Lack of enabling regulatory environment for agents:** In many cases, mobile-money transfer services can only start operating once MMOs are licensed by a central bank (Osafo-Kwaako, et al., 2018). Obtaining a licence, however, can not only be highly complex in terms of regulatory requirements, but also relatively expensive in terms of both fees and length of time needed to receive for approval (Cooper, et al., 2018). Regulatory uncertainty related to incomplete or ambiguous regulation can impose additional costs on MMOs that seek to provide innovative products (Cooper, et al., 2018)[8].
- **Burdensome customer due diligence (CDD) requirements and procedures:** The prevalence of rules-based CCD approaches for AML/CFT compliance in SSA often imposes costly challenges for payment service providers[9]. Specifically, due to its lack of flexibility and prescriptive nature, MMOs and agents are often required to provide an exhaustive amount of consumer documentation to regulators to ensure their compliance with know-your-customer (KYC) regulation, irrespective of the risks certain individuals pose to the financial system. The inability to tailor KYC requirements

Figure 2. Key supply- and demand-cost drivers of mobile money in SSA



Source: Author's Authors' own based on data from various literature sources

8 These costs are likely to be notably greater for smaller players who may not be able to benefit from regulatory grey areas as well as industry incumbents can.

9 A rules-based approach to AML/CFT compliance refers to a set of requirements and guidelines required by the public sector and the private sector to mitigate ML within the financial services sector (Cooper, et al., 2018). This approach is contrary to the risk or principles-based approach prescribed by the Financial Action Task Force (FATF) that is defined as a framework based on the implementation of compliance measures to mitigate ML relative to the associated level of risk. The application of a risk-based approach requires a robust understanding of risk and risk management (Cooper, et al., 2018).

proportional to the risks of clientele often leaves agents with the burden of large paper-document storage costs for all customers, high customer rejection rates related to undocumented clientele[10] and significant time lost due to complexities involved in adhering to stringent guidelines. These costs can be especially severe in the absence of clear regulatory guidance and can eclipse revenue streams from lower-income consumers (Cooper, et al., 2018d).

- **Unclear divisions of regulatory power:** Overlap in supervision oversight can often occur between financial service regulators and communications regulators. In certain instances, confusion on regulatory guidance between governing regulators can support unfair competition between MMOs. This is particularly true when MMOs are able to lobby the communications regulator to challenge central bank requirements that traditional financial institutions are required to comply with (Cooper, et al., 2018b).

Weak scheme integration and lack of interoperability increase reconciliation and processing costs. Although an increasing number of MMOs can interoperate with national switches, many mobile-money platforms continue to endure high costs in terms of money and time to settle payments between different, non-interoperable instruments across multiple networks and payment systems. Box 1 illustrates this by highlighting the complexity, and resulting array of reconciliation costs that MMOs and various other payment participants endure under three common forms of mobile-money systems or schemes. These three schemes refer to those that are closed-loop[11] schemes, open-loop[12] schemes and cross-border, mobile-money schemes. Under each scheme, a black "x" represents the existence and applicability of a present reconciliation cost for a given mobile-money scheme participant when facilitating the clearing and settlement of payment. Box 1 also shows that, irrespective of scheme, reconciliation costs to settle mobile-money payments are inherently high. This is not only due to the complex web of participants involved in the settlement procedure but also the explicit differences between uniquely defined mobile-money instruments across potentially different regions. The latter point is particularly highlighted by the fact that although open-loop schemes may allow for different mobile-money transactions to be facilitated across different systems, the need to clear payments across these various systems implies the accrual of additional and substantial costs. These costs increase further for cross-border mobile-money schemes when settlement and reconciliation are required across regional and/or international boundaries.

10 A lack of identification is cited as a primary reason for denied access to financial services by as much as 40% of the population in select countries in Africa such as the Central African Republic, Togo, Madagascar and Zimbabwe (World Bank, 2018).

11 Closed-loop mobile payments are those that enable consumers to load money into a spending account that is linked to a payment device and can only be spent or transferred to a fellow user of that system.

12 Open-loop mobile payment solutions allow users to pay at many different locations from one centralised digital wallet. Unlike their closed counterparts, open platforms are connected to a personal account – a credit card for example – and do not require a prepaid amount, which needs to be topped up when the money runs out.

Box 1. Mobile-money reconciliation costs across various stages of settlement between non-interoperable and partially-interoperable mobile-money schemes

A) Closed-loop mobile money – bank led	Agent	MMO	Bank 1	Bank 2	ACH	Central bank
Cash recon	x		x	x		
Bank account recon	x	x	x	x		
Mobile-money account recon	x	x				
Inter-bank recon		x	x	x	x	
Mobile-money scheme recon		x				
Automated clearing house (ACH) posting recon			x	x	x	
ACH settlement recon			x	x	x	
Central bank account recon						x

B) Open-loop mobile money – bank-led	Agent 1	MMO	Bank 1	ACH	Central bank	Bank 2	MMO	Agent 2
Cash recon	x		x			x		x
Bank account recon	x	x	x			x	x	x
eMoney account recon	x	x					x	x
Inter-bank recon		x	x	x		x	x	
Regional bank recon		x				x	x	
Mobile-money scheme recon		x					x	
ACH posting recon			x	x		x		
ACH settlement recon			x	x		x		
Central bank account recon					x			

C) Cross-border mobile money	Agent 1	MMO	Bank 1	ACH	Central bank	Regional bank	Central bank 2	ACH 2	Bank 2	MMO	Agent 2
Cash recon	x		x						x		x
Bank account recon	x	x	x						x	x	x
eMoney account recon	x	x								x	x
Inter-bank recon		x	x	x				x	x	x	
Regional bank recon		x							x	x	
Mobile-money scheme recon		x									
ACH posting recon			x	x				x	x	x	
ACH settlement recon			x	x				x	x		
Central bank account recon					x		x				
Regional balance of payment account recon					x						

Source: Author's own

Management and operational costs constrain the business case for agent-based mobile money. MMOs endure high operational costs due to high agent turn-over rates that raise the cost of recruitment and training[13] as well as security concerns that can force the installation of expensive security measures (Bersudskaya & Kuijpers, 2016). Low-income and low-density rural populations can further limit the profitability of agents and their ability to recoup costs if agent businesses are not sufficiently large and diversified. Liquidity management challenges, such as insufficient e-float to meet unpredictable cash demand, uncertain daily cash flows and unreliable electricity and connectivity, further undermine smooth business operations (Cooper, et al., 2018a).

3.2 Consumer barriers

Agent liquidity constraints limit consumer ability to conduct mobile-money transfers. Agents act as primary facilitators of mobile money to assist P2P money transfers, bill payments and other forms of mobile financial services. Agents without sufficient liquidity or e-float, a common characteristic in SSA, are unable to provide these services to customers (Lal & Sachdev, 2015). Research shows that in some instances, agents without liquidity actively deny the business of customers when they are unable to provide mobile-money transfers or cash-out services (Kiarie, et al., 2018). Furthermore, agents without sufficient e-float are exposing consumers to counterparty risks, thus creating reputational risk for the provider and high transaction costs in terms of recouping funds. These constraints can undermine consumer trust and reliance on agents, thus disincentivising greater mobile-money usage (Kiarie, et al., 2018).

Access to services is inhibited by limited proximity to agents in rural areas. Poor infrastructure, low revenue opportunities and weak access to existing encashment points limit the business case and viability of agent operations in rural areas (Mastercard Foundation & IFC, 2018). This has often resulted in not only the limited distribution of agents in these areas, but also their concentration around existing cash points that constrain their accessibility to remote populations (Cooper, et al., 2018c). As agents are often the only available points to cash in and cash out in rural regions, customers with payment-over-distance needs are subsequently forced to endure relatively high costs in terms of time and money required to travel to these agents to meet their needs (Achord, et al., 2017).

The lack of ubiquitous digital ecosystems limits convenience and ease of payment between different mobile-money instruments. Complete digital ecosystems remain relatively under-developed throughout SSA (Mastercard Foundation & IFC, 2018). This implies that, due to their closed-loop nature, money transferred through one mobile-money instrument may not necessarily be receivable by another mobile-money instrument on the other side of the country. This restricts the potential of P2P, peer-to-business, peer-to-government and government-to-peer use cases for mobile money (Mastercard Foundation & IFC, 2018). A lack of universal acceptance of mobile money by merchants further inhibits both its use and convenience for retail transactions relative to paper cash.

High system and processing costs are passed on to consumers. Mobile-money products are considered costly despite their relative affordability compared to more formal banking services (Donovan, 2012). These high costs stem from high transaction fees incurred by senders through money transfers, and receivers upon withdrawal, as well as high provider costs passed on to consumers (Tinsely & Ertekin, 2017). Fees can additionally refer to costs associated with bilateral partnerships, MMO payments relating to money transferred between non-standardised mobile-money schemes, mobile-money taxes (such as in Uganda and Zimbabwe for example), agent management costs, and deposit-holding fees charged by domestic and correspondent banks (Cooper, et al., 2018b). The expense of mobile data, airtime and

13 High managerial and training costs are worsened by the reluctance of mobile-money providers to share agents and contract third-party agent managers that could help to lower operational costs and benefit from economies of scale (Donovan, 2012).

other mobile contract fees exacerbate these costs further for consumers when using mobile money.

Low digital literacy and awareness reduce trust in mobile-money services. A commonly reported challenge to uptake and active mobile-money use is a lack of understanding regarding how mobile money operates and why it is beneficial to use (Mastercard Foundation & IFC, 2018). This lack of knowledge and public awareness fosters mistrust of mobile-money services and sub-optimal use (Statham, et al., 2017). This mistrust encourages low acceptance of mobile money as a valid means of exchange, thus incentivising individuals to retain cash in favour of digital financial services (Statham, et al., 2017). Furthermore, low levels of financial and digital literacy can be especially costly and detrimental when it places consumers at greater risk of being short-changed by agents, manipulated by agents as mobile-money service instructors, and at risk of fraud, leading to limited or restricted product use.

KYC requirements present hurdles in opening mobile-money accounts. Some form of national identity is typically required to open mobile-money accounts as per CDD compliance regulation (Cooper, et al., 2018b). In SSA, however, 31% of the adult population do not possess a national identity (World Bank, 2018b). Furthermore, of those without formal financial accounts, 25% attribute their exclusion to lacking the necessary documentation such as proof of address (World Bank, 2018). This implies potentially high costs to obtain the necessary documentation and to deliver it to relevant providers. Although many SSA countries permit reduced KYC requirements to open mobile-money accounts, these exemptions are likely to increasingly require some form of digital identity, such as biometric indicators, which only a limited proportion of the SSA population currently possess (Cooper, et al., 2018d).

> A lack of universal acceptance of mobile money by merchants further inhibits the use and convenience [of mobile money] for retail transactions relative to paper cash.

4 The potential impact of CBDC on mobile money in SSA

Given the promising role of mobile money for financial inclusion in SSA, this chapter focuses on the possible effects that CBDC may have on mobile money to help overcome its existing cost drivers and support its adoption.

Table 1: Identification of CBDC impact on mobile money

Positive effect	• Alleviating need for scheme integration • Improved payment efficiency at reduced risk and cost* • Facilitating agent access to liquidity
Promising effect	• Strengthening building blocks of trust • Consumer affordability • Alleviating the cost pressure of correspondent banking for providers
Neutral effect	• Infrastructure • CDD AML/CFT compliance regulation • National identity systems • Punitive regulation (mobile-money tax) • Financial literacy and numerical skills • Consumer data privacy
Destabilising effect	• Intermediation role of banks (short run)*
Negative effect	• Digital and financial inequality • Security relating to development of inclusive distribution channels*

Source: Authors' own

**These impacts of CBDC on mobile money reflect additional externalities that do not necessarily speak to a mobile-money barrier identified in Section 3.*

4.1. Positive, promising potential effect

Positive effect:

Weak scheme integration and interoperability between mobile-money schemes impose high reconciliation and processing costs on providers.

Interoperability through CBDC reduces the need for systems integration. Unlike mobile-money instruments, CBDC describes sovereign legal tender that is universally acceptable (Cooper & Allen, 2018). In many instances it would not be legally possible to compel all mobile-money providers to accept CBDC or for it to become their preferred medium of exchange over traditional cash, for example. The fungibility of CBDC would, however, facilitate the interoperability of instruments and thereby enable mobile-money providers to send and receive CBDC from any MMO, financial institution or point-of-sale facility with greater ease. In other words, due to its legal recognition by regulation and the prudential supervisor as legal tender, any instrument based on CBDC would increasingly be able to interoperate with other instruments underpinned by the same legal tender in the form of CBDC. This key similarity between fundamentally distinct mobile-money instruments would in turn translate into reduced complexity of transaction processing, reduced overall risk, governance and oversight, thus enabling true system-wide interoperability based on a ubiquitous instrument, i.e. CBDC-based mobile-money instruments. A ubiquitous, self-contained instrument such as this would facilitate the provision of seamless payments across providers and reduce connection costs for providers.

Positive effect:

Improved payment efficiency at reduced risk and cost relating to high reconciliation and processing costs on providers

CBDC application to mobile money can streamline reconciliation processes to boost payment efficiency and minimise systemic risks.
A primary feature of CBDC is its ability to facilitate the elimination of third-party intermediaries from the clearing and settlement stages of payment. This comes from its ability to replace these intermediaries with algorithmic protocols or governance rules to trigger reconciliation. This is in contrast to the step-by-step procedures within legacy systems. In the context of mobile money, Box 2 illustrates the extent to which these mechanisms could not only eliminate reconciliation steps and costs but also the systemic and counterparty risks inherent in lagged, step-wise layers of settlement procedures required before payment can be successfully sent or received.

Specifically, across all closed, open and cross-border mobile-money schemes, the roles of the central bank and ACH are removed. The removal of these intermediaries implies the elimination of their associated reconciliation steps and costs from settlement procedures. These cost eliminations are depicted in Box 2 by the greying of the "x's" associated with given reconciliation costs under different payment participants[14]. These costs may include payment reconciliation between distinct e-monies, interbank reconciliation, reconciliation between different mobile-money schemes, ACH posting and settlement reconciliation costs, regional intermediary bank reconciliation between different commercial banks, central bank account reconciliation and, in the case of cross-border payments, reconciliation of regional balance of payment accounts.

The removal of these steps promotes greater payment efficiency at faster speeds and lower costs for providers, as well as reduced risks for both providers and consumers. For providers, risks of constrained liquidity access are reduced, as well as those relating to the systemic failure of any one payment participant such as a bank. The minimisation of the former risk is especially relevant for mobile-money providers given that regulators perceive them as a high risk to the national money supply due to their ability to distribute cash equivalent instruments. By mitigating this risk, however, prudential regulators may start to perceive the financial stability risks of providers as relatively contained. However, proposed applications of unified security models for the protection of wider digital currency ecosystems could also be employed, to ensure the mitigation of any risk faced by providers or regulators who transfer CBDC value[15]. For consumers, counterparty risks related to the potential for payments to become stuck or lost in the system during clearing procedures between different intermediaries are significantly reduced, thus assuring timely payment over distances.

14 Encircled black x's in box 2 indicate their continued existence as a relevant cost to payment participants despite the application of CBDC

15 For more information on the Unified Security Model, please see the ITU focus group website on Digital Currency including Digital Fiat Currency: https://www.itu.int/en/ITU-T/focusgroups/CBDC/Pages/default.aspx

Box 2. Reconciliation steps and costs removed by the application of CBDC to closed, open and cross-border mobile-money schemes

A) Closed-loop – mobile money CBDC	Agent	MMO	Bank 1	Bank 2	ACH	Central bank
Cash recon	ⓧ		ⓧ	x		
Bank account recon	ⓧ	ⓧ	ⓧ	x		
Mobile-money account recon	x	x				
Inter-bank recon		x	x	x	x	
Mobile-money scheme recon		x				
ACH posting recon			x	x	x	
ACH settlement recon			x	x	x	
Central bank account recon						x

B) Open-loop – mobile money CBDC	Agent 1	MMO	Bank 1	ACH	Central bank	Bank 2	MMO	Agent 2
Cash recon	ⓧ	ⓧ	ⓧ			ⓧ	ⓧ	ⓧ
Bank account recon	x	ⓧ	ⓧ			ⓧ	ⓧ	x
eMoney account recon	x	x					x	x
Inter-bank recon		x	x	x		x	x	
Regional bank recon		x				x	x	
Mobile-money scheme recon		x						
ACH posting recon			x	x		x		
ACH settlement recon			x	x		x		
Central bank account recon					x			

C) Cross-border – mobile money	Agent 1	MMO	Bank 1	ACH	Central bank	Regional bank	Central bank 2	ACH 2	Bank 2	MMO	Agent 2
Cash recon	ⓧ	ⓧ	ⓧ						ⓧ	ⓧ	ⓧ
Bank account recon	ⓧ	ⓧ	ⓧ						ⓧ	ⓧ	ⓧ
eMoney account recon	x	x								x	x
Inter-bank recon		x	x	x				x	x	x	
Regional bank recon		x							x	x	
Mobile-money scheme recon		x								x	
ACH posting recon			x	x				x	x		
ACH settlement recon			x	x				x	x		
Central bank account recon					x		x				
Regional balance of payment account recon						ⓧ					

Source: Author's own

Positive effect:

Management and operational costs constrain the business case for agent-based mobile money.

CBDC eases the liquidity rebalancing needs of mobile-money agents. The likely decentralised nature of the system underpinning CBDC has the potential to reduce the reliance of mobile-money agents on commercial banks as traditional distributors of liquidity[16]. CBDC-compliant payment systems may alternatively allow any bank, and potentially non-bank institutions, to access CBDC on-demand as independent holders of funds as payment system participants subject to given mechanisms and system protocols. This level of participation would enable each agent and MMO to rebalance its own funds independently of partnerships with commercial banks or super agents. As a result, agents would no longer be placed in situations of having to deny transactions due to insufficient e-float or having to wait for banks or super agents to advance e-float only at predetermined times.

Promising effect:

Low digital literacy and awareness reduce trust in mobile-money services.

CBDC can strengthen the building blocks of consumer trust. There are three essential building blocks that either erode or develop trust in terms of product or instrument usage. These are predictability, perception of protected consumer interests and the perceived effectiveness of available recourse mechanisms (Rinehart, et al., 2018). CBDC-linked mobile money has the potential to address each of these elements:

- **Predictability:** As previously established, CBDC-linked mobile money has the potential of significantly reducing counterparty risk related to payments. This can resultantly ensure that when agents facilitate transactions, those transactions do indeed reflect their full value and in real time for consumer peace of mind.
- **Perception of the consumer's best interest:** The necessary backing of CBDC by a central bank suggests its ability to foster consumer trust in products associated with the instrument. The level of assurance provided will, however, depend on the amount of faith that consumers place in their central bank. Nevertheless, given that mobile money is often perceived as a riskier instrument than central bank digital currency cash, its link to CBDC distributed by a central bank with integrity has the potential to boost both its reputation and use.
- **Recourse availability:** The inherent traceability of CBDC transactions implies that authorities can more easily recoup value in the case of fraud, theft or miscellaneous use. Additionally, the potential for recourse is likely to be much stronger as CBDC would fall directly under the mandate of a central bank whose responsibility would be to ensure the security, irrevocability and immutability of its legal tender instruments. Mechanisms for its mitigation and recourse would have to be assured prior to implementation by the central bank even though the immutability of CBDC transactions suggests its low likelihood of being affected by fraud.

By actively addressing each of these building blocks and fostering consumer trust, CBDC-linked mobile money has the potential to stimulate greater willingness among consumers to engage with the product itself.

16 This role stems from their licence as banks to be deposit-taking institutions and resultantly capable of intermediating their available funds to create consumer credit and provide for their withdrawals. Other non-bank institutions such as money transfer operators or MMOs do not necessarily possess this right unless they are in partnership with a commercial bank and are able to utilise funds under clearly defined terms and conditions.

Promising effect:

High costs passed onto consumers due to weak scheme standardisation among other drivers

CBDC application reduces mobile-money operational costs. CBDC can address various payment and operational frictions that drive mobile-money provider costs upward:

- Firstly, CBDC eliminates the need for commercial banks to hold mobile money in escrow accounts on behalf of MMOs. Any fees associated with this requirement will resultantly fall away and reduce the costs passed onto consumers.
- Secondly, agents and their mobile-money services may no longer be burdened by costs passed on by commercial banks relating to reconciliation fees on interbank settlements or any other additional operating fees.

The combination of these cost-saving elements can resultantly reduce the total indirect costs passed onto users of mobile money.

Promising effect:

Alleviating the cost pressure of correspondent banking for providers

The nature of correspondent banking will change with CBDC implementation. Mobile-money schemes that offer cross-border payment services currently require correspondent banking relationships. However, if governments recognise and accept CBDC, it is possible that CBDC-linked mobile money may not need correspondent banks for foreign exchange in the same way. This would be possible given that CBDC could be automatically translated into different currencies through specific consensus mechanisms. These mechanism may, in turn, reduce the effect of burdensome correspondence banking costs for domestic providers; and it may free up capital to reinvest in the design of valuable and cost-effective product offerings.

4.2. Neutral potential impacts

There are a number of context-driven structural and regulatory constraints to mobile money that the application of CBDC is unlikely to change in the short-to-medium term. This implies that the immediate impact of CBDC on mobile money is more likely to be neutral on these specific constraints. These include:

- Inadequate infrastructure such as unreliable electricity supply, poor transport networks, poor internet connectivity and inaccessible or unreliable cell towers[17]
- Rules-based AML/CFT compliance practices that require regulators to buy into more principles-based frameworks, poor enabling regulatory environments that do not support innovation and grey areas of regulation
- A lack of national or financial identity systems and rules-based regulatory approaches that require significant capital investment from governments
- Punitive regulation or disproportionate prudential requirements imposed on MMOs, mobile-money tax
- Low financial literacy and numerical skills
- Consumer data privacy

Unlocking reforms in these key areas will resultantly be critical for both the broad uptake and use of CBDC-linked mobile money. Until these take place, CBDC-based mobile money is likely to succumb to the same constraints that current mobile-money instruments endure. Neither a positive nor negative effect can therefore be estimated from the application of CBDC.

17 For example, diesel-powered towers that run out of fuel periodically, particularly during the rainy seasons.

4.3. Destabilising-negative potential impacts

Destabilising effect:

Threatened intermediation role of banks

Mobile-money agents as holders of liquidity may threaten commercial bank intermediation in the short run. Independent agent access to CBDC liquidity suggests the reduced capability of commercial banks to utilise available funds for credit intermediation. This comes from the ability of non-financial institutions on more decentralised systems to provide more credit due to their direct access to market liquidity[18]. This potentially threatens a key function of commercial banking models as a vital source of revenue. In response, banks may either attempt to impose costs on CBDC products or improve their business model to compete on value rather than price. Short-term strategies by financial institutions are more likely to be geared towards retaining profitability at the expense of consumer affordability. It is key to note, however, that these strategies would only be required if the deposit-taking power of banks were extended to mobile-money providers, thus enabling them access to new sources of liquidity.

Negative effect:

Low digital literacy and awareness reduce trust in mobile-money services.

CBDC can exacerbate digital inequality in access and use of both mobile money and mobile phones. CBDC may introduce an unintentional layer of complexity to mobile-money usage. This complexity can, in turn, increase the difficulty to not only understand how mobile money operates but also how it can benefit consumers. Furthermore, marginalised individuals who do not have access to mobile phones may be further excluded from the benefits of the digital society in the absence of a prerequisite tool with which to interact with the digital financial services. In this way, CBDC-linked mobile money may risk worsening both digital inequality and financial inclusion among the most vulnerable and socio-economically excluded from society.

Negative effect:

Security of immutable transactions

CBDC-linked mobile-money accounts can inadvertently present security threats to transactions. This derives from the need to create channels to ensure that USSD-enabled or feature phones can utilise internet-dependent CBDC-linked mobile money. MNOs in this instance may be identified as de facto clearing houses or channels for standard mobile money to be directed to by basic phones, and subsequently converted into CBDC prior to its transfer to a smartphone-owning recipient. This process, however, implies the introduction of a centralised third-party intermediary (e.g. the MNO). This introduction may disproportionally place MNOs at risk of cyber-attacks on the CBDC ledger due to its function as a clearing house, in effect holding value behind USSD transactions. The vulnerable and poorer segments of the population, as primary USSD customers, may also be at risk of identity theft or fraud in this case.

18 This could arguably stimulate greater participation in the credit market by existing competitors such as Alibaba in China, and African MMOs such as M-Shwari by Safaricom in Kenya. Conversely, a higher speed and efficiency in cash turnover could provide commercial banking intermediation models with additional liquidity over time.

5 CBDC imperatives for financial inclusion through mobile money

Based on findings in the preceding chapters, it is clear that CBDC presents notable opportunities for current mobile-money instruments in terms of fostering greater interoperability, improving payment efficiency, cost-saving gains and reducing key risks. However, given the real risks that may occur due to the incorrect implementation of CBDC-linked mobile money, it is evident that a number of prerequisites need to be considered to ensure that the benefits of CBDC materialise in the form of higher levels of financial inclusion. This chapter summarises the key actions and prerequisites that need to be addressed by various market participants to achieve this objective while minimising the risks associated with CBDC-linked mobile money.

Mobile-money CBDC scheme rules and participation on national ledgers must be clearly defined for efficient and affordable transactions. The seamless and frictionless nature of CBDC-based mobile money will depend on the degree of interoperability between various MMOs and products. This implies the need to ensure the standardisation of mobile-money platform schemes, as well as the neutrality of their participation on the CBDC ledgers. The common design of mobile-money products and their on-par fungibility between each other will further be required. New arrangements and obligations may also need to be developed between commercial banks, MMOs and central banks. These should include:

- Reform of escrow holding accounts by commercial banks and their gate-keeping role to national payment systems
- Clear restrictions of MMO activity using CBDC relative to commercial banks, i.e. the business of banks and powers of intermediation of MMOs as non-deposit-taking entities

This process of reform will ideally be top-down, with clear and substantive regulation or guidelines developed.

The legal definition of CBDC and its incorporation into existing regulation are prerequisites for CBDC application. This may be achieved either through guidelines on the re-interpretation of existing regulation in favour of CBDC, issuing new regulation or promulgation of broad amendment legislation. Any form of guidance, however, should underline the operation or functionality of CBDC relative to physical cash and electronic money. In doing so, distinctions should be made between holders and owners of CBDC in relation to CBDC usage, i.e. a definitive law that either supports or deviates on existing statute and common law of currency. This law should explicitly state the equivalency of CBDC to physical currency, and clearly define exceptions and deviations. It should further differentiate between holding data, possessing it and ownership.

AML/CFT regulation frameworks will need to be adjusted to cater for the speed and frequency of mobile-money CBDC transactions. The AML/CFT framework specifically needs to balance AML/CFT risk concerns and financial inclusion considerations when considering CBDC. This may imply, for example, the incorporation of special CDD/KYC requirements for transactions conducted in CBDC as part of a broader tiered KYC approach with adjusted transactional limits. The implementation of risk-based or principles-based approaches to AML/CFT compliance, in line with prescriptions by the FATF , will be essential to ensuring the smooth incorporation of CBDC into risk assessments and current national regulation. However, effective implementation of this approach should not be radically altered by the consideration of CBDC, as the risks to mobile money would equate to, if not be lower than, the risk these schemes currently present to financial integrity with CBDC.

The safeguarding of consumer data is an essential prerequisite without which CBDC cannot exist. The usage of CBDC implies that the financial lives of consumers will predominantly take place online, thus potentially providing FSPs and telecommunication companies with an inordinate amount of consumer financial and/or transactional data. To ensure that this data does not get sold to third parties for marketing gains or manipulated to be used against clients for malicious purposes, national governments will require the promulgation of strong consumer

protection laws that place consumer interests at the centre of the laws. These laws should explicitly define who owns the data of consumers, how consumer data may be used, by whom, under what circumstances and with whose permission. In all instances, consumers should remain the primary holders of their data with the authority to dictate who can or cannot use their data for what purposes. Exceptions should be made for national authorities (such as financial intelligence units), but these exceptions should only be granted through special legal warrants.

Strict definitions and protection of consumer privacy are imperatives for both consumer and national security. The traceability of CBDC implies that the privacy of both consumer identity and provider information will require greater security than what is currently in place. To address this requirement, stricter and clearer definitions of consumer identity will have to be defined such that they take into account those that are digital. Furthermore, this redefinition of identity will require the explicit outlining of which type of institutional entities are privy to identity of digital ID proxy information (e.g. physiological traits, mobile global positioning system (GPS) location and transactional history) into consideration and explicitly state which entities are privy to these identities or digital proxies, i.e. who has access to digital identities and under what legislative process application can be made. This implies that restrictions or limitations may need to be defined and placed on the power of the central bank to access the CBDC accounts of individuals and freeze given accounts – an ability that should be restricted to only exceptional cases that are based on prima facie evidence. These restrictions should also be underpinned by the stipulation of clear safeguards that protect the integrity of the financial system, in addition to consumer value, from cyber-attacks by utilising programmes such as quantum computing and machine learning. Recourse mechanisms for the violation of consumer privacy and abuse of consumer data will need to be further outlined based on clear laws and legal procedures. MNOs acting as USSD clearing houses may require special regulatory guidance in this regard.

“The traceability of CBDC implies that the privacy of both consumer identity and provider information will require greater security than what is currently in place. To address this requirement, stricter and clearer definitions of consumer identity will have to be defined such that they take into account those that are digital.”

Clear stipulation is required on regulator powers governing CBDC-transferring MMOs. A distinction between the authority of a financial service regulator and telecommunications regulator is required to avoid unfair competition through ambiguity. Consensus will therefore be required between regulators regarding new CBDC developments and participants, as well as clearly defined guidelines and limitations to support innovation.

Business models of financial and non-financial institutions must be clearly defined, with appropriate incentives that do not undermine innovation. These models should include the weighing-up of short-term profitability drivers and long-term gains in efficiency and cost-savings. Proofs of concept on the likely outcomes of CBDC mobile money should be conducted to illuminate the true costs and gains for businesses. An additional component of this exploration by banks will require their concerted re-consideration of revenue models, such that value be created through innovation rather than inhibited by exorbitant mobile-money service pricing. Regulatory frameworks should also be in place to provide banks the option to test and learn from new business models, such as the introduction of sandboxes.

CBDC design should be context-specific and should accommodate infrastructural limitations. CBDC-linked mobile money should ideally be electricity-efficient where the supply is constrained (e.g. solar power). To facilitate network effects and scale, mobile-money network coverage would need to be wide enough to serve both urban and rural populations, as well as be sufficiently reliable, network-agnostic and enable CBDC offline access. The latter point will be particularly important for populations in developing countries where CBDC-linked mobile money should not be mobile-data intensive. Alternatively, it should accommodate USSD users as product-agnostic. The degree to which providers are technologically neutral will also ensure that the most appropriate technology be utilised to facilitate CBDC for the given contexts and requirements.

Literacy and trust are fundamental pillars of any CBDC-linked mobile money. Aggressive and long-term public CBDC awareness and literacy campaigns will be required to stimulate uptake and adoption by primary target markets; and ideally, consumer interaction or convenience should at least be equivalent to, or better than, existing mobile-money processes. These target markets should specifically include the low-income and rural. Demonstration and teachable moments may be vital mechanisms to encourage uptake and active usage of CBDC-linked mobile money. The ultimate success of these initiatives, as compared to existing attempts to encourage mobile-money adoption, must be strongly supported by the targeted and sustained collaboration between national authorities and MNOs. This may need to be stipulated as an obligation of CBDC mobile-money regulators.

6 Concluding remarks

Mobile money presents a significant use case for CBDC and financial inclusion, but not without risks. The link between CBDC and financial inclusion can be observed by its potential to ease constraints associated with mobile-money provision and use in SSA. As a result of its ability to remove unnecessary third-party intermediaries from the settlement procedure and streamline payment clearance, the application of CBDC has the potential to:

- facilitate true interoperability between different mobile-money instruments
- reduce the cost and complexity of reconciliation processes
- minimise systemic risks of mobile money
- ease the liquidity constraints of mobile-money agents
- possibly even address concerns of both mobile-money trust and affordability

Alternatively, however, CBDC also presents the possibility of threatening the intermediation role of traditional deposit-taking FSPs, exacerbating weak usage of mobile money through its perceived complexity, and placing mobile-money providers at risk of cyber-attack as potential CBDC clearing houses for USSD-based mobile-money transactions.

Satisfaction of key prerequisites determines the extent to which CBDC can strengthen mobile money in SSA. To minimise the potential of CBDC having a destabilising or harmful effect on mobile money, regulators and providers need to be considerate of a number of conditions that can undermine its benefits for financial inclusion. These conditions range from ensuring appropriate legal tender and AML/CFT regulation to implementing sufficiently robust consumer protection laws and national cyber-security defences. Furthermore, for CBDC-linked mobile money to be both accessible and utilised effectively, both context-specific supply and demand conditions affecting mobile money need to be considered. By addressing these concerns before and during its implementation, the impact of CBDC on mobile money could potentially contribute to greater levels of financial inclusion and better economic integration.

> “For CBDC-linked mobile money to be both accessible and utilised effectively, both context-specific supply and demand conditions affecting mobile money need to be considered.”

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About Cenfri

The Centre for Financial Regulation & Inclusion (Cenfri) is a global think tank and non-profit enterprise that bridges the gap between insights and impact in the financial sector. Cenfri's people are driven by a vision of a world where all people live their financial lives optimally to enhance welfare and grow the economy. Its core focus is on generating insights that can inform policymakers, market players and donors seeking to unlock development outcomes through inclusive financial services and the financial sector more broadly.

About FSD Africa

FSD Africa is a non-profit company that aims to increase prosperity, create jobs and reduce poverty by bringing about a transformation in financial markets in sub-Saharan Africa (SSA) and in the economies they serve. It provides know-how and capital to champions of change whose ideas, influence and actions will make finance more useful to African businesses and households. It is funded by the UK Aid from the UK Government. FSD Africa also provides technical and operational support to a family of 10 financial market development agencies or "FSDs" across SSA called the FSD Network.