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Digital Payment Innovations in Sub-Saharan Africa

Prepared by an IMF team led by Luca Antonio Ricci, Calixte Ahokpossi, Saad Quayyum, and Rima Turk, comprised Anna Belianska, Mehmet Cangul, Habtamu Fuje, Sunwoo Lee, Grace Li, Xiangming Li, Yibin Mu, Nkunde Mwase, Jack Joo Ree, and Haiyan Shi, under the guidance of Vitaliy Kramarenko.

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Executive Summary

This paper takes stock of developments and policy issues related to digital payment innovations across sub-Saharan Africa. The focus is on Central Bank Digital Currencies (CBDCs), fast payment systems (FPS), private mobile money, and crypto assets, which are now at the forefront of policymakers' attention in the region. On the one hand, these digital innovations offer potential complementarity and substitutability for key policy goals related to boosting financial inclusion—particularly unleashing a digitally enabled youth—improving financial sector efficiency and lowering transaction costs. On the other hand, achieving these goals requires addressing challenges and mitigating risks, which are particularly heightened in the sub-Saharan African region. These include limited financial development, lack of information technology (IT) resources, and constraints on central bank capacity in many countries. In this context, managing risks arising from crypto assets is particularly challenging. The paper takes into account sub-Saharan Africa-specific characteristics and offers tailored recommendations related to policy, regulation, and design. The goal is to help countries enhance financial efficiency and inclusion, including through promoting interoperability both domestically and across borders, as well as supporting digital financial innovations such as smart contracts, tokenization, and fractionalization, while minimizing risks to financial stability.

The paper draws insights from a recent IMF survey of sub-Saharan African central banks (Ricci and others 2024). About 75 percent of surveyed sub-Saharan African central banks are exploring CBDCs for its potential to boost financial inclusion and improve the efficiency of domestic payments. Key benefits of adopting CBDC include reducing transaction costs and facilitating remittances. Wider access to financial services through CBDCs could also potentially lower informality. Fast payment systems and mobile money are viewed as quick wins, despite their heterogeneous development across the region. The use of crypto assets is limited and concentrated in a few countries, and many central banks lack adequate frameworks to regulate them. The survey suggests there is scope to improve the digital payment landscape, leading to a more competitive and efficient financial sector, with better-regulated financial technology (fintech) activities, and ultimately leading to deeper financial development. A more efficient and inclusive cross-border payment system can also support regional trade integration and thus promote exports.

The analysis in this paper is grounded in the unique characteristics of sub-Saharan Africa compared with other regions. Whereas emerging literature now offers key policy recommendations for a broad set of countries, this paper focuses on the key policy issues associated with the special economic and structural features of sub-Saharan African countries. These include structural impediments, low financial development, limited access to capital flows, as well as weaknesses in governance, management of data privacy, and technical capacity. Many sub-Saharan African countries exhibit structural challenges, particularly with respect to mobile and internet penetration, but also in terms of unreliable electricity supply, large IT skill gaps, low financial and digital literacy, and slow and costly payment systems (notably for cross-border transactions). At the same time, most countries exhibit high informality, low financial inclusion, and shallow financial systems with weak traditional banking penetration. Remittances, which are affected by high transaction costs, are a vital source of household (HH) income and external financing in sub-Saharan Africa. Many countries extensively rely on capital flow management measures, including those for reserve management. Capacity and resource constraints are often significant in public administrations, whereas the human and physical costs of developing new financial instruments are large. The tax revenue-to-GDP ratio remains low, often reflecting extensive informality and the need for a more efficient collection and administration system. These characteristics lay the ground for more nuanced policy recommendations for sub-Saharan Africa compared with those that are generally being discussed for advanced economies or even emerging markets.

Several risks are also more prominent in sub-Saharan Africa than in other regions. Potential threats to financial integrity (including both ML/TF and corruption considerations), capital flow management, consumer protection, privacy, competition, and rule of law are quite pervasive in sub-Saharan Africa and could be exacerbated by the growing use of crypto assets, weak regulatory capacity, and limited financial education. Risks associated with network failures, internet disruptions, business continuity, and cybersecurity breaches would also be exacerbated by inadequate infrastructure and weak capacity potentially. Limited trust and poor adoption increase reputational risks, whereas the rapid obsolescence of new technological platforms and challenges in interoperability could be exacerbated not only by weak capacity but also by poor design and fast technological progress. Risks of banking disintermediation and financial instability, weaker monetary policy transmission, currency substitution, capital account volatility, and other cross-border issues—in part associated with inadequate instrument design or regulation—would be aggravated by weak macroeconomic stability in some countries.

The paper offers some high-level recommendations specific to the various digital payment innovations:

- ***Supporting the adequate development of private mobile money through the establishment of a robust operating environment*** would continue to revolutionize payments in Africa, particularly given its track record of improving financial inclusion and supporting remittance flows. Developing an adequate regulatory environment that lowers barriers to entry and promotes interoperability can stimulate competition and portability among digital payment providers. Regulations should seek to minimize risks for users, while ensuring the system remains robust to operational risks. Mobile money deposits, for example, need to be adequately backed, while digital lenders need to be regulated as other lending institutions. Digital payments through mobile phones could also help reduce informality and support better tax collection (though the extent could depend on the quality of public financial management and legal frameworks).

- ***Intensifying country efforts to leverage fast payment systems*** would improve payment speed, reduce transfer costs, and encourage wide adoption of rapid and more affordable digital payment options, while promoting competition and interoperability across different payment providers, including mobile money services. Fast payment systems are emerging as a key form of public–private collaboration to create a conducive environment for financial development by expanding digital payment access beyond those offered through traditional means. This offers a unique opportunity for technological leapfrogging in a region characterized by low financial literacy. Hence, the combination of an adequate FPS with a well-developed, competitive, efficient mobile money sector could deliver large gains of efficiency and inclusion in the payment system.

- **CBDCs can complement and support the development of private mobile money and fast payment systems** and could be pursued when there are well-identified market failures or other strategic reasons that require public intervention in the digital payment space. Many of the motivations for CBDCs, including greater financial inclusion, could often be efficiently addressed with private payment systems or through other public policy interventions. Hence, countries in sub-Saharan Africa could generally prioritize the development of adequate fast payment systems and well-regulated and competitive private mobile payments. At the same time, central banks could explore the complementary roles that CBDCs can play, assess specific market failures that a CBDC can uniquely address, and evaluate other strategic rationales for CBDCs. In countries where adequate fast payments and well-developed mobile money operations still give rise to market failures, a well-designed CBDC might potentially be the right way to contribute to financial development as well as financial inclusion (see IMF's CBDC Virtual Handbook Page [https://www.imf.org/en/Topics/digital-money-and-fintech/central-bank-digital-currency/virtual-handbook]). Some other strategic reasons why central banks may want to pursue CBDCs include risks of failure of private digital payment solutions, high costs of meeting demand for central bank physical cash, having programmable public money in the digital payment space, and the need for the central bank to interact more efficiently with well-advanced digital markets, including tokenized markets. CBDCs could indeed complement the combination of FPS and private mobile money by facilitating settlement, ensuring greater resilience in

payments, and reducing fragmentation. Conducting research and pilots and discussing with all stakeholders are important for assessing the likely effect of launching CBDC in the local context. Authorities should also gauge benefits against associated costs and risks, as well as consider alternative solutions, available resources, technical capacity, and macroeconomic conditions. Because CBDCs pose complex technological, policy, and regulatory challenges, it is important for authorities to consider the adequacy of technological infrastructure, internet connectivity, IT skills, and financial and digital literacy. A sound legal basis and effective regulatory framework are essential to contain risks to bank disintermediation, monetary transmission, capital flows, and ultimately financial stability (IMF 2020b), as well as to ensure that operational, cyber, and privacy risks are mitigated (Murphy and others 2024). Managing reputational risk and possible risks of limited trust and poor adoption would require appropriate communication policies as well as sound macro policies that support confidence in the local currency.

- ***Crypto assets should not be adopted as official currency or legal tender.*** Developing and enforcing comprehensive regulations and institutions, including prudential, conduct, and oversight requirements for crypto market actors (including local exchanges), would help contain their associated risks, such as those related to financial, external, and fiscal stability (IMF 2023d; IMF-FSB 2023). The regulatory environment should envisage a clear distinction between crypto assets which are fully backed and those that are not, because the former present lower risks for consumers and the financial system, notably in relation to valuation volatility. Granting crypto assets official currency or legal tender status should be avoided, because it would raise significant macrocritical legal issues as well as impair monetary sovereignty and monetary and financial stability.

The paper outlines four key sets of policy priorities to safely enhance digital payment innovations across sub-Saharan Africa:

Priority set 1: Addressing structural impediments and bottlenecks for the development of efficient digital payment innovations

- Urgent efforts need to be devoted to improving access to electricity, internet, and mobile networks because broader connectivity and lower risks of disruptions provide opportunities for wider and safer access to digital payments, thus deepening financial inclusion.
- Given the heterogeneity in the ability to develop internet and mobile connectivity across the region, it may be essential in many countries—at least in the immediate term—to favor, to the extent possible, technological solutions that allow for offline capabilities for digital payments while mitigating risks.
- Expanding coverage of national and digital IDs (generally a precondition for opening digital accounts) would broaden access to digital systems while facilitating operators' and regulators' ability to address financial integrity and ML/TF concerns.
- Greater investments in human capital would also be necessary to unlock the potential of digital payment innovations by promoting an environment in which new skills would emerge to develop digital finance.
- Broadening efforts to deepen financial literacy would not only promote financial inclusion but also enhance consumer protection and reduce exposure to consumer fraud.

Priority set 2: Supporting the robust development of private digital payment innovations and effective and interoperable fast payment infrastructures within an enabling, competitive, and secure environment that mitigates sub-Saharan Africa-specific risks.

- Governments can promote the development of digital payment innovations by creating an enabling regulatory, operational, and supervisory environment for digital payment systems, services, and providers. In particular, they should focus on developing interoperable digital payment platforms, at least domestically or regionally, along with enhancing governance and management of data privacy. These measures would

level the playing field, support safe and efficient digital payments, stimulate fair competition, promote portability of services across providers, prevent arbitrage, and contain disintermediation. In addition, they can help minimize risks for users, contain risks related to ML/TF, provide an alternative to some functionalities of crypto assets, and strengthen cybersecurity while enhancing consumer protection. Overall, developing an adequate FPS and a competitive and efficient mobile money sector would go a long way in delivering an efficient and inclusive digital payment system.

- Private digital service providers should be subject to similar prudential rules for comparable activities (if any) offered by traditional financing actors, including banks. It would be essential for e-money issuers (EMIs) to meet statutory minimum requirements for licensing on an ongoing basis. Their initial capital should be sufficient to undertake the proposed costly new activities, absorb startup losses as needed, and meet the cost of nonproductive assets. Customer deposits with EMIs should be invested in safe assets.

- Because often large segments of the sub-Saharan African population are at the fringe of the economic and financial system and may not have access to digital finance, safeguarding the provision of cash and the obligation to accept cash as a form of payment will be essential to ensure that financial exclusion is not exacerbated by the declining use and acceptance of cash.

- Bringing crypto assets into the regulatory and supervisory environment, along with strengthening regulatory capacity, would mitigate risks associated with their use. Particular attention should be given to consumer protection—considering the limited financial education among users—and to ML/TF considerations—given the generally weak regulatory and supervisory environment. There is also a need to strengthen institutional capacities and legal frameworks, especially for detecting and prosecuting corruption in fragile and conflict-affected state. In addition, addressing capital flow risks is crucial, given the high exposure to these risks, as well as promoting financial education, particularly for the older population and for navigating more complex digital products.

- Policymakers should stand ready to manage potential unanticipated effects on monetary transmission and financial stability. Mobile money balances may respond more significantly and quickly to monetary policy instruments, leading to higher velocity of money and faster shifts in deposits between traditional banks and online payment service providers (PSPs) during monetary policy cycles. The growth of a broader set of mobile money operators may potentially promote the emergence of large systemic depositors.

- Safeguarding bank intermediation, which is already low in sub-Saharan Africa, should be taken into account in policy choices regarding mobile money or CBDC, including on fees, interest rates, or limits on amounts.

- Promoting adequate investment in infrastructure and the development of a system involving multiple actors could help mitigate risks of network failures, disruptions, or breaches. Collaborating with other central banks would help contain risks associated with the rapid obsolescence of new technological platforms and essential interoperability. Risks to reputation, limited trust, and poor adoption could be managed through adequate design and regulation and by promoting private sector solutions.

Priority set 3: Establishing the expectation that public sector digital payment innovations—including CBDC—are complements rather than substitutes for private sector digital solutions.

- By supporting adequate fast payment systems and competitive private digital payment solutions, public sector digital plans and initiatives would not be seen as competing with mobile money providers and commercial banks. As discussed previously, an assessment of the persistence of market failures associated with private digital solutions (for example, insufficient reduction in transaction costs or reach of population) or of other rationales for a CBDC would be needed before developing CBDC (or publicly developed FPS).

- CBDC could complement FPS. CBDC could be settled on a private fast payment infrastructure, ensure greater resilience in payments, reduce fragmentation, and help discipline the market without necessarily being widely adopted. Moreover, a well-functioning fast payment system available to nonbanks which back their mobile money issuance with central bank reserves (for safety) would be very close to replicating CBDC (and could perhaps be provided more efficiently with CBDC itself). However, at present, the human and financial resources necessary to develop, maintain, and update CBDC would be larger than establishing an adequate FPS, especially in light of existing available standards for both, and notably the lack of an international standard for CBDC.
- Enhancing central bank capacity in digital technologies would ensure efficiency, help keep up to date on technological developments, and reduce risks of obsolescence and cyberattacks. Central banks with limited resources can take advantage of peer learning from central banks with more advanced digital payment systems to boost capacity.
- Digitalizing public finance could promote the regular use of private mobile money or CBDC for public transfers or paying taxes. This shift has the potential to expand the digital network, reduce waste and leakages in public spending by reaching individuals directly, enhance the targeting of vulnerable people, improve fiscal transparency, and reduce informality while enhancing tax compliance. Whereas the ensuing reduction in informality and enhancement of tax compliance could be seen as a deterrent for the adoption of the new digital solutions, the resulting higher efficiency gains and network effects may provide adequate incentive for the private sector to take advantage of digitalized transactions with the public sector.
- Government borrowing can also be fractionalized through a digital payment system that handles transactions in very small amounts (for example, by breaking up larger denominations into smaller ones), while remaining integrated within the broader digital financial system. This approach would facilitate lending to the government in small denominations through digital solutions, which would offer new savings opportunities also for people at the low end of the wealth spectrum. In addition, fractionalized digital payment systems could also be connected with both digital credit systems and digital investment vehicles, which would further expand access to overall digital finance.
- Artificial intelligence (AI) can accelerate the adoption of digital financial solutions and help countries explore synergies with climate financing. There is significant potential for digital finance and AI capabilities to offer impressive synergies, for example, by facilitating the collection and validation of information for crime detection, smart digital contracts, and supporting a broader development of financing opportunities. Some of these benefits and synergies can be harnessed through the blockchain technology used by CBDCs and crypto assets. This would support not only the fractionalization of public borrowing as noted earlier but also initiatives related to diaspora bonds and climate-related financing.

Priority set 4: Collaborating across borders to foster the efficiency and international interoperability of payment systems.

- Engaging in regional (if not global) consultations early on can help promote interoperability, so that ongoing and future digital developments would rely on consistent cross-border legal, regulatory, and technological solutions, which would help avoid the proliferation of potentially incompatible systems.
- Such collaborations would promote regional cross-border flows and reduce regulatory arbitrage, with possible beneficial effects also on trade integration. This would be particularly true if an interoperable, fast, and efficient regional payment system were realized. Additional interconnection with domestic records of credit history would promote cross-border lending and international financial integration.
- Concerns about the volatility of capital flows and sudden stops would need to continue to be addressed through appropriate macroeconomic policies and ongoing capital flow management measures, alongside adequate regulation of new digital financial instruments.

- International collaboration will be crucial not only for addressing interoperability but also for managing the rapid obsolescence of existing technological platforms.

Finally, it is essential to place the digital reform agenda in the context of sound macroeconomic policies. Designing an effective digital development plan and regulatory framework alone is insufficient to ensure financial development and stability. Such efforts must be accompanied by sound macroeconomic policies and adequate governance arrangements that buttress confidence in the local currency and in the economy, as well as foster consumer trust and protection.

Acronyms and Abbreviations

AACB	Association of African Central Banks
AE	Advanced Economy
AfCFTA	African Continental Free Trade Area
AMF	Arab Monetary Fund
AML	Anti-Money Laundering
API	Application Programming Interface
BCEAO	Central Bank of West African States
BCRG	Central Bank of the Republic of Guinea
BEAC	Bank of Central African States
BNR	National Bank of Rwanda
BSA	BankservAfrica
CAR	Central African Republic
CBDC	Central Bank Digital Currency
CBK	Central Bank of Kenya
CDD	Customer Due Diligence
CEMAC	Central African Economic and Monetary Community
CFA	*Communauté Financière Africaine*
CFT	Combating the Financing of Terrorism
CLT	Central Ledger Technology
COBAC	Regional Banking Commission
COMESA	Common Market for East and Southern Africa
DLT	Distributed Ledger Technology
DPS	Digital Payment Systems
EAC	East African Community
EAPS	East African Payment System
ECOWAS	Economic Community of West African States
EM	Emerging Market
EMIs	Electronic Money Institutions
EPSS	ECOWAS Payment and Settlement System
FCS	Fragile and Conflict-Affected States
FMI	Financial Market Infrastructure
FPS	Fast Payment Systems
G2P	Government-to-Person
GIMAC	*Groupement Interbancaire Monétique de l'Afrique Centrale*
IMF	International Monetary Fund
MAG	Monetary Authority of Singapore
ML	Money Laundering
MNOs	Mobile Network Operators
MTN	Mobile Money Service by MTN Group

P2B	Person-to-Business
P2G	Person-to-Government
P2P	Peer-to-Peer or Person-to-Person
PAPSS	Pan-African Payments and Settlement System
PASA	Payment Association of South Africa
PI-SPI	*Paiement Instantané-Système de Paiement Interopérable*
PKI	Public Key Infrastructure
PSP	Payment Service Providers
REPSS	Regional Payment and Settlement System
RTC	Real-Time Clearing
RTGS	Real-Time Gross Settlement
SADC	Southern African Development Community
SARB	South African Reserve Bank
SSCBT	Small-Scale Cross-Border Trade
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TA	Technical Assistance
TCIB	Transactions Cleared on an Immediate Basis
TF	Terrorism Financing
UMAC	Central African Monetary Union
USSD	Unstructured Supplementary Service Data
VPA	Virtual Payment Address
WAEMU	West African Economic and Monetary Union
WAMZ	West African Monetary Zone

1. Introduction

Digital innovations are rapidly changing the payment and financial landscape in sub-Saharan Africa, creating new opportunities to address the region's unique challenges such as improving financial inclusion, lowering the cost of remittances, reducing informality, deepening the financial system, facilitating cross-border payments and trade, and improving tax collection as well as other public services. They are also associated with risks and policy trade-offs that require careful and nuanced policy consideration, particularly in light of structural features that set sub-Saharan Africa apart from other regions. These features include (but are not limited to) limited traditional financial development, weak digital infrastructure, lack of national ID, low financial literacy, reliance on remittances and cash, limited central bank capacity and resources, weak regulatory frameworks, reliance on capital control, capital account volatility, and risk of currency substitution. Some of these features can heighten risks to financial integrity, financial disintermediation and stability, monetary transmission, cybersecurity, data privacy, business continuity and other operational challenges. Policymakers need to be cognizant that efficient private digital solutions may not develop organically everywhere, while widespread crypto adoption, particularly in the absence of regulation, can heighten risks. Central Bank Digital Currency (CBDC) can complement private sector digital innovation but presents institutional, resource, stability, and operational challenges. Finally, there is significant scope to improve interoperability among sub-Saharan African digital platforms.

A. Digital Payment Innovations in Sub-Saharan Africa

Sub-Saharan African countries are increasingly relying on a plethora of digital innovations for executing financial transactions.[1] Rapid digitalization and improvements in information technology (IT) infrastructure, access to the internet, and mobile technology have revolutionized payments. *Mobile money* is accepted by the unbanked population and widely used across the region, with significant uptake in East Africa. Nearly half the countries in the region have adopted fast payment systems (FPS) to transfer funds between bank accounts instantaneously and around the clock (World Bank n.d.). *Crypto assets* have also made considerable headway in many sub-Saharan African countries, such as Ghana, Kenya, Mauritius, Nigeria, Seychelles, and South Africa, and were temporarily given legal tender status in the Central African Republic (CAR). The public sector is also catching up, with many central banks exploring CBDC and Nigeria launching the eNaira in 2021.

The potential benefits of digital payments can help address some of sub-Saharan Africa's unique challenges and spur broader financial sector development.

- Digital payments often aim to improve financial inclusion, which is generally low in sub-Saharan Africa compared with other regions. Where traditional banking is less developed or lacks efficiency, innovation in payment systems carries the potential for widening access to finance by making it both cheaper and easier to serve the unbanked population.
- By making payments cheaper, faster, and more convenient, digital payment innovations would also help bring down the cost of receiving remittances, which are an important source of external financing for many sub-Saharan African countries.

[1] For the definitions used in this paper for concepts related to the main digital innovations (CBDC, FPS, private digital money, crypto), please see Ricci and others (2024).

- Digital payments can also help reduce informality (which is pervasive in the region) and deepen shallow financial systems.
- More efficient and interoperable digital payment systems, along with other digitalization solutions (including for custom procedures and enhancing digital credit assessment solutions), could decrease the cost of cross-border payments and facilitate cross-border financing.
- Digital payment systems would reduce the cost of managing cash by reducing cash in circulation, enable timely and targeted public sector transfers, and facilitate tax payments, potentially raising the low tax revenue-to-GDP ratios.
- Interoperable digital payment systems, both private and public, coupled with other digitalization solutions, can lead to more efficient and less costly cross-border payments regionally (and globally) while also enhancing trade within the continent (see Annex 4), possibly reducing the dependency on correspondent banks outside Africa for international transactions.
- Data generated by e-payments could help bridge the gap between payment systems and credit intermediation by circumventing the limitations of traditional banking sector in economies characterized by high informality. For example, in India, South Africa, and Zambia, data generated through digital payments for both vendors and customers serve as digital collateral to reduce information asymmetries and increase access to credit for small and medium enterprises and households (HHs).[2] Additional credit provided to SMEs (especially women-owned) could add a significant growth premium to sub-Saharan African economies (Goldman Sachs Global Markets Institute 2014).
- Increased adoption of new digital solutions for trade finance is also creating opportunities for African micro-, small-, and medium-sized enterprises to diversify their export markets, as greater use of digital platforms for letters of credit can support exports across different currency areas (Suominen 2021).
- The blockchain technology used by CBDCs and crypto assets can support smart contracts, tokenization, and fractionalization.
- A much enhanced and fractionalized digital payment system can also breed broader financial developments such as digital credit systems and digital investment vehicles, which could be integrated and further develop the overall financial system.
- The gradual expansion of these types of digital-based transactions could, in turn, result in a natural demand for the necessary institutional reforms, regulatory framework, and infrastructure development, instead of the public sector implementing these reforms in a vacuum without the catalyst role of a vibrant private sector (Cangul 2023).

Rapid growth in digital payments provides significant opportunities for leapfrogging in economic development. In addition to greater financial inclusion and more efficient financial intermediation that relies less on traditional banking, digital payments can support the process of wider digitalization, including by unlocking a digitally enabled youth, which is consequential in a region with a high share of the population under the age of 30.[3] They can spur digitalization, for example through network effects, as more people use them to make payments.[4] Greater use of these payment methods, in turn, can strengthen digital and financial literacy among the population, particularly the young, because they become introduced and

[2] "*Digital Collateral*" is a term coined by Gertler, Green, and Wolfram (2021). The example cited in the paper is pay-as-you-go (PAYGO) financing. The PAYGO contract requires a nominal down payment to take possession of an asset, followed by frequent, small payments made through a mobile payment system.

[3] According to the UN, 70 percent of the population in SSA is under the age of 30. By 2030, African youth is expected to comprise 42 percent of global youth.

[4] Gowrisankarana and Stavins (2004) argue that network effects, where the value of a good increases with the number of users, play a significant role in the adoption of technologies.

accustomed to new technology. In addition, they can facilitate new economic activities in the digital space, such as freelancing, ridesharing, and e-commerce while opening doors for further innovations in local markets and supporting structural transformation toward modern services. Moreover, the development of environmentally sustainable mechanisms underlying digital finance could support "green innovation" for sub-Saharan African economies, which are particularly vulnerable to climate change (Li and others 2022). The gradual expansion of these types of digital-based transactions could, in turn, result in a natural demand for the necessary institutional reforms, regulatory framework, and infrastructure development, instead of the public sector implementing these reforms in a vacuum without the catalyst role of a vibrant private sector (Cangul 2023).

Sub-Saharan Africa has recently seen an increase in the variety of payment methods for cross-border transactions, benefiting consumers and trade across the continent. Cross-border payments in sub-Saharan Africa are primarily driven by individuals as well as micro, small, and medium enterprises (MSMEs). Prevailing models for cross-border payments generally comprise correspondent banking, a closed-loop system, and aggregators (Reslow, Soderberg, and Tsuda 2024).[5] In sub-Saharan Africa, cross-border payments can be made through bank transfers, mobile money, digital wallets, money transfer operators (wire transfers and electronic funds transfers), cash payments involved in small-scale cross-border trade (SSCBT), and informal cross-border transactions leveraging intermediaries. Instant payment systems for cross-border transactions started operations in multiple countries (such as the Pan-African Payments and Settlement System [PAPSS], GIMACPAY in the Central African Economic and Monetary Community [CEMAC] region, the Southern African Development Community Real-Time Gross Settlement [SADC-RTGS] system in the SADC region, BUNA for the Arab countries cross-border payments, see Annex 4).[6] Innovating to reduce friction in intra-sub-Saharan African cross-border payments, thus making them faster and cheaper, is a major growth opportunity for sub-Saharan Africa (notwithstanding the associated challenges that will be further discussed in this paper) and is also essential to improve and support trade and infrastructure.

Yet digital payments are associated with operational challenges and macroeconomic risks that are prominent in sub-Saharan Africa. Poor financial literacy, capacity constraints, low internet and mobile penetration, internet disruptions, possible rapid obsolescence of existing technological platforms, network failures, and uncertainty about international and domestic interoperability exacerbate the challenges of setting up and maintaining a novel, costly, and untested infrastructure. Digital payments also raise concerns about consumer protection, privacy, competition, governance, and ML/TF, requiring the adoption of new legal frameworks, regulating the use of private data, and addressing cybersecurity and reputational risks.[7] Other risks include loss of the privacy traditionally offered by cash, limited trust, and poor adoption. At the same time, digital payments have macroeconomic implications and carry risks such as banking disintermediation and financial instability, changes to monetary policy transmission, possible currency substitution, bypassing of capital controls, and capital account volatility. Seigniorage revenues for central banks may also fall from higher velocity of money in circulation (Singh, Abouelmakarem, and Bhargava 2024).

[5] A closed-loop system is a payment network, typically owned and operated by a single company, which processes all payment transactions internally (examples include Western Union, PayPal, Wise, and Revolut), and hence facilitates cross-border payments thanks to operational presence in multiple countries and partnerships with local financial institutions. Cross-border payments through aggregators involve payment service providers (PSPs) using third-party aggregators (for example, VISA, MasterCard, MFS Africa, and Wise Platform) to process payments. The aggregators typically use correspondent banking networks to gain access to local markets but can also have direct relationships with local financial market infrastructures (Reslow, Soderberg, and Tsuda 2024). MFS Africa, for example, is an aggregator that enables mobile money operators, money transfer operators, banks, and other financial service providers, to send and receive payments across borders in multiple jurisdictions through domestic or regional payment rails (BIS 2023b).

[6] The CEMAC region comprises six Central African countries: Cameroon, Chad, Congo, Gabon, Equatorial Guinea, and Central African Republic. The SADC region consists of 16 Southern African countries: Angola, Botswana, Comoros, Democratic Republic of Congo (DRC), Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe.

[7] In-depth analysis of the financial integrity implications of CBDCs is captured in an IMF (2024a) report.

B. Structural Features of Sub-Saharan African Economies

Sub-Saharan Africa presents unique characteristics that make it different from other regions. Such unique features include low financial development, low financial inclusion, and shallow financial systems with weak traditional banking penetration. At the same time, most countries exhibit high informality, and a significant proportion of the population is dependent on remittances, which are affected by high transaction costs. Further, many countries extensively rely on capital flow management measures, including those for reserve management. The tax revenue-to-GDP ratio remains low, often reflecting the extensive informality as well as the need for a more efficient collection and administration system.

Moreover, several structural impediments in sub-Saharan Africa limit the pace of development and adoption of digital payments. Despite significant progress over the past decades, the use of digital innovations has been heterogeneous across the region. Structural deficiencies are most pronounced with respect to digital infrastructure (mobile connectivity, internet penetration, and high cost of the internet), unreliable electricity supply, large IT skill gaps, low financial and digital literacy, and slow and costly payment systems, particularly for cross-border transactions. Weak capacity and resource constraints are often significant in public administration, while the human and physical costs of developing new financial instruments are large. Other impediments to the development and adoption of digital payments include the lack of national and digital ID among a significant proportion of the population and poor governance and management of data privacy. Some of these challenges were particularly poignant during COVID-19 pandemic. For example, World Bank (2022) found that those countries that could leverage pre-pandemic investments in digital public infrastructure, including identification (ID), payments and trusted data sharing, were better able to implement COVID-response social assistance programs.

This paper argues that, owing to these features that differentiate sub-Saharan Africa from other regions, a nuanced policy approach is needed to spur the development of digital innovations across the continent. Because sub-Saharan Africa is different from other regions, policy recommendations from the nascent literature for a broad set of countries need to be tailored to the region's special structural and economic characteristics. For instance, supportive investments are needed to increase the quality of human capital, especially digital and financial literacy, and to scale up energy supply and internet connectivity. We next distill key issues that hamper the development of digital innovations in sub-Saharan Africa.

C. Key Issues for the Development of Digital Innovations in Sub-Saharan Africa

The paper aims to distill policy recommendations for sub-Saharan African countries related to four key digital innovations—CBDC, fast payments, private mobile money, and crypto assets. Such recommendations are organized around several key issues for the development of digital innovations in sub-Saharan Africa.

- ***Issue 1.*** **Quality and stable private mobile money may not develop organically everywhere in sub-Saharan Africa.** Notwithstanding growing connectivity and a large share of the unbanked population, adapting to a fast-changing global digital environment may still be slow. Moreover, service providers can go out of business, their operations may fail, or—in the other extreme—they can become systemically large and abuse their market power. For instance, they can rely on the scaling of network effects of often closed systems to create monopolistic environments where they become in the long-term price and

standard setters or can capitalize on data collection advantages.[8] These issues highlight the importance of consumer protection, greater scrutiny, and regulation to ensure adequate competition and safeguard the long-term stability and fairness of the payments and financial system.[9]

- ***Issue 2.*** **Digital payment instruments entail unique risks including for financial stability.** Using digital currencies can increase the risk of financial disintermediation if the people were to fund their digital wallets using their deposit accounts in existing financial intermediaries (like banks), which constitute the backbone of the lending market (in turn, deposit outflow would imply less credit creation). They can also trigger financial instability in case of rapid withdrawals of funds from commercial banks. Where regulatory oversight is limited, as in several sub-Saharan African countries, the risk of committing financial crimes—such as circumventing capital controls, cyber fraud, laundering the proceeds of other crimes, financing terrorism, and avoiding taxes—is higher than in jurisdictions with tighter regulation and supervision.

- ***Issue 3.*** **Widespread use of crypto assets could pose even broader risks in the absence of strong regulatory oversight.** Crypto assets may be high in demand not just for privacy or speculative purposes or to avoid sanctions but also because they may be perceived to provide better risk-adjusted returns compared with local assets, particularly in countries where macroeconomic instability is high. Where policy frameworks are weak and inflation is high compared with other regions, policymakers fear that significant use of crypto assets could lead to "crypto dollarization," which can undermine monetary sovereignty and transmission, especially if designated as legal tender. Crypto volatility could further trigger capital outflows, exacerbate exchange rate volatility, and undermine financial stability and macroeconomic stability. Moreover, the volatility of crypto assets can subject users in sub-Saharan Africa to large and sudden losses, raising consumer protection concerns particularly where financial literacy is low and access to information is limited. If accepted and held by governments, crypto assets would subject public finances to significant risks and exacerbate the aforementioned risks by implicitly or explicitly validating private sector usage.

- ***Issue 4.*** **Developing CBDC presents institutional, resource, stability, and operational challenges.** If sub-Saharan African countries decide to embark on CBDC, investment in institutional and resource capacity at central banks can be a major roadblock before they can set up a functional framework, operate a novel and untested digital infrastructure, and maintain it. Inappropriate design features of CBDC can exacerbate cybersecurity, financial stability, and ML/TF risks while also potentially limiting interoperability—both domestically (with private mobile money) and internationally (with foreign banks and other central banks). Given the likely evolving nature of global standards, a premature creation of a CBDC could expose countries to the risk of obsolescence of their technology and limited interoperability. The loss of privacy that accompanies the use of the traditional form of public money (cash) would have to be balanced against potential efficiency gains (it is important to note that financial integrity considerations would apply in either case).

[8] Patel, Kasiyanto, and Reslow (2024) argue that network effects reinforce the dynamics of "one-stop" or "super app" platforms, which can accelerate the scaling of platforms to systemic levels, thereby requiring a more agile and iterative approach to payments supervision to tackle broader digital market competition issues.

[9] Brunnermeier, James, and Landau (2019) articulated the general rationale for the concerns about digital currencies that are associated with large platform ecosystems such as Facebook's Libra, which was supposed to become a "stablecoin" pegged to a basket of official currencies.

- ***Issue 5*. Digital platforms across sub-Saharan Africa are not well integrated with each other.** There are multiple subregional settlement platforms such as the East African Payment System (EAPS), SADC-RTGS, the West African Monetary Zone (WAMZ) Payments System, the Central Africa Payment System, and the Regional Payment and Settlement System (REPSS) for the Common Market for Eastern and Southern Africa (see Annex 4 for a comprehensive list). However, at present, there is limited interoperability across these platforms and vis-à-vis other countries. Crucial collaborative explorations among sub-Saharan African countries are underway in this direction, such as PAPSS or the work of the Association of African Central Banks (AACB), both aiming to integrate payment systems in Africa.

The rest of the paper is structured as follows. Section II presents the heterogeneous digital payment landscape in sub-Saharan Africa, against a backdrop of inadequate traditional access to finance, high and costly remittances, and structural impediments to the wider development of digital payment innovations. The following four sections discuss the potential benefits and risks associated with each of the four digital payment innovations discussed in this paper—CBDC in Section III, fast payment systems in Section IV, private mobile money in Section V, and crypto assets in Section VI. Section VII provides policy recommendations to boost financial inclusion and improve the efficiency of the digital payments ecosystem across sub-Saharan Africa while mitigating potential risks and other unintended consequences, particularly for macroeconomic and financial stability as well as monetary policy. Section VIII offers complementary policies to strengthen individual digital payment innovations with a view to overcoming the specific challenges for CBDC, fast payments, private mobile money, and crypto assets.

2. Digital Payment Landscape in Sub-Saharan Africa

Rapid digitalization in sub-Saharan Africa is creating opportunities to increase financial inclusion, against a backdrop of inadequate access to traditional financial services as well as high and costly reliance on remittances through established financial institutions. Private mobile money, in particular, is revolutionizing access to finance, enabling the unbanked to take advantage of innovative digital payment instruments. In some countries, the use of other digital instruments, including crypto assets (such as stablecoins, cryptocurrencies, and tokens), is increasing in the absence of a proper regulatory framework for crypto assets. A few countries are considering Central Bank Digital Currency (CBDC). These developments in the digital landscape are happening in a context of unreliable electricity supply, deficient information technology (IT) infrastructure and internet connectivity, low coverage of national identification systems, weak institutions, and pervasive capital controls.

Sub-Saharan Africa has witnessed rapid digitalization over the past two decades. Broad improvements in digital services and access—including IT infrastructure, internet usage, quality, and know-how—were registered, especially in the past decade. The aggregate penetration of cellular subscriptions has also increased rapidly since 2000, reaching about 80 subscriptions per 100 people in 2021 (Figure 1, panel 1).[10] In addition, the region had 489 million unique mobile subscribers in 2023, indicating a 43 percent gross penetration rate (GSMA 2023). Concurrently, the growth of active mobile broadband subscriptions has slowed down in recent years in sub-Saharan Africa (as in other countries), while internet usage keeps surging (Figure 1, panels 2 and 3).

Nonetheless, digital access is still lagging behind advanced economies and emerging markets. Despite making rapid progress compared with other low-income countries (LICs), the region's digital access lags that of emerging markets (EMs) and advanced economies (AEs) across most indicators (Figure 1, panels 1–3). Only 33 percent of the region's population has internet access, much lower than EMs (68 percent) and AEs (90 percent). Furthermore, sub-Saharan Africa has a long way to go in broader digital readiness, having registered marginal improvements in key-related indicators such as IT infrastructure, knowledge, affordability, and quality (Figure 1, panel 4).[11]

In conjunction with digital development, financial technology (fintech) is revolutionizing access to finance, enabling the unbanked to take advantage of innovative digital payment instruments. Africa's fintech industry is coming of age, with a surge of the number of start-ups in recent years (Flototto et al, 2022). Digitalization of payment systems, as an integral part of the overall digitalization of the economy, continues to evolve across the world, and sub-Saharan Africa is no exception. The recent surge in the capacity of broadband and data infrastructure is extending to underserved or unconnected areas (Cruz 2024). Most of the digital payment innovation throughout the continent is happening outside the traditional banking system, such

[10] Mobile subscriptions per 100 people are calculated by dividing aggregate subscriptions by the total population of each country. Given that multiple cellular subscriptions per person are common in the region, the actual access level is likely lower—especially in rural areas. For example, the actual phone ownership per 100 adults in Ghana and Tanzania was 80 and 75 in 2017 (Pew Research Center [https://www.pewresearch.org/global/2018/10/09/majorities-in-sub-saharan-africa-own-mobile-phones-but-smartphone-adoption-is-modest/#:~:text=The%20exception%20is%20in%20South,third%20of%20adults%20own%20smartphones]), while the corresponding aggregate subscriptions per 100 people were much higher at 123 and 85, respectively.

[11] Infrastructure and affordability of digital services have improved and stand higher than other indicators, while the quality of digital services and overall utilization of the internet remain low.

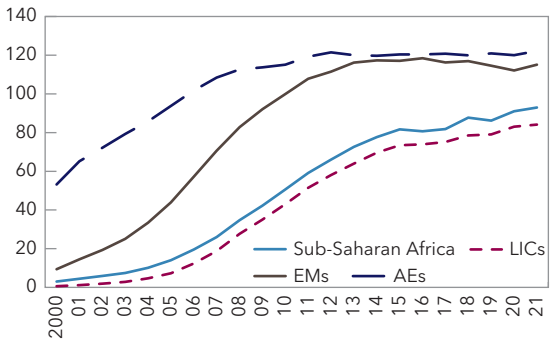
as by telecom operators, spurred by the lack of efficient and affordable traditional financial services.[12] This development is in clear contrast with AEs, where a significant part of today's digital payment options such as internet banking are being offered by most of the established banking system institutions, either directly or through their newly created subsidiaries.

Figure 1. Sub-Saharan Africa Lags in Key Digital Infrastructure, Despite Substantial Progress

1. Cellular Subscriptions Increased Rapidly and Yet Sub-Saharan Africa Lags AEs and EMs

Average Mobile Cellular Subscriptions

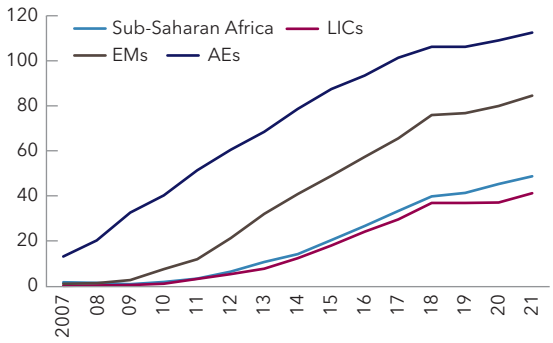
(Per 100 inhabitants)



2. Broadband Subscriptions Also Increased. . . .

Active Mobile-Broadband Subscriptions

(Per 100 inhabitants)

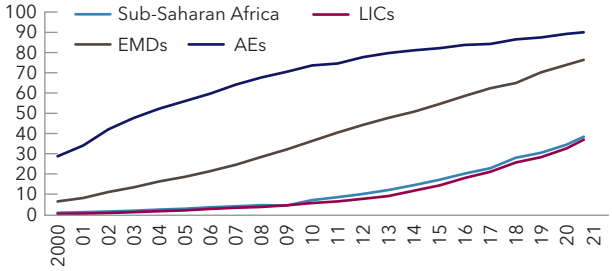


Source: International Telecommunication Union (ITU).
Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country

3. However, Internet Penetration Is Weaker in Sub-Saharan Africa Relative to AEs and EMs. . . .

Percentage of Individuals Using the Internet

(Per 100 inhabitants)

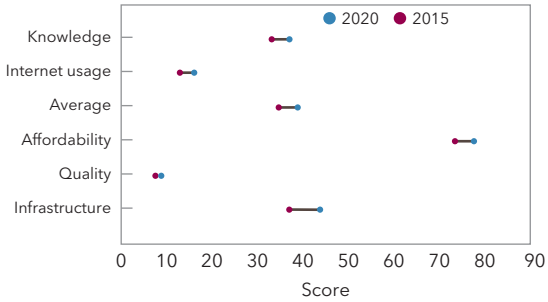


Source: International Telecommunication Union (ITU).
Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country

4. . . . While IT Infrastructure, Affordability, and Knowhow Have Improved Only Marginally

Sub-Saharan Africa: Evolution of Enhanced Digital Access Index, 2015–20

(Per 100 inhabitants)



Source: Alper and Miktus 2019; and Fund staff calculations.

[12] Generally, financial digitalization should be understood as either an evolution of traditional banking structures or as a disruptive innovative response to the insufficiency and relative inefficiency of traditional banking structures in terms of costs, inclusiveness, and supply. The most disruptive and innovative responses are typically provided by firms outside the financial system itself.

Where traditional banking is less developed, private mobile money is reshaping and continuing to transform access to financial services across Africa. Despite falling behind other countries in traditional access to finance (proxied by the number of commercial bank accounts per adult), the region is ahead in digital financial access like usage of mobile money accounts (Figure 2, panel 1). Sub-Saharan Africa is home to almost three-fourths (https://qz.com/africa/2161960/gsma-70-percent-of-the-worlds-1-trillion-mobile-money-market-is-in-africa) of the world's mobile money accounts, and in 2023 more than 70 percent of growth in those registered accounts was in sub-Saharan Africa (GSMA 2024). Limited traditional bank branch networks and provision of banking services in most sub-Saharan African countries make digital financial instruments like mobile money critical to support economic activity. Mobile money services offered by telecom operators rose significantly because they are easy to access, fast, cheap, and more inclusive (Figure 2, panel 2). By leveraging a network of authorized agents such as small businesses to exchange electronic money for cash and vice versa, telecom operators can reach customers in remote areas that are typically not served by traditional banks. In addition, only minimal financial services infrastructure is required for mobile banking in both rural and urban areas and their ability to operate with ease in multiple countries also facilitates cross-border business transactions and remittances (see Annex 10 on the digital payment landscape in the Central African Economic and Monetary Community [CEMAC]). Moreover, mobile operators often provide digital financial services also through traditional cell phones, without the need for more expensive smartphones.[13] In 2022, over 400 million of the more than 900 million mobile phone connections in sub-Saharan Africa were relying on a basic or feature phone (GSMA 2023).

The volume and value of private mobile money transactions increased steadily between 2015–21, outpacing such developments in EMs (Figure 2, panels 3 and 4). The increasing number of services accessible across mobile money platforms, such as savings accounts, mobile banking, loans, and insurance services is drawing a greater number of sub-Saharan African residents toward mobile money services (Sy 2019). During 2013–21, the number of transactions increased by more than sixfold from 10 to over 60 transactions per adult. Also, the total value of mobile money transactions as a share of GDP increased many folds, from just under 10 percent in 2015 to more than 40 percent in 2021. The pace of this progress has been markedly higher than the rate of improvement in EMs.

At the same time, access to private mobile money varies greatly across sub-Saharan African countries. The number of registered accounts per 1,000 adults is close to 2,000 in Benin, Ghana, Kenya, and Rwanda, much higher than in countries like Angola, Comoros, Gambia, and Seychelles, where mobile money is still at an early stage of development. Other countries like Ethiopia and Equatorial Guinea do not show up in the graph (Figure 3) because mobile money is almost nonexistent in those contexts. Cross-country heterogeneity is also observed in the availability of mobile money agents, who are critical players in ensuring financial inclusion and access in remote areas. The main reason behind these cross-country differences seems to be in-country regulations, that is, whether regulations are relatively protective of the traditional banking system or if they favor instead new types of business and technological models by telecom operators.[14] In addition, governments' proactive policies in favor of financial inclusion and innovation are disparate across the region, resulting in different effects on the development of mobile money.

[13] The most salient success story in Africa is the private mobile money operator M-Pesa, which provides services to more than 50 million customers across seven eastern African countries.

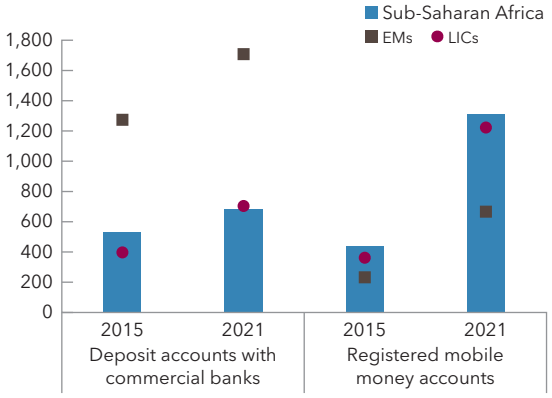
[14] A comparative study done by Lepoutre and Oguntoye (2018) indicated that, while Mobile Money Agents (MMA) supported by telecom operators contributed to mass adoption of mobile money in Kenya, the exclusion of MMA as focal actors by the financial market regulator in Nigeria prevented the achievement of similar adoption rates in this country. Since 2015, the Central Bank of Nigeria (CBN) has been granting more space for telecom companies to operate in the mobile money space, including through a new MMO licensing plan.

Figure 2. Digital Technology Is Facilitating Access to Finance in Sub-Saharan Africa Where Traditional Banking Services Are Limited

1. Mobile Money Is Bridging Lack of Access to Traditional Banking Services . . . .

Deposit Accounts and Registered Mobile Money Accounts

(Accounts per 1,000 adults)



Sources: Financial Access Survey and IMF staff calculations.

Note: Data availability covers a sample of 29 and 21 sub-Saharan countries in 2015 and 2021, respectively for deposit accounts; and 30 and 21 countries in the same years for mobile money accounts. EMs = emerging markets; LICs = low-income country

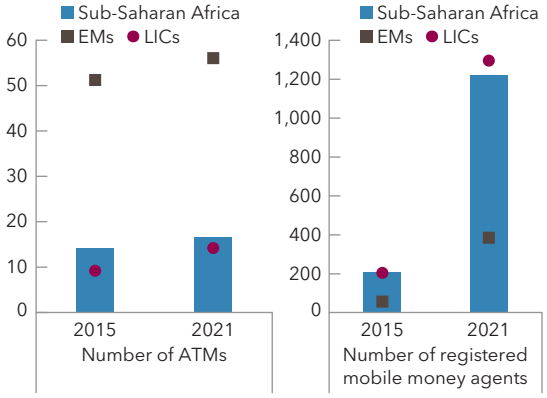
2. . . . with Mobile Money Agents Making Up for Shortage of ATMs

(a) Number of ATMs

(ATMs per 100,000 adults)

(b) Number of Mobile Money Agents

(Agents per 100,000 adults)



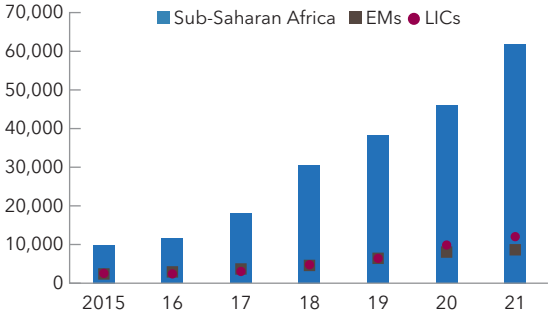
Sources: Financial Access Survey and IMF staff calculations.

Note: Data availability covers a sample of 40 and 34 sub-Saharan countries in 2015 and 2021, respectively for number of ATMs; and 28 countries in the same years for mobile money agents. EMs = emerging markets; LICs = low-income country

3. The Number of Mobile Money Transactions is Growing. . . .

Number of Mobile Money Transactions

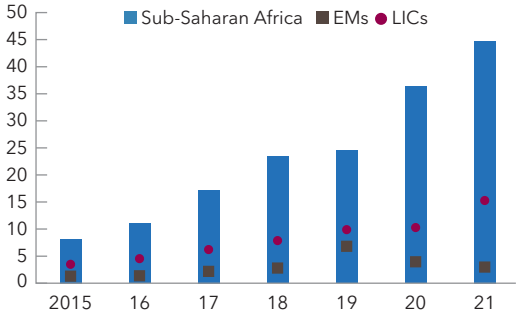
(Transactions per 1,000 adults)



4. . . . Accompanied by Increases in the Value of Such Transaction Relative to the Region's GDP

Value of Mobile Money Transactions

(In percent of GDP)



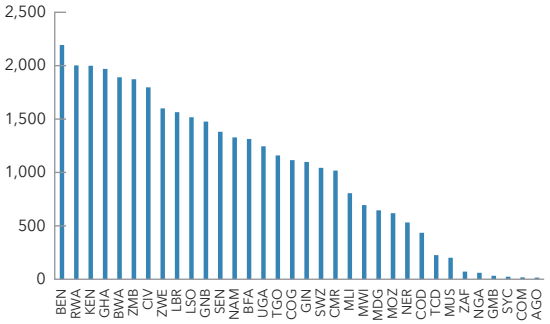
Sources: Financial Access Survey and IMF staff calculations.

Note: AEs not included because of small sample size. AEs = advanced economies; EMs = emerging markets; LICs = low-income country

Figure 3. Heterogeneous Fintech Development across Sub-Saharan African Countries

1. SSA: Registered Mobile Money Accounts (2020)

(Number of accounts per 1,000 adults)

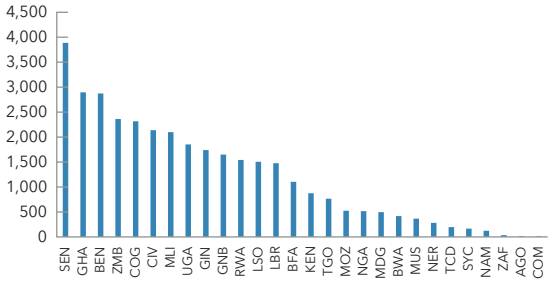


Sources: Financial Access Survey and IMF staff calculations.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

2. SSA: Registered Mobile Money Accounts (2020)

(Agents per 1,000 adults)



Sources: Financial Access Survey and IMF staff calculations.

Note: Number of agent outlets that have facilitated at least one transaction over the past 30 days. An agent is a person, quasi-corporation, corporation, or machine that facilitates mobile money account registration, CICO transactions, and customer support. Normally, they are registered with MMSPs and perform as agents of MMSPs on a commission basis. Calculated as: (number of registered agent outlets) * 100,000/adult population in the reporting country. Data labels in the figure use International Organization for Standardization (ISO) country codes.

The main economic driving factor for the fast growth of private mobile money and its widespread use across sub-Saharan Africa is low financial inclusion in the context of a dominant informal economy (see Annex 5). The Global Financial Inclusion (Global Findex) database shows that only 33 percent of adults in sub-Saharan Africa had an account at a formal financial institution in 2020, implying that the excluded segment of the population is much larger than in AEs and EMs (Figure 4, panel 1). As a gateway to financial inclusion, 34 percent of adults rely on mobile money for their transactions (Figure 4, panel 2). In parallel, informality is very high in sub-Saharan Africa compared with EMs, with about 70 percent of employment being informal (Figure 4, panel 3; Alexander, Ribarsky, and Quirós-Romero 2021), particularly among the youth segment of the population, which has limited access to formal financial services. Similarly, undocumented migrants and informal traders who dominate migration corridors across most sub-Saharan African countries cannot access formal financial services (UNCTAD 2018). Therefore, increased digitalization of financial services through mobile money offers an opportunity for greater access to financial services among the most vulnerable, and a secure and formal way to facilitate payments, transfer money including for remittances, or even obtain small credits.

In a region where reliance on remittances through established financial institutions is high but costly, mobile money and other digital payments create massive opportunities for efficiency gains (see Annex 3). External remittance flows are generally higher and more stable than both foreign direct investment and portfolio flows (Figure 4, panel 4), thereby providing a stable source of external funding, accounting for about 2.5 percent of GDP, much higher than for EMs (Figure 4,panel 5), and originating mostly from AEs and sub-Saharan Africa (Figure 4, panel 6). In addition, nearly half the population in sub-Saharan Africa received domestic remittances (money sent from within the same country) in 2021–22, and about two-thirds of that was sent through digital means (World Bank 2024).

However, the cost of remittances remains much higher in sub-Saharan Africa compared with emerging markets. The cost of remittances in sub-Saharan Africa only recently (2021) fell below the level prevailing in low-income countries, perhaps because of the rapid development of mobile money, with the average cost of sending a transfer of US$500 declining to 9 percent of the value of the transaction in March 2022 from an average of 10 percent in 2011 (Figure 5, panel 1). Despite this improvement, remittance costs for sub-Saharan African countries remain above that of other regions and much higher than the 2030 Sustainable Development Goal (SDG) target of 3 percent (Figure 5, panel 2), with significant heterogeneity across countries ranging from as low as 3 to almost 17 percent of the cost of the transaction (Figure 5, panel 3). The average remittance

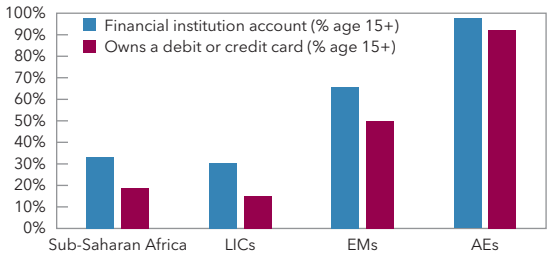
costs are significantly higher when using bank and nonbank financial institutions compared with mobile operators (Figure 5, panel 4). Transfer costs can also be high within countries because of limited competition, allowing disproportional monopolistic rents to domestic telecom operators and financial institutions.

Figure 4. Low Financial Inclusion, High Informality, and Dependence on Remittances

1. Financial Inclusion Is Low as Measured by Traditional Banking Indicators. . . .

Financial Inclusion: Banking Indicators, 2021

(Percent)



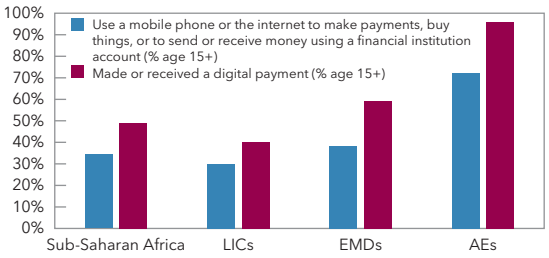
Source: World Bank Global Findex.

Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

2. . . . And Digital Payments Are Filling the Gaps Partially

Financial Inclusion: Digital Payments, 2021

(Percent)

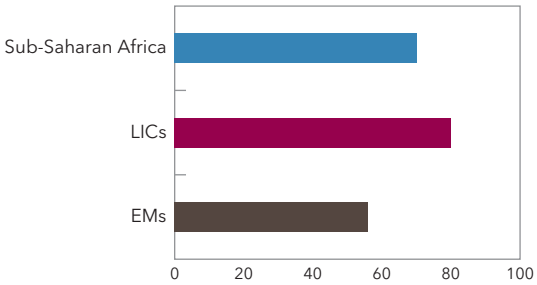


Source: World Bank Global Findex.

3. Employment in the Informal Economy Is Very High

Informality, 2018

(Percent of GDP)



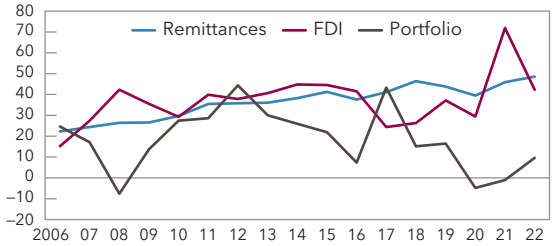
Source: World bank and IMF staff calculations.

Note: EMs = emerging markets; LICs = low-income country.

4. Remittances Flows Are Higher and More Stable That Foreign Direct Investment and Portfolio Inflows

Sub-Saharan Africa: Selected Inflows, 2006–22

(Billions of US dollars)



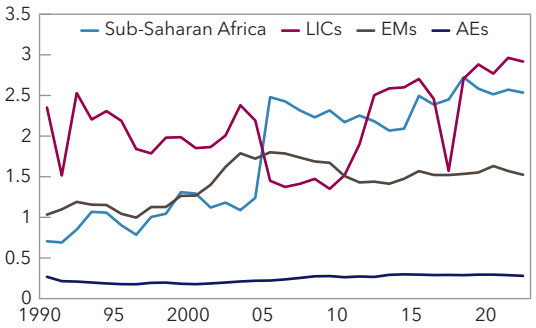
Sources: IMF, World Economic Outlook database; World Bank; and staff calculations.

Note: Excludes Mauritius. FDI = foreign direct inverstment.

5. They Are Important Sources of Income . . .

Personal Remittances, 1990–2022

(Percent of GDP)



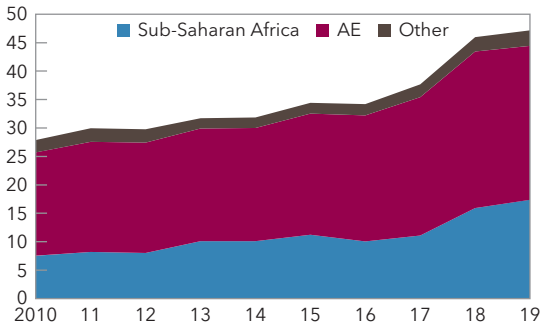
Sources: World Bank, World Development indicators.

Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

6. . . . Originating Mostly from AEs and sub-Saharan Africa

SSA: Remittance Inflows by Origin, 2010–19

(Billions of US dollars)



Sources: Allen (2022), World Bank Remittances Database and IMF staff calculations.

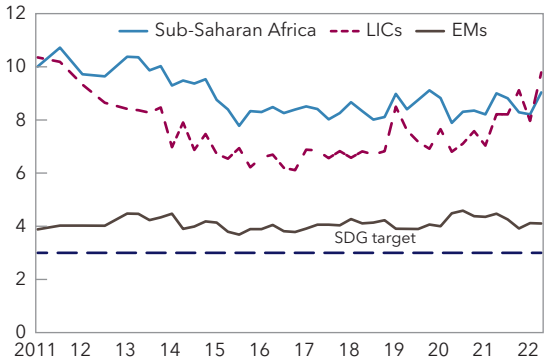
Note: AE = advanced economy.

Figure 5. Cost of Sending Remittances

1. The Costs of Sending Remittances Are High in Sub-Saharan Africa. . . .

Cost of Sending 500 USD

(Average for sending from country group, in % of the transaction)



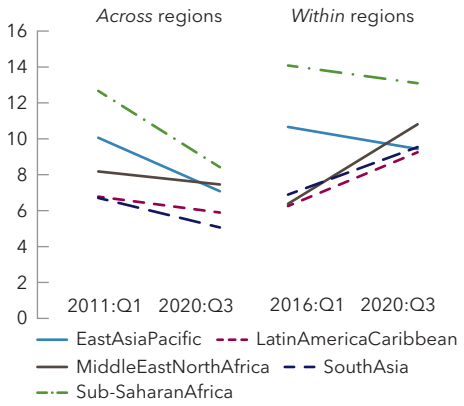
Sources: IMF staff calculations and The World Bank, Remittance Prices Worldwide.

Note: The average percentage cost of sending remittances is computed as the simple average of the total cost of the transaction in percentage of all the transactions sent by each region during the reference year. EMs = emerging markets; LICs = low-income country.

2. . . . Much Higher Than for Other Regions

Cost of Sending 200USD to the Following Regions

(Simple average, percent)

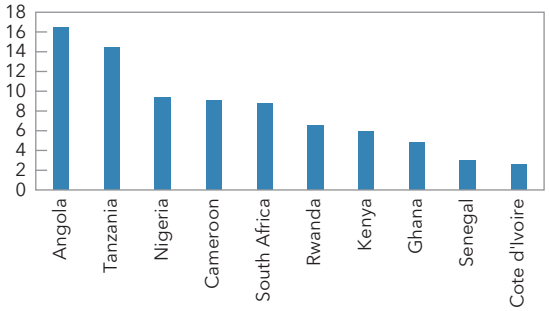


Sources: World Bank Remittance Prices and IMD staff calculations.

3. There Is Significant Heterogeneity across Countries. . . ..

Average Remittance Costs by Source Country, 2020–22

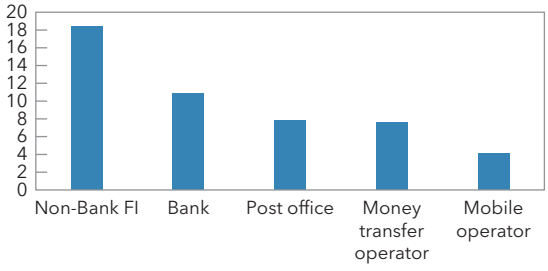
(Percent of cost of transaction)



4. . . . As Well As across Intermediaries

Average Remittance Costs by Firm Type, 2020–22

(Percent of cost of transaction)



Sources: World Bank Remittances Price Worldwide and IMF staff calculations.

Besides mobile money, the use of other digital instruments, including crypto assets and stablecoins, is increasing in some countries (see Section VI; Annexes 2 and 11). Adoption of crypto assets, while still low in the region, has gained some momentum in recent years. The region's crypto transactions peaked at US$20 billion per month in mid-2021. Bitcoin and Ethereum are the region's two most common crypto assets. These privately issued cryptocurrencies can be used for settling business transactions or transferring funds—within and across national borders—through a decentralized mechanism using distributive ledger technology (DLT). Some countries, particularly those with more developed fintech sectors (Ghana, Kenya, Nigeria, and South Africa), have seen more widespread crypto adoption than others (Figure 6, panel 1).

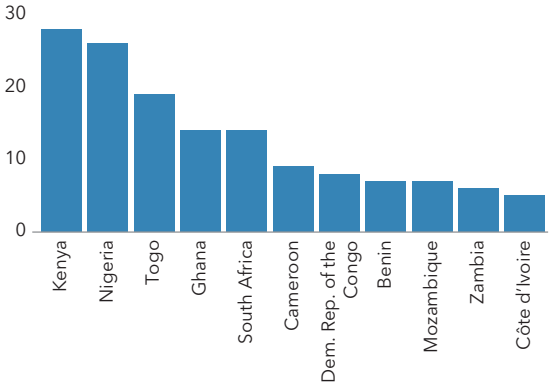
Yet, a proper regulatory framework for crypto assets is missing in most countries. Crypto assets are not just a means of payment, but they are also used for speculative transactions and money laundering. They can be attractive for users seeking anonymity because they are difficult to track, thereby creating regulatory challenges for policymakers, who often resort to restrictions to address risks. Only one-quarter of sub-Saharan African countries formally regulate crypto assets, but two-thirds (including Central African Economic and Monetary Community [CEMAC] countries) have implemented some restrictions, and other countries—Ethiopia, Sierra Leone, and Tanzania—have banned them altogether (Figure 6, panel 2).[15]

Figure 6. Crypto Adoption Is High in Some Sub-Saharan African Countries, while Most Impose Some Restrictions

1. Utilization of Crypto Is Higher in Kenya and Nigeria. . . .

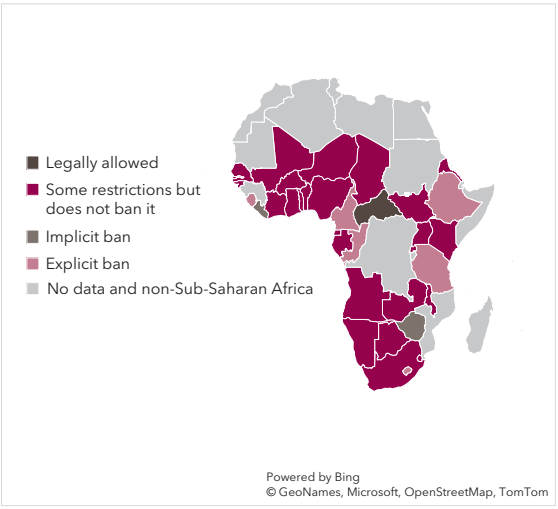
Top 10 Crypto Adopters, 2022

(Index, scale 0 to 100)



Source: Chainalysis 2022 and IMF staff calculations.

2. . . . Although Most Countries Impose Restrictions on Their Use



Source: IMF AFR Regional Studies Division, "Country Teams Survey."

In parallel, the public sector is catching up on digital finance, with some sub-Saharan African countries considering CBDCs. CBDCs are a digital form of fiat money. Just like private mobile money, they can be designed to allow for the immediate transfer of funds (including P2P, P2B, G2P, and P2G), potentially without the need for internet or bank accounts and using either feature or smartphones (see Box 1 and Annex 6 on China's and Nigeria's experience with CBDCs, respectively). Nigeria, the first country in the region to issue a CBDC, has made the eNaira available (by phases) to individuals without bank accounts but having a national identification number or a phone number to ensure that wallets are properly linked to users' identification in line with its anti-money laundering/combating the financing of terrorism (AML/CFT) regulations. Sixteen other national central banks in the region are either piloting or researching CBDCs (Figure 7). Ghana, a country in an advanced stage of CBDC development, is in the pilot stage of its own CBDC, the eCedi (see Annex 12). South Africa, after piloting two domestic and one international CBDC, decided to place a hold on launching the domestic CBDCs, while it may still consider the launch of the international CBDC in the coming five years (according to the Survey). Other countries are either researching or have developed a proof of concept. The West African Economic and Monetary Union (WAEMU) and the Central African Economic and Monetary Community (CEMAC) are also exploring regional CBDCs.

[15] Bans often do not work because of the borderless nature of crypto assets (IMF 2023d) and central banks' weak capacity to enforce them. P2P = Peer-to-Peer payments (or Person-to-Person payments); P2B = Person-to-Business; G2P = Government-to-Person; and P2G = Person-to-Government.

Box 1. China's Experience with CBDC[1]

China adopted a gradual approach to developing a Central Bank Digital Currency (e-CNY). In 2014, the People's Bank of China (PBC, China's central bank) started a digital currency electronic payment (DCEP) research project. Since the end of 2019, the PBC has initiated pilot programs in four representative cities (Shenzhen, Suzhou, Xiong'an, and Chengdu) and developed scenarios for the 2022 Beijing Winter Olympics to ensure the pilots run in a steady, safe, innovative, and practical manner. In early 2021, the pilot programs broadened significantly to seven regions (the Yangtze River Delta, the Pearl River Delta, the Beijing-Tianjin-Hebei region, and China's central, western, northeastern, and northwestern regions). The e-CNY app—a one-stop portal for individual users—launched on major app stores in January 2022. On March 31, 2022, China further expanded the pilot to an additional 11 cities. Since the public pilot began, authorized banks have seen growth in both new and reactivated customers, supported by expanded digital and smart service offerings. Government agencies, large enterprises, and other institutions have also actively explored the e-CNY's potential for digital governance and operational management. Following theoretical research, closed-loop testing, and public pilots, an ecosystem has been developed around the e-CNY. There are now 10 e-CNY authorized operators and 26 pilot regions covering 17 provinces. As of December 31, 2024, 200 million individual wallets have been opened through the app, with cumulative transactions reaching RMB 9.4 trillion.

The e-CNY is the digital form of central bank currency and related payment system provided by the PBC. It has all the fundamental functions of money, namely, unit of account, medium of exchange, and store of value. It is China's legal tender, just like the physical form of Renminbi (RMB). The e-CNY is mainly a substitute for cash in circulation (M0) and coexists with the physical RMB. Both e-CNY and physical RMB are the PBC's liabilities to the public, having the same legal status and economic value. The PBC states that it issues e-CNY and physical RMB in parallel and takes account of both versions of fiat currency in daily data collection and analyses, as well as in monetary policy management. It will neither stop supplying the physical RMB nor replace it through an administrative order, as long as there is demand for it.

Since 2016, the e-CNY has operated under a centralized management model and a two-tier operating system, successfully implemented by the PBC. In this structure, the PBC serves as Tier 1, responsible for its issuance, inter-institutional connection, wallet ecosystem management, and the selection of authorized operators. It also provides centralized infrastructure for transaction routing, clearing, and settlement, including smart contracts—ensuring interoperability across institutions. Tier 2 consists of commercial banks and payment service providers, which offer customer-facing services to individuals and businesses. Digital wallets serve as the main channel through which users access e-CNY. Under the unified reserve management and data governance of the two-tier system, the PBC and the authorized operators share responsibilities and jointly develop the ecosystem. This model supports two key goals: centralized management by the central bank and non-disintermediation of the financial system. It also accommodates both retail and wholesale use cases. The architecture has been widely recognized by central banks and international organizations and is emerging as a global standard for CBDCs.

The e-CNY has demonstrated the viability of a CBDC that accommodates both account-based and value-based models. Under the account-based model, e-CNY functions like a digital version of a bank account, where e-CNY transactions take place through wallet-to-wallet transfers issued by banks—seamlessly interoperable with traditional bank payment systems. Under the value-based model, the

e-CNY serves as a digital version of cash, enabling peer-to-peer payments via blockchain or in offline and power-outage scenarios using token-based transactions. This dual model is designed to meet the diverse needs of various users.

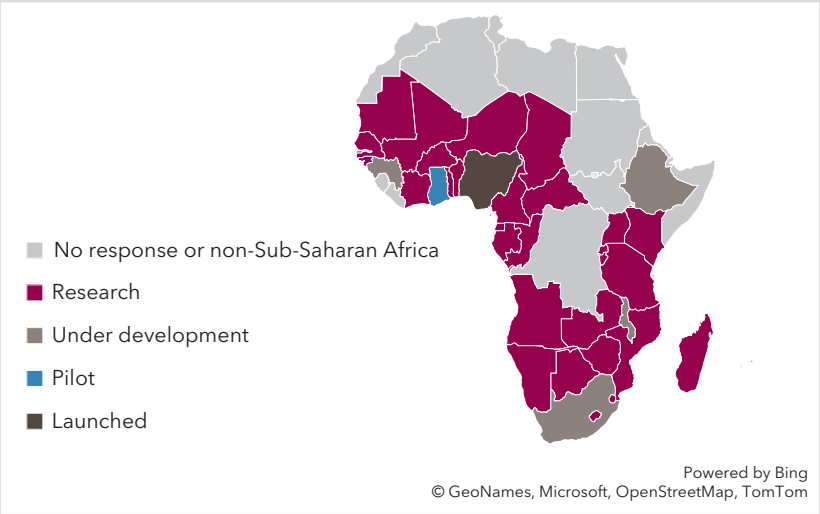
To echo the G20 initiatives on enhanced cross-border payments, the e-CNY has also explored cross-border collaboration following the three principles of "No Disruption", "Compliance", and "Interoperability". At the multilateral level, the BIS Innovation Hub, the Bank of Thailand, the Central Bank of the United Arab Emirates, the PBC, and the Hong Kong Monetary Authority collectively launched Project mBridge—the world's first central bank linked multilateral local currency settlement infrastructure enabling non-stop real-value transactions. mBridge fully respects each jurisdiction's currency sovereignty and regulatory framework, using a modular "Lego–Bricks" approach to enhance regulatory and policy flexibility and system adaptability. It enables interoperability with both CBDC platforms and traditional payment systems, supporting multi-currency cross-border payments and liquidity arrangements. As assessed by the BIS, mBridge can improve the transaction process, reducing cross-border payment costs by 50 percent. On bilateral collaboration front, cross-border interoperability has been promoted together with other central banks or monetary authorities. The e-CNY has developed a cross-border digital payment module to link with local payment infrastructures abroad. This enables bilateral local currency channels, co-developed by central banks and commercial institutions, that reduce transaction costs, improve efficiency, and mitigate compliance risk associated with cross-border operations. Currently, the e-CNY has already interoperable with the Faster Payment System (FPS) in Hong Kong SAR, with ongoing collaborations with Laos and Singapore in similar manners.

The e-CNY is designed to complement, not replace, commercial wallets such as WeChat Pay and Alipay. While WeChat Pay and Alipay act as wallets holding balances backed by institutional credit, the e-CNY is a universal, account-based CBDC backed by sovereign credit. It operates on a different dimension from WeChat Pay and Alipay but can also be used within these platforms. As part of the two-tier operating system, all compliant market institutions—including the consortiums formed by WeChat Pay and Alipay with their respective affiliated banks—can serve as authorized operators, providing services for exchange and circulation of the e-CNY. Tencent (WeChat Pay) and Ant Group (Alipay) platforms enable end users to make digital payments using funds held in commercial bank (personal) deposit accounts, which are indirectly backed by central bank reserves. The PBC requires that all balances in these wallets be fully backed by such reserves. In contrast, the e-CNY is legal tender that is not linked to just one single platform and can be transferred across e-wallets maintained by various providers. Unlike commercial bank deposits, the e-CNY does not bear interest—similar to physical cash. This design helps limit financial disintermediation by making it less attractive as a savings vehicle compared to interest-bearing deposits.

Looking ahead, the e-CNY will continue to refine its ecosystem by enhancing its overall design, strengthening the institutional environment, and exploring market-oriented incentive mechanisms. Beyond reducing costs and improving efficiency for merchants and market participants, the e-CNY aims to foster active stakeholder engagement and support the ecosystem's sustainable development.

[1] By Yibin Mu.

Figure 7. Status of CBDC Development in Sub-Saharan Africa



Source: Ricci and others (2024).

These developments in the digital landscape are happening in the context of low coverage of national identification systems, weak regulation and supervision, and pervasive capital controls.

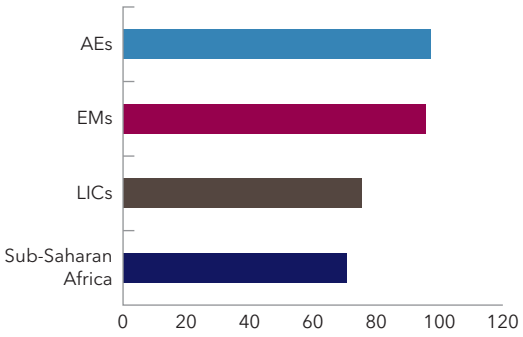
- In 2021, only 65 percent of the population in sub-Saharan Africa were enrolled in national identification systems, much lower than in EMs and AEs, and even lower than the 75 percent average in low-income countries (LICs) (Figure 8, panel 1). Within the sub-Saharan African region, the coverage varies greatly across countries, with a few (South Africa and Zambia) above the EM average and Mauritius above the AE average, whereas most of the countries are below the LICs average (Figure 8, panel 2).
- Like other regions, sub-Saharan African faces challenges in financial sector regulation and supervision. One good example is private mobile money. The root of the regulatory issues varies from protecting the banking system status quo versus telecom operators to simply transplanting bank regulations to mobile money operators. However, mobile operators bear much less risk than the core banking system for functions such as intermediation, often resulting in overregulation for the new instruments, which by nature are more agile and light (Greenacre 2018).
- Although monetary policy frameworks in sub-Saharan Africa are catching up quickly with EMs and AEs on independence and accountability, and with EMs on policy and operational strategy, they are still lagging significantly on communications (Figure 8, panel 3; Unsal, Papageorgiou, and Garbers 2022).
- Very few sub-Saharan African countries have legislation covering e-transactions, cybercrime, and data protection and privacy (Figure 8, panel 4).
- Persistently low fiscal revenues as a percent of GDP (even relative to the average in LICs) make it difficult for sub-Saharan Africa, countries to invest in developing key digital-friendly institutions (Figure 8, panel 5), let alone finance other social and development challenges.
- Finally, capital controls are pervasive in sub-Saharan Africa (Figure 8, panel 6), as in LICs in general, and remain higher than in EMs.

Figure 8. Sub-Saharan Africa Remains Behind in the Development of Key Digital-Friendly Institutions

1. Coverage of National Identification Systems Is Low. . . .

National Identification, 2021

(Percent of population)



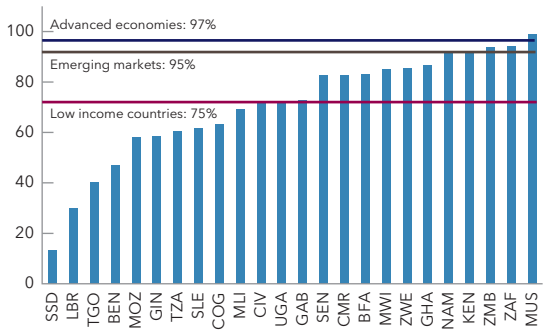
Source: International Telecommunication Union and IMF staff calculations.

Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

2. . . . And Also Varies Greatly among Countries

National Identification, 2021

(Percent of population)



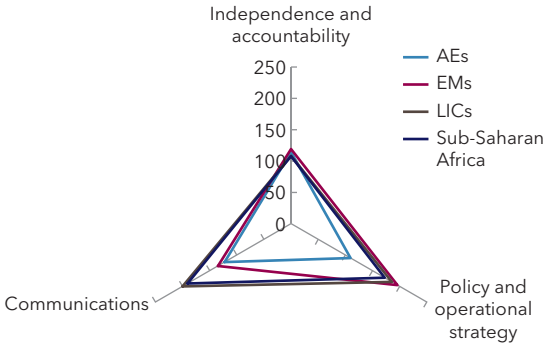
Source: International Telecommunication Union and IMF staff calculations.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

3. While Monetary Policy Frameworks Have Improved in Some sub-Saharan African Countries. . . .

Independence and Accountability, Policy and Operational Strategy, and Communications Index (IAPOC), 2018

(Index 2007=100)

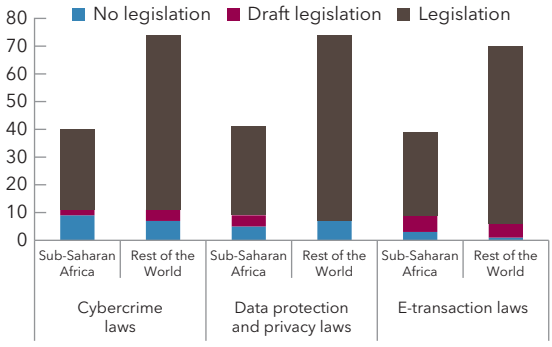


Sources: Unsal and others (2022) and IMF staff calculations.

Note: A higher score indicates a greater independence and accountability, policy and operational strategy, and communications. SSA includes 11 countries of the SSA region that account for 65 percent of the region GDP: Ghana, Kenya, Malawi, Mauritius, Mozambique, Nigeria, Rwanda, South Africa, Tanzania, Uganda, and Zambia. AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

4. . . . Digitalization-Related Legislation Is Lagging Behind. . . .

Digital Legislation, 2021



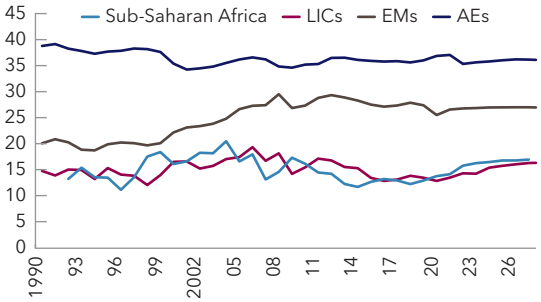
Source: UNCTAD and IMF staff calculations.

Figure 8. Sub-Saharan Africa Remains Behind in the Development of Key Digital-Friendly Institutions (Concluded)

5. . . . Domestic Revenue Mobilization also Remains Low. . . .

Revenue

(Percent of GDP)



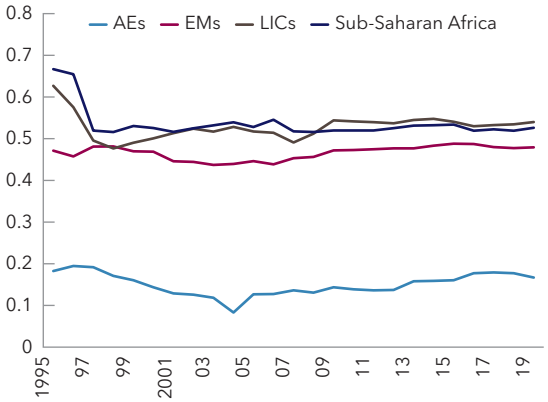
Source: IMF Fiscal Monitor Database.

Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

6. . . . And Capital Control Restrictions Are High

Overall Capital Control Restriction Index

(Index)



Source: Fernández and others (2016).

Note: AEs = advanced economies; EMs = emerging markets; LICs = low-income country.

3. CBDC in Sub-Saharan Africa

Given the heterogeneity of economic structures and policy priorities across sub-Saharan Africa, the choice to adopt Central Bank Digital Currency (CBDC) and eventually the pace at which countries should consider introducing CBDCs need to be informed by the country-specific context in consultation with all stakeholders. Although the priority is to develop an adequate fast payment system and promote a well-regulated and competitive private payment system, it will be essential for central banks to explore the complementary roles that CBDCs can play, assess specific market failures that a CBDC can uniquely address, and evaluate other strategic rationales for CBDC. In this context, it would also be important for sub-Saharan African countries to conduct thorough analyses of the opportunities and risks that a CBDC poses—including the macrofinancial effect and implications for legal and regulatory frameworks—develop capacity, undertake pilots to test the technical feasibility of the CBDC design, and address potential challenges before launch. To ensure a seamless integration of CBDCs within the evolving financial landscape, a clearly defined road map will be needed from research and design to deployment and oversight. International collaboration could help leverage other countries' experiences and resources, as well as promote cross-border interoperability.

CBDC is a digital form of fiat money, free from liquidity and credit risks.[16] CBDC is often discussed in two variants: retail and wholesale. Retail CBDCs are designed for general public use and are sometimes referred to as "digital cash." Wholesale CBDCs are designed for financial institutions and other central banks for use in interbank transactions, settlements, and securities trades.[17] While central banks have recently intensified their work on wholesale CBDCs (BIS, 2024a), the analysis in this paper focuses mainly on retail CBDCs as part of examining retail digital payment innovations in SSA. Like physical cash, retail CBDC is a direct liability of the central bank and is available to the general public for everyday transactions. It has legal tender status and functions as a medium of exchange, a store of value, and a unit of account. Although the user interface and technology employed for a CBDC could be similar to private digital monies issued by the private sector such as mobile money and commercial bank deposits, a retail CBDC is credit and liquidity risk-free whereas private digital monies embody the credit and liquidity risks of the issuer (Adrian and Mancini-Griffoli 2021).

There is substantial interest in engaging in CBDC work across sub-Saharan Africa, with varying paces of implementation. The survey of central banks by the IMF African Department (see Ricci and others 2024, hereafter "the Survey") revealed that over 75 percent of the countries surveyed are currently engaged—or are planning to be engaged—in CBDC research, development, or pilot activities. Of these, roughly two-thirds are in the research phase; slightly over one-third are planning to conclude pilots within the next two years; and more than a quarter are actively preparing for a CBDC launch by 2028. More in detail, the Survey shows that (1) Nigeria already has a CBDC; (2) Ghana and South Africa have advanced to undertake pilots; (3) Cabo Verde, Kenya, Madagascar, Mauritius, Namibia, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe are at the research stage; and (4) slightly less than a quarter of sub-Saharan African countries are not planning to engage in either exploring or developing a CBDC. These latter countries prefer to wait and see broader international experiences, considering that the CBDC area is evolving rapidly, and they plan, for the time being, to continue relying on existing payment systems, including private mobile money (considerations of different strategies are outlined in Patel, Kasiyanto, and Reslow 2024).

[16] Although CBDC arrangements do not present liquidity and credit risk, they can present money laundering/terrorism financing risks, with risk levels dependent on design features, use cases, and the surrounding ecosystem (IMF 2018, 2021d, 2021e).

[17] While wholesale CBDC (which represent commercial bank reserves at the central bank being placed on a blockchain) is suitable for large digital transactions between a central bank and banks, and potentially the settlement of a large tokenized securities market, a key innovation could be its easier interoperability across countries (like the BIS project M-Bridge [https://www.bis.org/about/bisih/topics/cbdc/mcbdc_bridge.htm]).

Policymakers consider that CBDCs can support important public policy objectives (IMF 2021b; Alberola and Mattei 2022; European Central Bank 2023; IMF 2023c, 2023g). IMF (2023f) outlines three broad policy objectives for CBDC: access to payments and financial inclusion; payment system competition, efficiency, and resilience; and monetary sovereignty as well as monetary and financial stability. According to the Survey, the top two motivations for CBDC issuance in the sub-Saharan African region include enhanced financial inclusion and domestic payments efficiency (see also Lannquist and Tan 2023). Most survey respondents indicate that CBDCs can reach people without bank accounts and that CBDC adoption would reduce the cost and time of transactions, with more gains on the latter. These benefits are particularly important in sub-Saharan Africa, where a small number of payment providers dominate the market, resulting in high costs for consumers and limited technological advancement (Cooper and others 2018).[18] By supporting the development and integration of new digital technologies in the real economy and the public sector—such as through the digitalized distribution of social transfers,[19] customs and tax collection (UNCDF 2022), and digitalized trade payments supporting intra-regional trade and remittances[20]—CBDC could also help decrease informality and make the public sector more efficient.

Retail public money remains a cornerstone of the monetary system, whether it is issued in the form of physical cash, CBDC, or both. A Bank of Canada paper warns that a monetary system without retail public money would be prone to fragmentation if different types of private money do not trade at par, and that market failures could arise from the network effects of payment platforms (Rivadeneyra, Hendry, and Garcia 2024). Indeed, if physical cash becomes less relevant in the economy and is no longer a competitive payment alternative to private mobile money, issues could arise with respect to the uniformity of the value of the currency in its many different forms or the potential excessive market power exerted by private money providers. Many central banks are exploring ways to maintain the demand for central bank money in the face of widespread use of crypto assets and potentially foreign-issued CBDCs or other digital assets. If a substantial portion of domestic transactions is not denominated in the official currency or settled with central bank money, it could render monetary policy ineffective (IMF 2023f).

A key design decision is whether to use the traditional centralized ledger technology or distributed ledger technology, which will depend on use cases. In addition, a hybrid approach is also a possible option (Soderberg and others 2023; Tourpe, Lannquist, and Soderberg 2023; Lukonga, forthcoming). With a constantly evolving digital landscape, blockchain technology and tokenization are at the forefront of this transformation. For CBDCs, this involves tokenizing assets, creating decentralized financial services, or adopting blockchain-based security measures. Tokenization simplifies the trading and management of assets, making them more accessible and efficient, potentially addressing longstanding challenges of financial inclusion and payments efficiency and resilience (Nassr 2021; BIS 2024b).

However, supporting competitive private digital payment solutions, grounded in an adequate FPS and in a robust operating environment, can also advance public policy objectives, often before considering CBDC. Many of the motivations for CBDC, including greater financial inclusion, could in many cases be effectively addressed with private payment systems or through other public policy interventions (for example, countries with large power outages or limited cellular coverage could focus on addressing these infrastructural bottlenecks). Fostering private competition by developing an adequate FPS and leveling the playing field can offer an adequately conducive environment—whether in terms of financial regulation and supervision, physical infrastructure, or digital interoperable payment platforms—thereby supporting financial inclusion (World Bank 2021a), and would require at present less human and financial resources than developing and maintaining a CBDC (given also the lack of an international standard for CBDC). Strong oversight and legal frameworks would prevent market power abuse while supporting innovation, security, and overall financial

[18] The authorities in Kenya are working with M-Pesa and other mobile money operators to enhance their interoperability, thereby facilitating the use of mobile money (IMF 2022b).

[19] See the related website of the Central Bank of Nigeria [https://www.enaira.gov.ng/].

[20] The cost of sending remittances to SSA is the highest in the world at about 8 percent of the amount being transferred (IMF 2022b).

system resilience, thus helping contain private sector risks. Innovations in payment systems can improve access to digital networks, accelerate settlement times, reduce fragmentation, and eliminate predatory practices. Central banks can leverage private sector strengths alongside public strategies (for example, by requiring interoperability, they can increase the likelihood that private payment systems will grow rapidly and lower costs for consumers and retailers).

Notwithstanding, some central banks may find that there may still be additional rationale for a retail or wholesale CBDC.

- **CBDC may help address market failures.** In countries where adequate fast payments and well-developed mobile operators still give rise to market failures (for example, insufficient reduction in transaction costs or reach of population), a well-designed CBDC might potentially be the right way to contribute to financial development as well as financial inclusion, unless other public policy tools are more appropriate. Central banks that choose to introduce a CBDC must determine whether to embark on a wholesale or a retail CBDC, and therein the relationship with the private sector.

- **CBDCs can reduce cash management costs.** Managing the distribution of physical cash can be costly, particularly in the context of weak transportation infrastructure, currency fragmentation, and denomination mismatches—where high-value transactions necessitate large amounts of currency, while smaller denominations are needed for everyday use. This creates inefficiencies and challenges in cash management, especially because cost and risks may deter private payment providers from transporting smaller banknotes. These challenges are exacerbated in the event of natural disasters or financial turmoil. CBDCs could complement cash and reduce the infrastructure needed for cash distribution (IMF 2023f), and countries like the Bahamas, India, and Nigeria see CBDC as a potentially effective solution for reducing cash use (Patel, Kasiyanto, and Reslow 2024). It is important to note that not only CBDCs but also mobile money or an efficient fast payment system can drive a reduction in cash use, and countries like Brazil have leveraged its fast payment system, PIX, to reduce cash use.

- **CBDCs could also support business continuity in the event of disruptions in private digital payment solutions.** They can play a complementary role in private payment systems, providing a fallback option in the event of system failures. Interoperability would ensure that if private systems experience outages or failures, businesses can switch to using the CBDC without significant disruption to their operations. Moreover, during crisis episodes, they could provide a guaranteed means of payment as they are issued and backed by the central bank.

- **A retail CBDC has the potential to compete with or complement existing private payment solutions, particularly mobile money—the primary payment method in sub-Saharan Africa, offering financial access to the unbanked population.** CBDCs could be offered directly to end users, with accounts held directly with the central bank, but this has many hurdles including limitations in central banks' agent networks and infrastructure bottlenecks. Moreover, most central banks may decide to concentrate on their core responsibilities, such as monetary policy and financial stability, while fostering a competitive environment for private sector innovation in digital payments. Design options include (1) tiered access with the CBDC provided to the retail through regulated financial intermediaries or (2) an open, flexible approach that enables a broad range of authorized private service providers (including mobile money operators). Once a customer has a CBDC wallet, private service providers can access it through application programming interfaces (APIs)[21] to deliver all retail services, possibly increasing competition in the industry and enhancing efficiency. The second option could bode well, particularly given the sub-Saharan African population's familiarity with mobile money (Annex 1).

[21] APIs allow one application system to communicate with another through pre-defined protocols. They can be thought of as a service contract between two applications that define how they communicate with each other using requests and responses.

- **A wholesale CBDC is typically token-based and is designed for use by financial institutions for large-value transactions and settlements**. For example, a potential case for a wholesale CBDC in South Africa (Project Khokha 2) is primarily centered around improving the efficiency and security of interbank payments and settlements. South Africa is also collaborating with other central banks, such as those of Australia, Malaysia, and Singapore, on projects like Project Dunbar to explore the potential for wholesale CBDCs in relation to cross-border transactions. A wholesale CBDC can streamline the settlement process, reducing the time and cost associated with interbank transactions. Token-based systems often use blockchain or distributed ledger technology to facilitate these transactions.
- **CBDCs can have features that could support the digital payment system in unique ways, particularly as technology advances**. For example, CBDCs can be designed to be programmable and execute smart contracts—contracts that automatically execute terms of a financial agreement between two parties when certain agreed-upon conditions are fulfilled. Payments, for example, can be made contingent upon the successful delivery of products. Government social transfers through CBDCs could be designed to be used only for predetermined expenses that policymakers target (for example, the purchase of food and other essential goods). Allowing payment service providers (PSPs) to hold CBDCs can also promote interoperability between private digital money.
- **Some potential benefits of CBDC may not even be visible yet, given the extreme dynamism of the digital finance environment**. As financial innovations like decentralized finance and asset tokenization evolve, CBDCs may introduce new use cases whose benefits are not yet fully understood.
- **Overall, CBDC and fast payment systems could exist side by side, especially in countries that have enough human and financial resources to develop, maintain, and update a CBDC**. Both fast payments (plus private mobile money) and CBDC require a rich ecosystem (developers, wallets, distributors, QR code standards, merchant acquirers, and so on). This ecosystem is usually provided by private firms, which must be incentivized to participate in it. In that sense, CBDC does not crowd out the private sector (just private mobile money, potentially), while it could complement the FPS. Indeed, CBDC could be settled on a fast payment infrastructure; ensure greater resilience in payments (by backstopping more directly lender-of-last-resort operations); reduce fragmentation (by standardizing payment interfaces, or ensuring the execution of transactions irrespective of relationship with different operators, and potentially allowing stablecoins transactions directly on its platform); and help discipline the market (by setting low benchmarks for fees), without necessarily being widely adopted. Moreover, a well-functioning fast payment system available to nonbanks which back their mobile money issuance with central bank reserves (for safety) would be very close to replicating CBDC (and could perhaps be provided more efficiently with CBDC itself).

The decision to issue CBDC requires thorough engagement with a wide range of stakeholders, including the private sector and legislators. Because public policy objectives and private sector incentives may not necessarily align, central banks would need to navigate carefully potentially conflicting preferences for CBDC. In particular, CBDC issuance and distribution require a sound legal basis and solid regulatory foundations to provide legal certainty, contribute to monetary and financial stability, and ensure appropriate accountability and transparency over the central bank's role (see Box 2 and IMF 2020b). Communication strategies that highlight the benefits of CBDC, and how various risks (including data privacy and cybersecurity) to end users and intermediaries are addressed, can help build trust and support wider adoption.

Pilots could enable the testing of innovative technologies, products, services, or approaches in a real-life environment (Tourpe and others, 2023). CBDC pilots are valuable and would help central banks—jointly with leveraging international experience—realistically assess technological and financial feasibility. The central bank and participants can avoid reputational risk by thoroughly road-testing a product concept in a pilot before letting it interact with real customers (ESCAP 2023). The ability to undertake policy experimentation and regulatory discovery offers major additional benefits over and above the pure testing aspects of a pilot (Bains and Wu 2023; ESCAP 2023).

Box 2. Retail CBDC and the Law[1]

Retail CBDC issuance and distribution must be based on a sound legal basis and regulatory foundations to ensure certainty, monetary and financial stability, and accountability and transparency. This involves many areas of the law, mainly in central bank law, monetary law, payments law, and private law.[2]

Central bank law. The central bank's power to issue CBDC needs to be clearly founded on a solid, ideally explicit, basis in the law. The central bank law should clearly allow the central bank to issue digital currency and not limit this function to banknotes and coins. Jamaica, for example, amended its Bank of Jamaica Act in 2022 to include, in addition to notes and coins, "Central Bank Digital Currency (CDBC)." Furthermore, if a CBDC is qualified, for legal purposes, as account-based, then the law should grant explicit power to the central bank to open accounts for all CBDC holders.

Monetary law. The most important question is whether CBDC is legally qualified as a currency. If it is, then giving it the typical key attributes of currency should be assessed, including legal tender status. The Bahamas, for example, revised the Central Bank of Bahamas Act in 2020 to grant legal tender status to "electronic money" issued by the central bank. Although arguably the State's power to attribute legal tender status is unlimited, granting this status to a means of payment such as a CBDC, that cannot be technically received by the majority of the population could raise fundamental questions including ones related to fairness. To this end, it should be assessed if exceptions could be considered to this status.[3]

Payment laws. The launch of CBDC could require updating existing laws related to payment. This includes ensuring final settlement of CBDC payments or transfer instructions. Payment laws need to also address CBDC distribution channels and the regulation of intermediaries involved (for example, wallets, fees on distribution and holding or transaction limits are areas that will need to be closely regulated).

Private law. Sound private law rules such as rules on contracts and property will be critical for the wide circulation and safe holding of CBDC. If CBDCs are legally designed as a token-based (a new legal type of asset), legal intervention might be needed to clarify their legal nature and ownership, transfer, conditions, custody, and related security interest rules.[4] Some challenges could be addressed through contracts, but in most jurisdictions the design of the contractual regime will need to be supported through comprehensive legislative intervention. International efforts such as the publication of the 2023 Principles on Digital Assets and Private Law by the International Institute for the Unification of Private Law (UNIDROIT) have paved the way for solutions to navigate some of these challenges.

[1] By Marianne Bechara and Adrian Dorel Dumitrescu Pasecinic.

[2] The introduction of a retail CBDC arrangement may also require some amendments to the AML/CFT legal and regulatory frameworks. AML/CFT considerations relevant to CBDCs, including the adaptation of the domestic legal and regulatory frameworks, will be addressed in a forthcoming IMF publication on the Financial Integrity Implications of CBDCs.

[3] For example, like in the digital euro regulation, for example, a payee is entitled to refuse digital euro where it is an enterprise that employs fewer than 10 persons, or a natural person acting in the course of a purely personal or household activity, or prior to the payment it was agreed with the payer on a different means of payment.

[4] While account-based CBDC could be qualified as a contractual account in the books of the central bank, it is typically governed by detailed rules.

To reap the potential benefits of CBDC (as with other digital instruments), sub-Saharan African countries would need to address multiple structural impediments to its adoption. Unlike cash, CBDC can only be used for payments if a well-functioning technological infrastructure is in place to transfer balances and ensure that payments are correct, timely, and final. The general public should also have devices to make and receive payments, as well as a national ID, but these are lacking in many countries in the region. As a digital payment instrument, CBDC further requires a high degree of digital infrastructure (for example, internet connectivity and mobile penetration), some financial and digital literacy among customers, and technical expertise to manage a CBDC network 24/7 among central bank staff. Many of these preconditions are either inadequate or lacking in many sub-Saharan African countries, raising concerns related to introducing a novel and untested form of digital money.

If not well designed and implemented, CBDC issuance could entail considerable operational and reputational risks (CRS 2023; IMF 2023b). Like other digital payment instruments, CBDC is vulnerable to information technology (IT) outages, cyber-attacks, and ML/TF concerns (Bharath, Paduraru, and Gaidosch 2024). Business continuity risks, if they were to materialize, would result in interruptions or disruptions to the CBDC platform and services (BIS 2023a).[22] New operational risks could also emerge from using CBDC in new technological environments (for example, double spending in offline payments) and from the evolving nature of existing financial risks (for example, new forms of counterfeiting as well as breaching data security and privacy), which central banks may not be accustomed to managing. In turn, operational failures and cyberattacks could undermine central bank reputation, damage its credibility, and lead to low trust and user adoption.

Central bank operational and reputational risks associated with CBDC are particularly pronounced in sub-Saharan Africa. The issuance of CBDCs places a heavy burden on sub-Saharan African central banks, where capacity constraints make it more challenging to maintain continuous functionality of the system, ensure its resilience, and safeguard its stability, while demonstrating the capability to recover from operational failures without affecting the system's reputation (Canuto and Ghazi 2023). In addition to high operational burdens, central banks in sub-Saharan Africa may also be more exposed than elsewhere to cybersecurity risks and the difficulty of adequately implementing key policies to mitigate them (BIS 2023a).

Without adequate safeguards, CBDC could alter financial market structures, adversely affecting bank intermediation, liquidity risk, the efficacy of monetary policy, and potentially financial stability (IMF 2021b; Alberola and Mattei 2022; CRS 2023) (see Box 3). An often-cited concern with CBDC and the associated ease with which it could facilitate rapid changes in financial holdings is the possibility of bank disintermediation (Infante and others 2022). Especially if CBDC is remunerated, banks' dependence on more costly deposits could increase, adversely affecting the availability of credit, with negative implications on monetary policy transmission and financial stability (Das and others 2023; Kunaratskul, Reslow, and Singh 2024). In sub-Saharan Africa, where monetary policy transmission is already weak, monetary policy can become even more ineffective. However, certain CBDC design features, such as caps on and nonremuneration of CBDC holdings, can moderate financial disintermediation risks (Lukonga 2023). That said, these design choices involve several complex trade-offs: for example, the more the system is designed to reduce financial disintermediation risks, the fewer gains it may offer in terms of financial inclusion, unless the system manages to capture additional financial participation. Given that financial inclusion is low in most sub-Saharan African countries, CBDC use could enhance monetary policy implementation and transmission, assuming adoption rates are high (Alberola and Mattei 2022). Whereas CBDC proponents claim that a partial shift from private

[22] Business continuity is "the process that allows organizations to continue operating during a disruption, ensuring the protection of their processes, assets, and human resources (Consultative Group on Risk Management 2022).

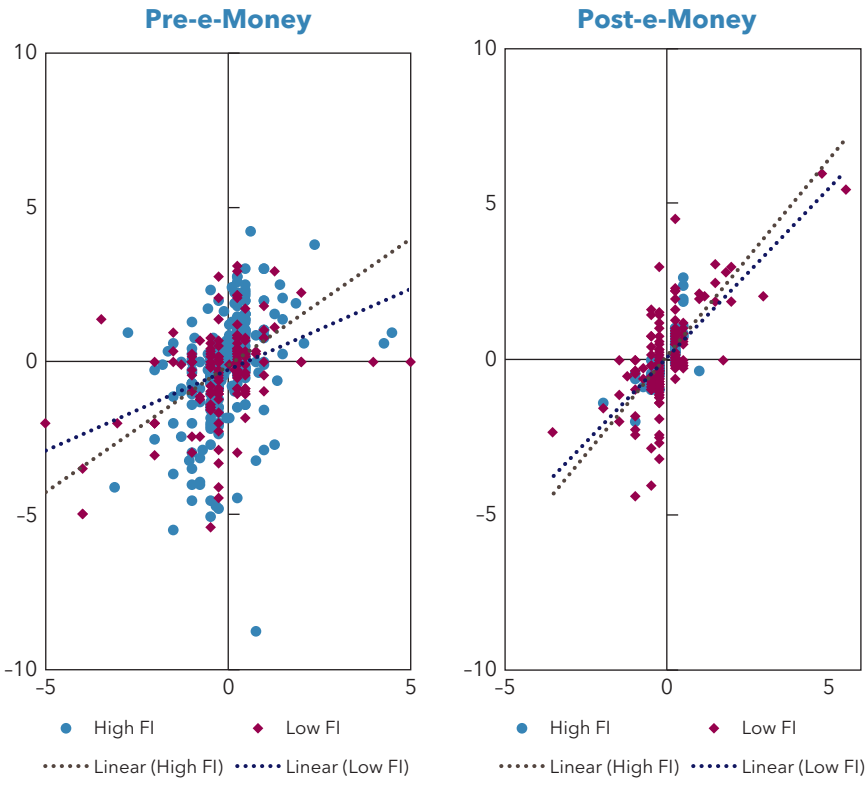
Box 3. Monetary Policy Transmission[1]

In Africa—and in many emerging countries around the world—digital means of payments denominated in legal tender and exchanging funds through feature or smartphones, have gained widespread adoption. This in turn has driven central banks to seek to understand the effect of this "e-money" on monetary policy transmission, as well as its implications in designing digital currencies such as Central Bank Digital Currency (CBDC).

E-money development can have important, yet theoretically unclear, consequences for monetary policy transmission. E-money can substitute for the role of banks, thus reducing the amount of bank deposits and leading to financial disintermediation. However, it can also complement banks by enlarging the pool of depositors and borrowers, leading to higher financial intermediation and stronger transmission of monetary policy rates to bank lending rates. The question of whether the growth of e-money enhances or weakens monetary policy transmission therefore has to be gauged empirically.

A panel data analysis covering 47 countries shows that the growth of e-money is followed by stronger outcomes in terms of monetary policy transmission, growth in bank deposits and credit, and efficiency gains in financial intermediation.[2] Two channels examined are the credit channel, where e-money growth enhances banks' ability to create credit, and the interest rate channel, assessing the effect of e-money on the responsiveness of lending rates.

Box Figure 3.1. Relationship between Lending Rate Changes and Policy Rate Changes



Source: Huang and Others 2024

Notes: This figure shows the relationship between changes in policy rate and changes in lending rate for low and high financial inclusion countries in pre- and post-e-money era. Policy rate change is measured as the change in policy rate from month t – 1 to t + 6. Data cover months from 2001 December to 2019 December, while periods when there was no policy rate change are excluded.

Box 3. Monetary Policy Transmission (Concluded)

All countries, irrespective of initial conditions, experience stronger monetary policy transmission with the development of e-money. This transmission, measured by the elasticity of the lending rate with respect to the policy rate, is higher in the post- (relative to pre-) e-money era (Box Figure 3.1). The evidence is particularly pronounced in countries where e-money development takes off in a context of limited financial inclusion: in these countries, we observe an increase in the elasticity of bank lending rate with respect to a change in the monetary policy rate by about 0.3 with the development of e-money.

E-money and the banking sector seem to develop in tandem, suggesting that e-money issuers are complementing banks by bringing into the banking system previously unbanked customers' funds into the banking system, and by extension, promoting higher financial intermediation and stronger monetary policy transmission.

Data also show that growth in e-money and growth in deposits and credit are more correlated in countries with limited initial levels of financial inclusion.

The paper also provides empirical evidence that the introduction of e-money gradually promotes financial inclusion itself.

Finally, bank lending-deposit spreads tend to decline with the development of e-money, suggesting a more competitive banking sector in the post-e-money era.

[1] By Z. Huang, A. Lahreche, M. Saito, and U. Wiriadinata.

[2] Panel data at both monthly (covering 21 countries) and annual (covering 47 countries) frequency during 2001–19 was constructed using Financial Access Survey, International Financial Statistics, and World Economic Outlook.

bank accounts to CBDC would improve financial stability, others argue that CBDC could make bank runs more likely by offering an alternative to bank accounts that people could switch to during times of bank distress (CRS 2023).[23]

Other potential macrofinancial risks are also associated with CBDC. In addition to assessing the potential effect of CBDC issuance on bank intermediation and monetary policy transmission, it is essential that central banks assess the effect on currency substitution, cross-border transactions, capital flow management, the exchange rate regime, possible monetary union membership, legal and regulatory frameworks, and oversight capacity (He and others 2023; IMF 2023f). Currency substitution, capital account volatility, and cross-border flows are particularly relevant in sub-Saharan Africa, as many sub-Saharan African countries are often concerned with possible capital outflows and drainage of reserves (Alberola and Mattei 2022; He and others 2023).[24]

Ensuring CBDC interoperability and common standards with other payment rails would prevent fragmentation of payment systems (BIS 2021; Alberola and Mattei 2022). It would be important for CBDCs to be designed to achieve an easy flow of funds to and from other payment systems (including domestic private savings products, government payments and receipts, and cross-border mobile money), safeguarding the coexistence of CBDC within the wider payment ecosystem. Interoperability would be helped by establishing

[23] Where seigniorage plays a role in central bank funding and independence, CBDC could reinforce central banks' role as issuer of the public unit of account and preserve seigniorage incomes for central banks, relative to private digital payments that would instead reduce seigniorage. Indeed, as cash use declines in favor of digital payments, seigniorage will decline in the absence of CBDC. For more on seigniorage in a digital era, see Abouelmakarem and others (forthcoming).

[24] CBDC generates some additional considerations for financial stability relative to FPS if it substitutes heavily for bank deposits; however, mobile money, and particularly mobile money backed by a central bank, would have a similar impact if not greater.

standards for messaging, data management, security, and other technical and regulatory aspects (for example, operational processing, opening hour requirements, and supervisory obligations). Common standards would allow a reduction of friction and barriers, arguably necessary for the success of any infrastructure interoperability measure such as an interlinkage or technical interface. Potential options for CBDC infrastructure interoperability include sharing functions (for example, using the same authorization and clearing providers or using the same digital identity program), incorporating settlement (for example, one system settling in another), or completely sharing processing infrastructure and services outside the CBDC core system.[25] A programmable CBDC could also be used to enhance the conversion of currencies and to prevent noneligible transactions (including ensuring that foreign exchange [FX] controls and capital flow management measures are not thwarted) while facilitating the flow of trade finance.

Against this backdrop, sub-Saharan African countries will need to carefully weigh the implementation challenges, assess the needs, and adequately prepare for deployment before CBDC issuance and use. It is important for central banks to consider (1) availability of resources; (2) risk management; and (3) most importantly, existing market failures, the rationale for CBDC, and alternatives available. Because CBDC is a complex technological, policy, and regulatory undertaking, having adequate financial resources will pave the way for investing in new technologies and infrastructures, as well as building the institutional capacity needed to manage a secure system that runs 24/7 and is interlinked to other payment systems. An integrated risk management framework would also need to be applied to the entire lifecycle of a CBDC—from research and design to implementation and operation. In that respect, leveraging other countries' experiences (both regional and international) and possibly experimenting with technology tests and a pilot CBDC would be helpful, while public education will also be critical for CBDC adoption.

Foundational principles would need to guide CBDC exploration while tailoring it to individual country conditions. These principles are (1) "do no harm" to monetary and financial stability; (2) coexist with cash and other types of money in a flexible and innovative payment ecosystem; and (3) promote broader innovation and efficiency (Group of Central Banks 2020). Meeting the basic principles requires a CBDC to have certain core features covering the CBDC instrument, the underlying system, and the broader institutional framework in which they exist (see Table 1 in Group of Central Banks 2020). Given the variety of potential CBDC business models, central banks may need to understand the potential benefits of each model, including incentives to participants and value added to end users (Group of Central Banks 2023). That said, the design of CBDC would need to be informed by country-specific factors and policy objectives, as sub-Saharan African countries have heterogeneous economic structures and policy priorities. For instance, offline systems (Minwalla and others 2023), if feasible, are crucial for countries with poor connectivity, while regulations should ensure operational security and resilience against counterfeiting, especially in countries more exposed to criminal activity.

Developing CBDC would require central banks and other public authorities to make design choices and decide on related trade-offs (Group of Central Banks 2020; BIS 2023c). These design choices include whether to (1) impose limits or caps; (2) use centralized, decentralized, or combination distributed ledger technology; (3) offer account- or token-based CBDC; (4) aim to provide offline functionality; (5) charge fees or not; and (6) allow nonbanks to offer CBDC wallets or not.[26] Design and technology trade-offs would need to be carefully balanced. CBDC design features should not exacerbate cybersecurity, financial stability, or ML/TF risks, or potentially limit interoperability—both domestically (with private mobile money) and internationally (with foreign banks and other central banks).

[25] A World Bank paper illustrates how CBDC systems could interoperate with retail payment systems using two technology design experiments on (1) settling fast payment systems obligations in a wholesale CBDC system and (2) ensuring interoperability between FPS and retail CBDC users—with the caveat that these experiments do not take into account complexities that may be involved with live systems (World Bank 2024).

[26] Often, payments benefit strongly from nonbanks having direct access to fast payment systems and not going through banks that extract high rents.

Pooling central banks' resources to explore CBDC and ensure interoperability can be particularly beneficial in sub-Saharan Africa. Prior to launching CBDC and during its life, central banks would need to engage in significant domestic, regional, and international consultation and dialogue to deeply assess the practical effect of policy and design choices (BIS 2021).[27] Given the capacity constraints of many sub-Saharan African central banks, regional or international collaboration would facilitate the development of common digital platforms and information sharing, helping overcome resource limitations. Moreover, harmonizing technology and regulations with respect to digital payment instruments can lead to more efficient regional cross-border flows and minimize regulatory arbitrage, with possible beneficial effects for trade integration. Leveraging other countries' experiences, including both inside and outside of sub-Saharan Africa, would be very useful to avoid possible mistakes in CBDC design and implementation. Nonetheless, countries should consider that there is no one-size-fits-all model for CBDC design and interoperability. In line with the broader development of the financial sector, policymakers should continually upgrade legal frameworks to address governance, ML/TF concerns, ensure financial integrity, and tackle cybersecurity risks. Such international collaboration and coordination on technological, regulatory, and supervisory issues would be beneficial even if the countries do not follow up with the development of a CBDC.

Key Policy Implications

The decision to adopt CBDC and the pace of adoption depend on country-specific circumstances, based for example on the assessment of market failures or other rationales that justify the role of CBDC, and consideration of resource constraints faced by the central bank. CBDC has the potential to improve efficiency and financial inclusion, but several preconditions and challenges need to be addressed first.

- Many of the motivations for CBDC, including greater financial inclusion, could in many cases be efficiently addressed with private payment systems or through other public policy interventions. For example, countries with large infrastructure gaps, power outages, and insufficient mobile network coverage could focus on addressing these bottlenecks first.

- For many sub-Saharan African countries, the pressing priority remains enhancing payment modernization and financial efficiency and bolstering financial inclusion by providing a conducive environment for private mobile money and fast payment systems, including greater operability between different mobile platforms and more efficient cross-border transactions.

- In countries where adequate fast payments and well-developed mobile operators still give rise to market failures (for example, insufficient reduction in transaction costs or reach of the population), a well-designed CBDC might potentially be the right way to contribute to financial development as well as financial inclusion. Heavily digitized sub-Saharan African economies—in some countries, mobile money transactions exceed 50 percent of GDP (Diouf and others 2024)—could potentially benefit from "digital" cash to support monetary policy. For countries on the opposite end of the spectrum, where the private digital financial sector is limited, a widely supported and well-designed CBDC could address some of the market failures in case other public policy tools cannot. By streamlining the payment process and reducing the need for intermediaries, a widely adopted CBDC could reduce financial transaction costs and foster financial inclusion, while the enhanced security reduces the risk of fraud and can help combat illicit flows. This solution can also enable more timely and targeted social transfers.

- In addition to market failures, other strategic reasons may induce central banks to pursue CBDCs. These include the risks of technical failures of private digital payment solutions; the high cost of managing and meeting the demand for central bank physical cash; the value of programmable public money in the digital payment space; and the need for the central bank to interact more efficiently with well-advanced digital markets, including tokenized markets.

[27] Project M-Bridge explores how a multi-central bank digital currency (CBDC) platform can promote interoperability and make cross-border payments more efficient.

- Several preconditions need to be satisfied before adopting CBDC. First, after clearly identifying the existing market failures or other strategic reasons for CBDCs, it is essential to ensure that the corresponding objectives cannot be resolved with other more appropriate policies. For example, financial inclusion motivations, while warranted, could be best addressed with other public policy solutions, particularly if they arise from a lack of infrastructure, such as systemic power outages or large gaps in mobile network coverage. Second, the lack of national or digital identification in many countries in the region can be a roadblock for wider CBDC adoption and make it more difficult to apply anti-money laundering/combating the financing of terrorism (AML/CFT) preventive controls by intermediaries in the CBDC ecosystem.

- When the preconditions are met, a multifaceted set of issues should be considered. In this regard, the nature of the relationship between the CBDC and private payment systems, including mobile money (the predominant retail payment system in sub-Saharan Africa), should be explored. First, for CBDCs to be widely adopted, the user experience needs to be satisfactory, with minimal glitches; hence the design needs to be simple and user-friendly, yet efficient and secure, thus requiring central banks to devote considerable resources to the design, maintenance, and operation of the system. Second, the CBDC needs to ensure flexibility and adaptability, both to the evolution of the domestic payment system and the compatibility with private sector initiatives, as well as with the fast international evolution of standards. Third, a sound legal basis and effective regulatory framework, as well as updated macroprudential policies, are essential to contain risks to bank disintermediation, monetary transmission, capital flows, and ultimately financial stability. Finally, managing reputational risk and the possible risk of limited trust and poor adoption would require appropriate communication policies.

- In designing CBDCs, central banks could benefit from choosing options that complement private payment systems and support interoperability. For sub-Saharan African countries, given the prevalence of the unbanked population, design options that include private system providers (for example, mobile service providers) could be considered, thereby ensuring seamless transfers between CBDCs and private digital solutions. These would need to be supported by regulatory and other safeguards to protect end users, as well as infrastructure and technological solutions that can lower interoperability costs.

- However, CBDCs could also pose some risks and challenges that need to be carefully analyzed and mitigated. These risks include data privacy, cyber insecurity, system outages, business continuity, trust in the newly established system, financial integrity, financial disintermediation, financial and banking sector instability, as well as new regulatory challenges, requiring new frameworks and international cooperation. Central banks with limited resources would benefit from carefully considering their payments landscape, objectives, and practical constraints, as well as the benefits of learning from the experiences of others before deciding on the adoption of CBDC.

- It is important for national authorities to proceed very cautiously, given design and operational challenges, international interoperability uncertainty, fast technological developments, high costs, and limited resources. At this stage, experimenting with technology tests and piloting CBDC, while developing capacity, seems an appropriate step. Regional collaboration through sharing experiences, pooling resources, harmonizing regulation, collaborating on supervision (as well as developing common digital platforms) would be particularly beneficial within sub-Saharan Africa, also to promote interoperability, more efficient regional cross-border flows, and trade integration as well as to minimize regulatory arbitrage.

4. Fast Payment Systems (FPS) in Sub-Saharan Africa

FPS enable real-time, around-the-clock payments through various channels, including the internet and mobile phones. In sub-Saharan Africa, despite challenges such as uneven mobile and internet penetration and low financial literacy, FPS can significantly enhance financial inclusion with a concerted effort to improve digital infrastructure and financial education. Although the role of central banks in FPS implementation can vary, careful design of public intervention in payment systems can promote competition, foster innovation, address coordination issues, and ensure the security and accessibility of the systems.

FPS are defined as a financial infrastructure focused on clearing and settling payments quickly and continuously. FPS are very different from Central Bank Digital Currencies (CBDCs): fast payment systems are just settlement infrastructure, not actual mobile money, and they rely on mobile money being created and distributed by banks (and sometimes nonbanks); CBDC instead embeds both mobile money and settlement infrastructure. FPS can facilitate payments through the internet, mobile phones (including feature phones without internet access), as well as physical banks and ATMs. They can be used for transfers and transactions between individuals, business entities, and the government. These payments (1) are notified and made available to the payee in real time or near-real time and (2) can be made on a 24-hour, seven-day (24/7) basis (BIS 2016). FPS are often accompanied by a fast payment program—a set of procedures, rules, and technical standards—that facilitates the payments.[28] FPS are significantly *faster* for end users than traditional payment systems, as in the latter systems, the transfer of funds between two parties across different payment providers can take anywhere between a few hours to a few days to be completed and payees typically do not have access to the full funds until the payment is cleared. Moreover, the continuous availability of FPS represents a significant improvement over traditional payment systems which only function during working hours and business days. It is important to note that FPS envisage immediate transfers of funds for end users, but not necessarily immediate clearing and settlement between the underlying intermediary financial institutions (like banks) that end users rely on.[29]

The economic landscape of sub-Saharan Africa poses distinct challenges for leveraging on FPS yet also offers substantial opportunities. Key barriers such as uneven mobile penetration, limited digital connectivity, and a lack of financial literacy among a considerable portion of the population hinder the widespread adoption of digital payment solutions. Nevertheless, these obstacles are likely to soften over time, as concerted efforts toward financial inclusion deepen, relying on public and private initiatives to enhance digital infrastructure and financial education.

FPS could influence the relevance of private mobile money, but certain special characteristics of the latter can make them complementary. The introduction of FPS was motivated in part by the need to respond to customers' desire for speed, convenience, and leveling the playing field among mobile money and financial

[28] FPS are distinct from CBDC and private mobile money in that are not an instrument or a claim, but rather infrastructure and system to transfer claims that are in digital format.

[29] FPS are generally separate from central banks' real-time gross settlement (RTGS). FSP generally focus on ensuring instantaneous clearing at the transaction level (say retail level, or small frequent transactions), while settlements among corresponding providers may or may not be instantaneous. Often FPS settle through the RTGS, which offers the benefit of the lower liquidity requirement generally associated with netting out transactions at regular intervals. Specific FPS infrastructure is usually built for clearing and sorting messages, focusing heavily on liquidity management arrangements—even more so if non-banks are part of FPS (Patel, Kasiyanto, and Reslow 2024).

technology (fintech) operators, without the need for a new digital currency (see Bech, Shimizu, and Wong 2017). To the extent that well-designed FPS manage to promote the growth of competitive digital payment service providers (PSPs), more efficient and inclusive payment services could be more widely available to the public, including among the unbanked.

FPS could also benefit from a complementary CBDC. A BIS survey found that the majority of central banks believe there is value in having both FPS and a retail CBDC, as CBDC could have unique features such as programmability and being a riskless form of money (Kosse and Mattei 2023). Moreover, a CBDC could offer both instantaneous clearing and settlement (which would be possible also for FPS, depending on the design of the underlying infrastructure, though not all existing FPS offer such features), and may spur further innovation in the digital financial world.

The role of central banks in FPS varies and depends on national priorities, as well as technical and human resources. FPS can be public, private, or mixed, depending on how much involvement the central bank aims to have in FPS: as catalyst, overseer, or operator (Khiaonarong and Humphrey 2022). As a catalyst, the central bank takes a central role in promoting FPS by helping create the needed infrastructure (for example, coordinating with other stakeholders in the government or working as a link between the government and private agents, helping set a strategy or road map for the implementation of FPS). As an overseer, the central bank would develop the regulation for FPS to operate safely and monitor the operators to ensure they are working as expected. Some central banks are also involved in some development stages, such as providing real-time settlement or being active in the governance structure of the firm providing the FPS (for example, Australia, Norway, Thailand, United Kingdom, and among others), without running the FPS themselves. Finally, as operators, some central banks operate, manage, and own the FPS in their country (for example, Brazil PIX).

The recent IMF survey of sub-Saharan African central banks sheds light on the design of FPS in the region (Ricci and others 2024). The FPS can be accessed through mobile phones or internet connections in more than 80 percent of the countries in sub-Saharan Africa. In over 70 percent of responding countries, access to the FPS would require a national ID. FPS are maintained and managed by the private sector in two-thirds of sub-Saharan African countries and regulated by central banks in most jurisdictions. FPS fees are generally low, especially for small transactions, generally because of policy choices implemented through regulation or public operation of the system but they are not negligible. Several sub-Saharan African countries have reported bilateral or multilateral arrangements with other countries or regional communities for cross-border transactions.

The majority of countries in sub-Saharan Africa already have domestic FPS in place or are actively designing them to promote fast progress toward financial inclusion, but success in terms of adoption and usage varies greatly. The following cases illustrate the diversity of experiences in sub-Saharan Africa:

- **PesaLink in Kenya.** Launched in 2017 to provide real time P2P payments solution to customers in Kenya and reduce the payment cycle from two days (Electronic Fund Transfer) to instant payment, the objective of PesaLink (https://fastpayments.worldbank.org/sites/default/files/2021-09/World_Bank_FPS_Kenya_PesaLink_Case_Study.pdf) is to digitize the payment landscape (see Box 4). Banks and microfinance banks associated with the Kenya Bankers Association (KBA) can become direct participants of PesaLink, while Payment Service Aggregators (PSA) can participate indirectly through a sponsor bank for settlement. PesaLink supports multiple channels of payments such as branch, mobile, and internet banking, unstructured supplementary service data (USSD)-based payments, and agent networks, while mobile numbers are used as an alias. Transactions are settled through a deferred net settlement mechanism at the RTGS system of the Central Bank of Kenya. From its inception in 2017 to 2020, PesaLink registered a compounded annual growth rate of about 36 percent in both transaction volume and value of transactions (World Bank 2021b).

Box 4. M-PESA—Mobile Money Pioneer in Africa[1]

M-PESA is Africa's most successful and widely used mobile money service. Launched in Kenya in 2007, it is available in seven countries—Democratic Republic of Congo (DRC), Egypt, Ghana, Kenya, Lesotho, Mozambique, and Tanzania—and has over 50 million active users. It processes over 1 billion transactions per month and is the conduit for over US$1.5 billion in remittances, including 60 percent of formal remittances into Kenya and 20 percent into Tanzania every year according to Vodafone (M-PESA Africa, https://www.m-pesa.africa/what-is-mpesa; D'Silva and Gathinji 2022; M-Pesa 2024). M-PESA provides a convenient way to send and receive money, make bill payments, receive salaries, and get short-term loans, particularly for those who have a mobile phone but do not have a bank account. In Kenya, for example, only 40 percent of adults had bank accounts, compared with 79 percent having mobile money accounts (CBK 2022). Recently, M-PESA launched a global virtual VISA card that even allows users to pay for goods at international online sites.[2]

M-PESA has improved financial inclusion and helped to reduce poverty. Household access to formal financial services increased over threefold between 2006 and 2019 in Kenya, much of which can be attributed to the use of M-PESA (CBK 2019). Suri and Jack (2016) find that mobile money access in Kenya increased per capita consumption and lifted 2 percent of Kenyan households (HHs) out of poverty. Moreover, it also supported gender inclusion: the effect on consumption and the likelihood of living in poverty was indeed stronger for woman-headed HHs, because of increased financial resilience, higher savings, and better labor market outcomes. Mobile money provided women with better occupational choices, allowing them to move out of agriculture and into business.

Widespread use of M-PESA, particularly among low-income HHs, makes it a useful conduit for providing targeted welfare support. The Government of Kenya has a national payment program through mobile phones akin to social security, which provides US$20 per month to people aged seventy years and above (CBK 2022). The World Food Program also used M-PESA to disburse support for the poor individuals and to ensure that the vouchers they provide are used for food and water as intended through M-PESA's closed-loop system, which allowed voucher redemption only at specific merchants (M-Pesa 2024).

A key ingredient for M-PESA's success is the proximity of a large retail network of agents supporting unbanked customers. M-PESA has over 600,000 active agents spread throughout the countries where the network is present, particularly in areas where banks or ATMs may not be easily available. These agents are able to change M-PESA for cash and vice versa, including remittances sent through M-PESA from abroad. Person-to-person transfers can happen in real time and agents who allow cash-in and cash-out are usually available beyond regular banking hours. McKinsey attributes the success of M-PESA to its decision to match network growth to customer-based growth, ensuring a steady number of transactions per agent per month (Cobert, Helms, and Parker 2012). Other factors that have possibly contributed to M-PESA's success are the first mover advantage in Kenya, a supportive regulatory framework, and a significant network effect (given its large share of the mobile money market in Kenya).

Given the success of M-PESA and other private digital payment providers in promoting financial inclusion, the introduction of CBDC needs to be carefully thought through. In May 2022, the Central Bank of Kenya issued a discussion paper on CBDC, noting that benefits related to CBDC in terms of promoting financial inclusion are limited, but that there may be benefits related to cost reduction, interoperability, and enhancing cross-border payments.

[1] By Saad Quayyum.

[2] It can provide access to as many as 100 million foreign merchants including Amazon and Alibaba through mobile phones, without the need for credit cards or formal accounts with processors such as PayPal.

- **FASTT in Sierra Leone.** After the introduction of a *National Payment Switch* in 2023, the project named "Frictionless Affordable Safe Timely Transactions" (World Bank 2023c) is being implemented to accelerate the development of fast payments and financial inclusion in Sierra Leone (World Bank 2023c). This new financial infrastructure, which is part of a $12 million funding program from the World Bank, interconnects six commercial banks and enables payments interoperability among banks, microfinance institutions (MFIs), mobile money operators, and fintech firms. It aims to facilitate interoperability of card transactions among different channels of payment (internet, mobile, agent, ATM) and PSPs, stimulating innovation and competition in the financial sector and fostering progress toward financial inclusion in the country.

- **PayShap in South Africa.** Launched in March 2023, PayShap is an FPS created in partnership with BankservAfrica and the Payments Association of South Africa (PASA) to enhance financial inclusion by handling low-value, real-time retail fund transfers between bank accounts. Although initially slower than anticipated, the uptake has been strengthening since its launch. By May 2024, the system had attracted over 6 million unique users, with the number of transactions surging to 30 million, valued at R19.5 billion (BankservAfrica 2024). Four major banks participated in PayShap during the initial launch. This number expanded to 10 banks by July 2024, indicating the system's growing integration with the financial sector. Customers of participating banks can make transfers through their banking applications, using either a registered mobile number (ShapID) or traditional bank account information. In line with its goal to facilitate low-value transfers, PayShap caps the maximum amount per transaction at R3000 initially, with transaction fees varying across banks, especially for larger amounts. Despite the system's significant progress, hurdles remain, and adoption has been slower than expected for various reasons: accessibility (including the lack of standardized access across various banking applications and the absence of QR code payment options), cost (lack of uniform costing and relatively high cost for low-value payments), and limited use cases. Future enhancements are on the horizon. The introduction in December 2024 of a "request-to-pay" feature is expected to enhance the system's appeal to merchants. In addition, while direct participation is currently limited to commercial banks, there are ongoing efforts to broaden access to the underbanked population, including the prospective integration of PayShap into the mobile money platform MoMo through the MTN's partnership with banking and financial services companies (Annex 7).

- **GIP in Ghana.** In August 2015, the Ghana Interbank Payment and Settlement Systems (GhIPSS), a subsidiary of the Bank of Ghana, launched GhIPSS Instant Pay (GIP). The fast payment system facilitates the real-time clearing of interbank transfers and is accessible through various banks' internet and mobile banking platforms. Since 2019, there has been a surge in usage, also owing to the Bank of Ghana's efforts to promote digital payments amid the coronavirus disease 2019 (COVID-19) pandemic and the Digital Financial Services Policy 2020—which includes measures to simplify customer due diligence (CDD)[30] requirements and increase transaction limits. Between 2022 and 2023, the system experienced a 51 percent increase in the transaction volume and a 104 percent increase in the transaction value, with the total transaction volume reaching 115.37 million and the total transaction value reaching GHS 120.1 billion (14 percent of GDP) in 2023 (GhIPSS 2024). A key feature of the system is its interoperability. First, GIP is integrated with the Mobile Money Interoperability (MMI) service, enabling smooth transactions between mobile money and bank accounts. Second, to further enhance the ease of payments, GhIPSS introduced Ghana's universal QR code solution and the Proxy Pay service in 2020. These functionalities allow businesses and individuals to use QR codes and proxy IDs for receiving and making payments, significantly simplifying the payment process.

[30] CDD is a process that businesses and financial institutions use to verify customer identities and assess their risk profiles, as part of their risk management strategy and as required by laws and regulations on minimum identification requirements and verification and AML/CFT reporting obligations.

- **Other active FPS in sub-Saharan Africa.** Other FPS include EthSwitch (Ethiopia), NatSwitch (Malawi), Mauritius Central Automated Switch (Mauritius), NamPay (Namibia), Tanzania Instant Payment System (Tanzania), GamSwitch (The Gambia), and ZimSwitch Instant Payment Interchange Technology (Zimbabwe). Some countries have several FPS, but only in Ghana are these systems interoperable with each other (AfricaNenda, World Bank, and UNECA 2023b).

Cross-border FPS and related efficient infrastructure are pivotal for bolstering financial inclusion, exports, regional trade, and economic growth. Interlinked regional FPS would facilitate seamless transactions across borders, enabling businesses to expand their operations and access new markets, and individuals to remit funds affordably. Access to efficient cross-border FPS allows for enhanced liquidity in financial markets, improved access to financial services for underserved communities, and stronger economic ties across the region. Yet, the complexity of cross-border payments poses implementation challenges and risks. These include infrastructural inadequacies, regulatory divergences, and susceptibility to ML/TF risks. In addition, the variance in technological adoption and the digital divide exacerbates the operational challenges, making the harmonization of cross-border payments complex. Various methods for cross-border payments have been adopted in the region: (1) bank transfers, which rely on established correspondent banking networks, though often criticized for high cost and slow processing times; (2) private mobile money, as M-Pesa in Kenya, which capitalizes on the wider use of mobile phones to offer quick and low-cost remittance options; (3) regional payment systems, such as the Southern African Development Community Real-Time Gross Settlement (SADC-RTGS), which reduce reliance on foreign currencies and international financial systems; (4) cryptocurrency platforms, which bypass traditional banking infrastructure, hence posing regulatory and volatility concerns; and (5) financial technology (fintech) innovations, including digital wallets.

Several ongoing initiatives—often overlapping and at various stages of development—are seeking to promote regional interoperability of FPS across a number of countries and could significantly contribute to regional and global financial integration and economic empowerment in sub-Saharan Africa (see also Annex 4).

- **PAPSS.** The Pan-African Payment and Settlement System (PAPSS) is a cross-border, financial market infrastructure enabling payment transactions across several African countries for the instant or near-instant transfer of funds between originators in one African country and beneficiaries in another. Launched in 2022, it aims to bring together a growing network of central banks, commercial banks, PSPs, and other financial intermediaries into a network that would enable fast, secure, and less expensive transactions among the continent's 42 local currencies, recognizing the economic benefits of simplifying the payment landscape across the African continent so that more Africans can trade with each other. As of December 2024, 14 central banks across Africa are members, alongside over 50 commercial banks (eight countries had live commercial banks on PAPSS, with Ghana and Nigeria taking the lead, with six more countries on the way).[31] In 2023, the central banks of the Caribbean region (CARICOM) adopted PAPSS for intra-regional trade transactions, thereby expanding the reach of the PAPSS beyond the African continent. In 2022, a memorandum of understanding established a connection between PAPSS and BUNA, the cross-border

[31] The participating Central Banks are of the following countries: Nigeria, Ghana, Liberia, Guinea, The Gambia, Sierra Leone, Djibouti, Zimbabwe, Zambia, Kenya, Rwanda, Malawi, Tunisia, and Comoros (https://papss.com/network/). In November 2024, the Central Bank of Egypt approved the agreement to join PAPPS, with several banks operating in Egypt also expressing interest and willingness to join PAPSS (https://www.cbe.org.eg/en/news-publications/news/2024/12/03/09/38/centeral-bank-of-egypt-joins-the-pan-african-payment-and-settlement-system-papss).

and multicurrency payment system owned by the Arab Monetary Fund (AMF).[32] Whereas no statistics on transactions are available, volumes in 2023 doubled every month, with the most active payment corridors remaining in West Africa, where the program was first rolled out, especially in Ghana (the network's original launch market) and Nigeria (*The Banker* 2024).

- **SADC-RTGS.** It is a regional cross-border interbank real-time gross settlement system that went live on July 22, 2013. Operated by the South African Reserve Bank, it covers 16 countries and 88 banks (including central banks, commercial banks, and NBFIs).[33] The current system is operated by the South African Reserve Bank (SARB) and settles payments in South African rand (ZAR). Transaction volumes and values are relatively low but have been growing steadily. Through October 2024, the system processed a total of 4.15 million transactions representing ZAR15.45 trillion (US$902.83 billion; Settlement Statistics and Indicators 2024).

- **GIMACPAY.** Is a regional interoperability platform that was officially launched (in 2020) in Central African Economic and Monetary Community (CEMAC) with the objective of providing end users in the region with a low-cost, efficient digital payment option for both domestic and cross-border payments (AfricaNenda, World Bank, and UNECA 2023a). It has 105 participants (53 commercial banks, 11 MMOs, 27 nonbank PSPs, and 14 MFIs). In 2023, it recorded over 12 million transactions valued at almost US$1 billion (AfricaNenda Foundation 2024a).

- **PI-SPI. The Banque Centrale des États de l'Afrique de l'Ouest (BCEAO)** is in the pilot phase of an interoperable instant payment system (PI-SPI) of the West African Economic and Monetary Union (WAEMU) (see Annex 9). This new infrastructure is compliant with international standards for the security of payment systems and will be operational continuously (24/7). As part of its commitment to financial inclusion and modernizing the region's financial infrastructure, the new platform will be capable of processing transactions of multiple providers—banks, electronic money issuers, MFIs, or payment institutions, as long as they are connected to the interoperable system—even if the financial institution of the beneficiary is different from that of the sender. Funds would be received instantly and available immediately (Africa Briefing 2024; BCEAO 2024).[34]

- **EAPS.** The East African Payment System (EAPS) is a funds transfer mechanism used to transfer money from one bank to another across the border within the East African Community countries of Kenya, Rwanda, Tanzania, and Uganda. Transactions are carried out in the EAC local currencies. EAPS services are offered to bank customers (public) through RTGS between 08:30 AM to 04:00 PM EAT (East African Time) on weekdays (Monday to Friday), excluding public holidays.

- **REPSS.** The Regional Payment and Settlement System (REPSS) of the Common Market for Eastern and Southern Africa region is a regional payment and settlement initiative developed by the COMESA. The system operates in the US dollars and euros.[35]

- **WAMZ.** The West Africa Monetary Zone (WAMZ) Payment System Development Project achieved its objective of upgrading the payments system infrastructure of The Gambia, Guinea, Liberia, and Sierra Leone to a substantial level already attained by Ghana and Nigeria. The completion of the project in 2018

[32] BUNA is a cross-border multi-currency payment system in North Africa and the Arab region (22 countries), supported by Arab central banks and fully owned by the Arab Monetary Fund. https://www.trade.gov/market-intelligence/ghana-pan-african-payments-settlement-system-papss-update#:~:text=The%20current%20participants%20include%20the,here%20for%20additional%20market%20intelligence.

[33] Participating SACD countries are Angola, Botswana, Comoros, Democratic Republic of the Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe.

[34] The WAEMU countries are Benin, Burkina Faso, Côte D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo.

[35] REPSS is operational in nine countries: Democratic Republic of the Congo, Egypt, Eswatini, Kenya, Malawi, Mauritius, Rwanda, Uganda, and Zambia (COMESA Clearing House – Common Market for Eastern and Southern Africa (COMESA); https://www.comesa.int/comesa-clearing-house/).

opened opportunities for the interlinkage of the payments system infrastructure of those six member states for cross-border payments and settlements in national currencies (West African Monetary Institute, https://wami-imao.org/en/west-african-monetary-zone?language_content_entity=en).

- **The Bank of Ghana and the National Bank of Rwanda** have recently signed a Memorandum of Understanding which will introduce the first license passporting framework in the continent, in addition to retail payment interoperability between their respective countries (https://www.bog.gov.gh/news/press-release-ghana-and-rwanda-sign-mou/). The two central banks, in collaboration with the Global Finance and Technology Network (GFTN) and PAPSS, aim to explore cross-border payment interoperability within the continent (https://gftn.co/media-hub/ghana-and-rwanda-to-implement-africas-first-fintech-license-passport-framework).

- The widest approach on the continent comes from the African Central Banks that are members of the African Association of Central Banks (AACB), which are jointly working on the integration of payment systems in Africa through the establishment of the **AACB Task Force** on Payment Systems.[36]

- **Ghana–India interconnection**. Plans are underway to link Ghana's instant payments system with India's Unified Payments Interface (UPI). With an agreement in May 2024 to operationalize UPI on the GhIPSS, the two countries aim to support real-time, low-cost cross-border transfers between the two countries on a reciprocal basis.

- **India- Mauritius-Sri Lanka interconnection**: India's UPI was expanded in February 2024 to two popular tourist destinations, Mauritius. and Sri Lanka (Box 5), fostering digital connectivity and facilitating faster, seamless transactions between nations (*The Economic Times* 2024).[37]

The existing cross-border systems have varied arrangements with respect to settlement currency. For instance, EAPS settles transactions in local currencies, SADC-RTGS uses the South African rand, and PAPSS uses the US dollar. A cross-border settlement platform that can accommodate settlement in multiple currencies can help better serve diverse markets and heterogeneous member needs, ultimately improving interoperability across countries. A non-instantaneous cross-border settlement system could envisage two stages: first, the settlement of gross bilateral transactions in the two currencies over a certain time horizon; and second, the settlement of the net position against one or more reference currencies at the end of the time horizon.

FPS experiences from countries outside of sub-Saharan Africa often provide lessons for sub-Saharan African countries in setting up or strengthening their own FPS. Some of these examples of FPS include TIPS in the euro area, CoDi in Mexico, FedNow in the United States, PIX in Brazil, and the Unified Payments Interface (UPI) in India. Although the pace of adoption varied across countries, in most cases it took more than four years from the implementation for uptake to rise significantly (Frost and others 2024), suggesting the potential need for medium- and long-term efforts. The Brazilian and Indian FPS experiences exemplify different approaches with respect to implementation, reflecting distinct objectives and the existing contexts of each country.

- **PIX in Brazil.** Launched by the Brazilian Central Bank (BCB) in 2020, PIX exemplifies an instant payment system owned, operated, and maintained by a central bank (see also Box 6). It allows users to make payment transactions within six seconds, anytime, including during nonbusiness days. PIX's experience in Brazil is considered a successful one. As of September 2024, about 75 percent of the Brazilian population and 84 percent of companies had used PIX. Within the program of fees set by the BCB, PIX is free for transactions between individuals, but a small charge applies to transactions involving merchants. Participation

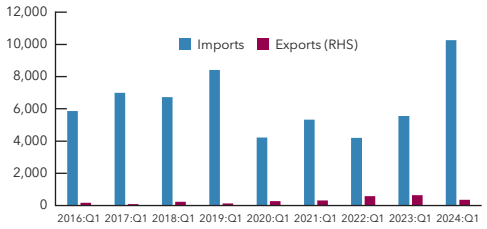
[36] The AACB comprises 41 Central Banks representing 53 African countries (Member Central Banks | AACB (https://aacb.org/en/member-central-banks).

[37] Indian Ministry of Trade and Commerce Press Release, May 2024 (https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2019724).

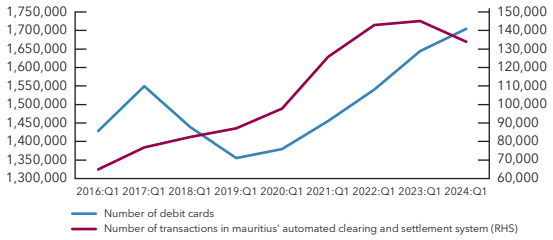
Box 5. Mauritius' RuPay and Unified Payments Interface with India[1]

A newly adopted payment network in Mauritius holds the potential to facilitate cross-border payments with its major trading partner India. In February 2024, Mauritius and India launched the RuPay and Unified Payments Interface (UPI) linkage between the two countries.[2] RuPay, originally launched in 2012 by the National Payments Corporation of India, is a payment card that allows for electronic payments in India and cooperating countries. UPI, India's fast payments system launched in 2016, aims to promote digital transactions by enabling money transfers through mobile devices, linking multiple bank accounts into a single digital application. The UPI also accommodates third-party payment applications such as Amazon Pay, Google Pay, and Samsung Pay. In February 2024, Mauritius became the first country in Africa to issue cards using RuPay technology, enabling connectivity of its payments system MauCAS to India's UPI.

Box Figure 5.1. Mauritius' Trade with India
(In millions of Mauritius' rupees)



Box Figure 5.2. Mauritius' Card Transactions



Source: Statistics Mauritius.

The RuPay, UPI, and MauCAS linkage is expected to strengthen bilateral trade and tourism by enabling smooth, cost-effective, and secure payments both in Mauritius and in India. The innovation enables an Indian tourist in Mauritius to pay a local merchant using India's UPI, and a Mauritian tourist to do the same in India using the Instant Payment System (IPS) app of Mauritius. Bilateral trade, notably Mauritius' imports from India, which revived in the first quarter of 2024 (Box Figure 5.1), is expected to increase with the adoption of the new payment network. The UPI linkage, as well as Mauritian banks' ability to issue India's RuPay cards domestically, could also contribute to further expanding the supply of retail payment cards in Mauritius. The number of debit cards in Mauritius had seen a steep expansion after the pandemic, along with a similar surge in transactions processed through the country's automated clearing and settlement system (Box Figure 5.2).

Central bank cooperation on interoperability and technology was a key factor behind the expansion of RuPay and UPI linkage in Mauritius and other countries. The Bank of Mauritius (BOM) and the Reserve Bank of India worked closely to ensure the implementation of the new payment network. The BOM also benefitted from the technical support of the National Payments Corporation of India.

The fast expansion of UPI reflects several factors. By December 2024, just in India, the system included nearly 17 billion transactions per month, connecting 641 banks. Other countries have also adopted RuPay and UPI, including the United Arab Emirates, Singapore, Sri Lanka, Maldives, Bhutan, and Nepal. The key factors driving success include the ease of development of applications, a technology-agnostic architecture allowing transactions across multiple third-party applications, user-friendly interfaces, low or zero transaction costs for end users, collaboration with the private sector, and strict regulations on data storage and use (Cornelli and others 2024).

[1] By Félix F. Simione.

[2] Media Release: Mauritius and India launch RuPay and Unified Payments Interface Linkage (https://www.bom.mu/media/media-releases/media-release-mauritius-and-india-launch-rupay-and-unified-payments-interface-linkage).

Box 6. Brazil's Experience with the Fast Payment System PIX[1]

In November 2020, the *Banco Central do Brasil* (BCB) launched a domestic fast payment system (FPS), known as "PIX."

Policy Objectives. The policy objectives include fostering the digitalization of payments, promoting financial inclusion, addressing gaps in payment market offerings, ensuring a level playing field to improve competition and thus lower fees, and encouraging innovations in the payment market.

BCB's Role. PIX was built in-house by the BCB. Its development cost only US$1.8 million, fully funded by the BCB's budget. The maintenance cost rose gradually to US$10.3 million by 2024 from US$5.2 million in 2021, borne by the BCB's budget. The BCB operates the settlement payment infrastructure (SPI) as well as the directory and anti-fraud database (DICT). It also sets the rules and technical specifications such as the application programming interfaces (APIs).

Key Features. PIX is an open scheme and system. It is available 24 hours every day. PIX transactions are irrevocable and processed within 6 seconds. There are no fees for individuals (cash-like). Fees for businesses are based on cost recovery (0.022 percent as of October 2024). There is no minimum limit for payments or transfers, but PIX participants may establish maximum limits for PIX transactions per payer, day, and month. Users can use their taxpayer identity number, email, or cell phone number as an alias, or create a random alias (for example QR codes). PIX processes a wide range of retail payment/transfer types: person-to-person (P2P), person-to-merchant (P2M), person-to-business (P2B), business-to business (B2B), business-to-person (B2P), government-to-person (G2P), and government-to-government (G2G).

Participation. It is mandatory for all authorized payment service providers (PSPs) with more than 500,000 active customer accounts. It is voluntary for all other banks and nonbanks (including those that do not need a license), as well as licensed Payment Initiation Service Providers (PISPs). In total, as of October 2024, there are 863 PIX members (banks, financial technology (fintech) companies, credit unions, brokers, national treasury, and other financial institutions), of which 34 are mandatory participants.

Governance. Although PIX is owned, managed, and operated by the BCB, there is an active engagement with all stakeholders. The BCB regularly hosts official forum where it engages the private sector in discussions about rulemaking and organizes public consultations for the development of new products.

Impact of PIX. As of September 2024, PIX transactions have reached 45.7 billion, up from 9.4 billion in 2021, equivalent to 26 transactions per capita. 161 million individuals (75 percent of the Brazilian population) and 18 million of companies (84 percent of companies) have used PIX. 71.5 million of individuals have started to transfer digitally (e-commerce, food delivery, ride apps, entertainment), and the percentage of individuals with an account rose to 87.6 percent in 2023 from 77.3 percent in 2019. According to a CEBR report for ACI Worldwide (October 2024), PIX contributed $24.6 billion (1.32 percent of GDP) to the overall economy.

Key Factors of PIX Success. These include (1) mandatory participation of larger PSPs, (2) active engagement with all stakeholders and a strong governance structure, (3) a user-centered approach, (4) low fees (and no fees for individuals), (5) a strong brand and communication strategy, and (6) an emphasis on transaction security.

Development Agenda. Several products and functionalities are under development/consideration, including the use of PIX for recurrent payments and cross-border transactions, the development of wallets and offline capabilities (only offline-to-online capability is currently being considered, not the offline-to-offline), and the use of future-dated payments or payment in installments.

[1] By Mesmin Koulet-Vickot.

is mandatory for PSPs that have more than 500,000 active customer accounts, including fintech. The BCB's decision to make PIX usage mandatory for some institutions, combined with strong governance arrangements, has been credited as key ingredients behind its success (Duarte and others 2022).

- **UPI in India.** India offers an example where the public sector can help integrate platforms that are already in place to handle various features of payment systems. The Unified Payments Interface (UPI) was launched by the National Payments Corporation of India (NPCI) in 2016 and is regulated by the Reserve Bank of India. UPI's key features include interoperability among various banks and financial institutions through its open application programming interface (API) architecture, as well as the convenience of multiple identification options, such as a virtual payment address (VPA) and a mobile number. Users can manage multiple bank accounts through a single UPI app and make payments using QR codes directly from their smartphones (Box 5). The integration has not only accelerated the uptake of digital payments but also facilitated financial inclusion by connecting traditional banking services and the digital economy (D'Silva and others 2019).

The public sector can play a crucial role in fostering competition and innovation, as well as addressing coordination challenges. In the absence of public sector intervention, large and dominant financial institutions can prevent the emergence of viable alternatives and retain a monopoly or an oligopoly, thus keeping costs for end users artificially high and extracting rent from users. Moreover, dominant incumbents may resist the introduction of new technologies that would disrupt their entrenched older technologies, thus preventing the population from benefiting from innovations that could raise efficiency and reduce costs.

Public intervention in the payment system must be carefully designed, aimed at ensuring integrity, security, trust, acceptance, and accessibility of fast payment systems. Considerations for the decision on central bank involvement and the extent of public support for developing FPS include coverage of national identification, implementation of customer due diligence (CDD) and AML/CFT procedures, capacity, and availability of resources at the central bank, and developments in the private sector. Consultations with the private sector are crucial to prevent the risk of the implemented system not meeting the private sector needs, leading to its underutilization. It is also important that the system avoids imposing excessive costs on financial institutions or unnecessarily coercing their participation. To promote acceptance, the system needs to be compatible with a wide range of technical payment solutions, such as apps, QR codes, mobile texts, and so on. Implementing robust security measures, such as licensing and disclosure requirements, to safeguard these systems against cyber threats and protect sensitive transactional data would be crucial. Such measures not only secure the system against vulnerabilities but also help in building trust among users. Moreover, it is important for central banks to ensure wide accessibility, tackling issues such as financial literacy and mobile penetration that are significant in the region. Efforts such as rolling out national IDs, enhancing phone ownership, and improving internet access, would be critical in this regard. By addressing the barriers to accessibility, public policy can lay a foundation that promotes financial inclusion.

Key Policy Implications

FPS can provide a key opportunity for wide adoption of fast and affordable digital payments across sub-Saharan Africa. However, adoption will depend on the characteristics of the FPS and the role of the state.

- Fast payment systems provide opportunities for significant reductions in transaction costs and enhanced interoperability among operators, by potentially increasing competition and allowing for a level playing field. Indeed, one of the reasons for the high cost of transactions in sub-Saharan Africa is the limited interoperability among operators. The success of several initiatives to enhance interoperability of payment infrastructure across the region—and potentially reach continent-wide compatibility—will depend on adequate management of several issues related to governance, data management, scalability, currency of settlement, and coordination of regulatory frameworks.

- FPS could provide sub-Saharan Africa with a technological leapfrogging opportunity, given the lagging state of traditional payment systems relative to other regions (prevalence of traditional banking, card payments, wire transfers, and so on). Progress in expanding traditional payment systems has been limited over the past few decades in part because of the high cost of establishing an extensive network of bank branches and ATMs. A successful deployment of FPS can make the development of traditional payment systems unnecessary or less pressing. Further, when nonbanks have direct access to FPS without going through traditional banks (occasionally with limited competitiveness), payments often benefit strongly.
- The level of adoption of FPS will depend on the quality and extent of use cases. For example, FPS that operate through multiple methods (QR code, feature phone, texting, and so on) will promote wider acceptance. The participation of a wide range of institutions, for example, not just mobile money operators but also microfinance and other financial institutions, would also contribute to broader adoption.
- The technical characteristics of FPS also play a role in their adoption. For example, options for temporary offline usage in situations of electricity blackouts or lack of internet can boost the reliability, and hence usage of FPS, though offline FPS functionality, can be relatively more complex to establish and requires more capacity and capability from central banks to supervise and monitor. Also, the simplicity of use of FPS (requiring little literacy) is particularly important for its successful adoption in sub-Saharan Africa where financial literacy is low.

The role of the state is crucial for the efficiency and broad adoption of FPS. The state needs to clearly define its role as regulator and overseer of active participants. Whereas the state would aim to facilitate fast, affordable, and secure transactions, the approach adopted will need to depend on country circumstances, and strong partnership with the banking system would be strategic in some countries.

The emergence of FPS and digital payment innovations is transforming the monetary landscape, significantly affecting the money supply and traditional monetary mechanisms. These systems facilitate quicker transactions, leading to a higher velocity of money circulation, which may necessitate a reevaluation of current monetary policy frameworks. In addition, changes in consumer behavior regarding saving and spending could influence interest rates and overall economic activity. Furthermore, if these systems develop alongside mobile money depositing in banks, there could be an emergence of large systemic depositors, which would require careful monitoring. Therefore, the central bank must remain vigilant, continuously monitoring the implications of these innovations on monetary policy and financial stability.

5. Private Mobile Money in Sub-Saharan Africa

Private mobile money has been playing a major role in the rapidly changing payment landscape in sub-Saharan countries. Cash continues to account for a large share of payment transactions, but electronic money in the form of mobile money issued by private telecom companies has been growing in importance. Supporting the development of private sector solutions in mobile money payments has great potential to reduce costs, improve efficiency, enhance financial inclusion, and facilitate remittances. Mobile money could also be used as an efficient conduit to provide targeted transfers to the poor individuals. By offering an enabling regulatory environment, governments can promote digital development, stimulate competition, and minimize risks for users, ensuring that their deposits are sufficiently secure and that the system remains robust to operational risks. There is significant scope to further integrate mobile money with the wider financial system.

Mobile money innovations dominate financial technology (fintech) in the sub-Saharan African region, which is the region most reliant on this technology worldwide (see Sy 2019). Mobile money adoption and usage have grown rapidly, with sub-Saharan African countries actively using this new fintech. Sub-Saharan Africa leads the world in mobile money accounts per capita (both registered and active accounts), mobile money outlets, and the volume of mobile money transactions. Mobile money account penetration in sub-Saharan African countries recorded a remarkable increase of over 200 percent between 2015 and 2021 in surveyed countries, largely driven by ongoing financial innovation (IMF 2021c). In addition, in 2021, transactions occurring through mobile money amounted to nearly 45 percent of GDP, compared with just 18 percent of GDP in the rest of the world (IMF 2021c). Most transactions are related to sending and receiving international remittances.

Mobile money accounts have now overtaken traditional bank accounts in several sub-Saharan African economies. Based on data for 16 sub-Saharan African countries for which both mobile money and traditional bank account data are available, mobile money accounts in 2021 were, on average, nearly twice as many as traditional deposit accounts (IMF 2021c). In particular, mobile money accounts surpassed traditional deposit accounts in 10 of the 16 reporting economies, which include some of the largest in sub-Saharan Africa, such as South Africa, Kenya, and Tanzania. Within sub-Saharan Africa, East Africa continues to lead in terms of adoption and usage rates, but progress is rapid in other regions as well.[38] Whereas overall financial depth remains below global levels, mobile money is emerging as an engine of growth and a technological enabler that fosters financial inclusion and economic development in sub-Saharan Africa.

A variety of private mobile money services are available in sub-Saharan Africa, each tailored to the specific needs of its market. They highlight the role of mobile money in improving financial access and driving economic growth across the region.

- **M-Pesa (Kenya and Tanzania).** M-Pesa, launched by Safaricom in Kenya in 2007, is one of the most successful mobile money platforms globally. It allows users to transfer money, pay bills, and access microloans as well as savings products through their mobile phones. After its success in Kenya, M-Pesa expanded to Tanzania and other countries, though with varying levels of success (see Box 4).

[38] M-Pesa is the mobile money pioneer in East Africa, launched in 2007 and available in seven countries (see Box 4). The second largest mobile money network in SSA is Airtel Money, launched by a telecommunication company (Airtel Africa plc) in 14 countries. Orange Money is another service by the French telecom company Orange that is active in 14 countries in SSA.

- **MTN Mobile Money (Ghana, Uganda, and West Africa).** MTN Mobile Money is a service by MTN Group, a leading telecom operator in Africa. Launched in 2009 in Ghana, it quickly became a dominant player in the mobile money market across several countries, including Uganda, Côte d'Ivoire, and Cameroon. Users can transfer money, pay bills, purchase goods, and access savings and loan products. MTN Mobile Money also facilitates international remittances, a vital service in many African countries.
- **Orange Money (West and Central Africa).** Orange Money is a mobile money service provided by the Orange Group, targeting primarily French-speaking countries in West and Central Africa, such as Côte d'Ivoire, Senegal, and Mali. Orange Money enables users to send and receive money, pay for goods and services, and access microloans and savings. It also offers cross-border payment services, which are crucial for the region's large diaspora community. Orange Money has grown rapidly, becoming a key player in the region's financial ecosystem, especially in countries where traditional banking infrastructure is limited.
- **Airtel Money (East Africa and West Africa).** Airtel Money, offered by Airtel Africa, operates in several countries across East and West Africa, including Uganda, Zambia, and Tanzania. It provides mobile money services similar to its competitors. Airtel Money allows users to conduct money transfers, pay bills, purchase airtime, and access banking services like savings and loans.
- **EcoCash (Zimbabwe).** EcoCash, launched by Econet Wireless in Zimbabwe in 2011, quickly became the country's leading mobile money platform. It offers a wide range of financial services, including money transfers, bill payments, and savings. EcoCash has been particularly important in Zimbabwe, where economic instability and hyperinflation have made traditional banking difficult. EcoCash allows users to manage finances in an environment where cash is scarce and the local currency is volatile.
- **Tigo Cash (Ghana and Tanzania).** Tigo Cash is a mobile money service provided by Tigo, a telecom operator in several African countries, including Ghana and Tanzania. Tigo Cash users can send and receive money, pay bills, transfer international remittances, and undertake other financial transactions. Tigo Cash has a strong presence in Ghana, where it competes closely with MTN Mobile Money. It has played a role in increasing financial inclusion in both urban and rural areas.
- **GloCash (Nigeria).** GloCash is a mobile money service offered by Globacom, a Nigerian telecommunications company. Although not as widespread as some other services, it is part of Nigeria's competitive mobile money landscape. GloCash provides basic mobile money services, including money transfers, bill payments, and airtime purchases.

Private mobile money is accelerating financial inclusion and development in sub-Saharan Africa. Making it cheaper and easier to send money may seem like a small innovation, but mobile payments have had a profound effect on the ability of African households (HHs) to transfer money and pay for bills, as well as deposit and borrow funds using their mobile phones. Mobile payment services have also improved people's ability to deal with shocks and allowed businesses to better coordinate their activities and connect to the broader financial system.

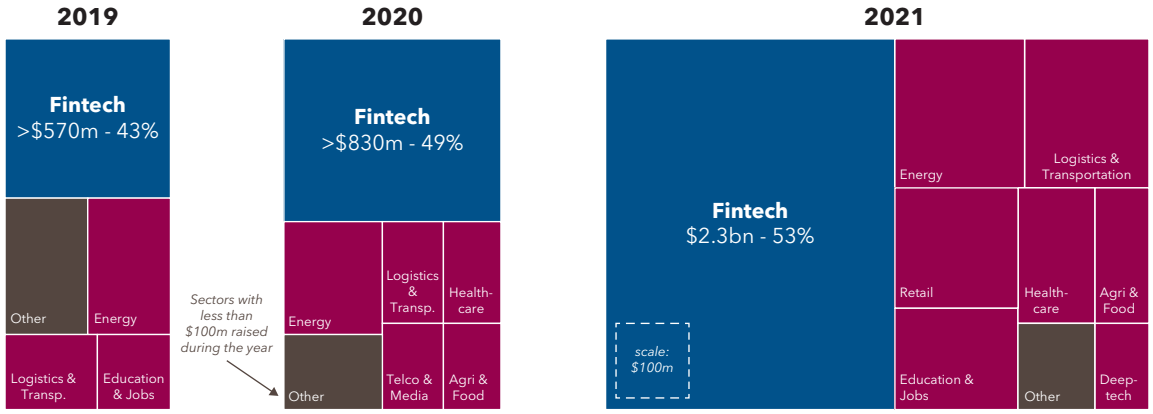
Mobile payments have proved to be particularly useful in managing shocks such as the coronavirus disease 2019 (COVID-19) pandemic in sub-Saharan Africa. User capabilities and reliable infrastructure account for the significant increase in digital payments observed worldwide during the pandemic (Cull and others 2023). In sub-Saharan Africa, governments have leveraged the technology to improve the effect of their social safety net programs, particularly in cases where in-kind transfers (such as food vouchers or cash payments) are difficult or impossible to deliver. This is the case in refugee camps, for instance, but also during the COVID-19 pandemic. The Novissi (which translates to "solidarity" in Ewe) cash transfer program in Togo, for instance, distributed more than US$22 million through mobile payments to 600,000 citizens who live in urban areas during the health crisis (see Annex 8). To target rural areas, the program used satellite imagery, mobile data, and artificial intelligence (AI) to estimate individual wealth, relying on indications that poorer people use cell phones less often, receive more calls than they make, and have lower mobile money balances.

There is a complementarity between mobile network operators (MNOs), mobile money service providers, and commercial banks.[39] Mobile money service operators rely on banks for the management of the "float," that is, the balance of e-money, physical cash, or money in a bank account that a mobile agent can immediately access to meet customer demands to purchase or sell electronic money. Partnerships between MNOs and banks have helped deepen financial inclusion by providing synergies across financial services of different providers. For example, the MNO Orange has partnered with the bancassurance company NSIA to open a bank in Côte d'Ivoire (Orange Bank Africa) that targets micro savings and credit. Customers of mobile money company Wave in Senegal can use prepaid credit cards by UBA Bank to debit their accounts.

The extent of horizontal and vertical integration seen in some Asian economies (for example, China) has not yet taken place in sub-Saharan Africa. In addition to remittances, mobile payments are being used for domestic transactions, such as paying utility bills, receiving wages, and payments for goods and services. Increasingly, this technology is also used to pay taxes in several countries, such as Cameroon and Kenya. In Kenya, savings and loan services (M-SHWARI) are available to M-Pesa, and the government has experimented with the issuance of retail bonds through mobile phone (M-AKIBA). However, the region is far from the level of horizontal and vertical expansion seen in some Asian economies, and the ecosystem remains dominated by MNOs and banks. For example, in China, big data and new technologies—such as AI and cloud computing—have enabled new fintech-based institutions (for example, MYbank) to expand horizontally from payment to other financial services such as lending. In addition, some institutions have achieved vertical expansion by creating ecosystems that integrate various aspects of daily life, including e-commerce, logistics, health care, and entertainment. Meanwhile, fintech remains the sector that attracts the most funding for startup companies in Africa (mostly in Nigeria and South Africa), much more than in other sectors such as e-commerce (Figure 9). The fintech sector raised about 53 percent (US$2.3 billion) of total funding raised by startups in 2021, up from 49 and 43 percent in 2020 and 2019, respectively (Figure 9). Estimated revenues from the fintech sector in Africa amounted to US$4 to US$6 billion in 2020 (McKinsey and Company 2022).

Figure 9. Funding Raised by Startups in Africa since 2019–21, by Sector

(From **thebigdeal.substrack.com** *by Maxime Bayen & Max Cuvellier)*



Source: Full database of dear: thebigdeal.gumroad.com.

Note: Based on deals $1m & over for 2019 & 2020, $100k & over for 2021. Both publicly disclosed & confidential deals shared by selected investors.

[39] Mobile money service providers are distinct entities from MNOs (which provide mobile operations, such as phone calls, data, and so on) and commercial banks, but they can often be owned by either an MNO or a commercial bank. For example, M-PESA is owned by Safaricom, which is an MNO. BKash in Bangladesh is a mobile money service provided by BRAC Bank.

Although sub-Saharan Africa has the highest mobile money account ownership in the world, other regions outpaced sub-Saharan Africa in mobile digital payments adoption.[40] In sub-Saharan Africa, 33 percent of adults have a mobile money account (Figure 10), a higher share than in other regions, followed by Latin America, with almost 25 percent of adults. However, of those who have such an account, only one in two sub-Saharan African adults (43 percent) use mobile payments for a range of purposes such as person-to-person (domestic remittances), person-to-merchant, government-to-person (wages, transfers, and pensions), person-to-government (utilities), or payments for private sector wages and agricultural products. In contrast, mobile payment usage reaches 70 percent in Europe and Asia. Shifting payments from cash into mobile accounts can serve as an entry point to the formal financial system, thus increasing financial inclusion and reducing the informal business sector. The challenge for businesses and governments, however, is to ensure that digital payments are more affordable, safe, and transparent than cash-based alternatives, and are also well regulated.

Fintech regulation in sub-Saharan Africa is fragmented and implemented through sector-specific legislation. According to Global System for Mobile Communications Association (GSMA) Mobile Money Index, which measures the extent to which country regulation provides an enabling framework for sustainable mobile money services, the cross-sectoral regulatory frameworks in sub-Saharan Africa are uneven (Figure 11).[41] sub-Saharan African countries have made strides in areas like authorization, transaction limits, and agent networks. However, many countries lag in sectors such as investment, infrastructure, consumer protection, and customer due diligence (CDD) rules. These shortcomings are because of limited resources, capacity constraints, an unfavorable business climate, and the lack of unique identifiers or social security numbers to prevent fraud and identity theft. Although the highest GSMA sectoral regulatory score is observed in transaction limits, with an average score of 96.9 out of 100, CDD rules (as proxied by KYC) have the lowest sectoral regulatory score, averaging 53.5 (Figure 11). Addressing regulatory challenges in CDD rules and consumer protection, as well as in infrastructure and the investment environment, could increase digital payments adoption across sub-Saharan Africa and enable effective payment systems.

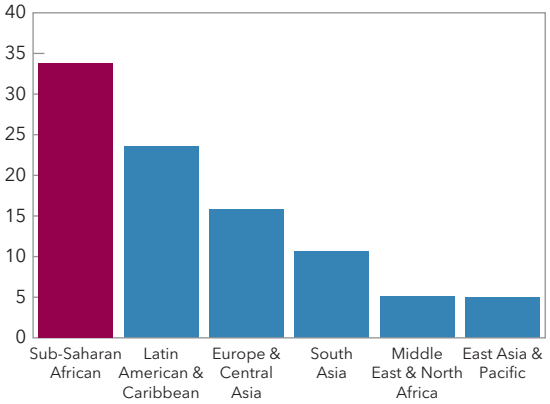
The foray of fintech firms into lending activities also requires adequate regulations to minimize risk. Firms involved in mobile money operations often engage in lending activities in the region (OECD 2020). Lending activities by e-money issuers could expose client funds to credit, maturity transformation, and leverage risks (IMF 2021a). If they do engage in lending activity, careful supervision is needed to ensure customer funds are segregated, secured, and adequately backed. They should be regulated as other lending institutions, such as banks, and be subject to proportionate prudential regulatory requirements. IMF (2021a) provides guidance on prudential supervision and oversight frameworks for e-money providers.

[40] As defined, digital payments include in-store or online merchant payments; paying utility bills; sending or receiving domestic remittances or receiving wages; receiving payment for agricultural products; government transfers; or a public pension directly from or into an account.

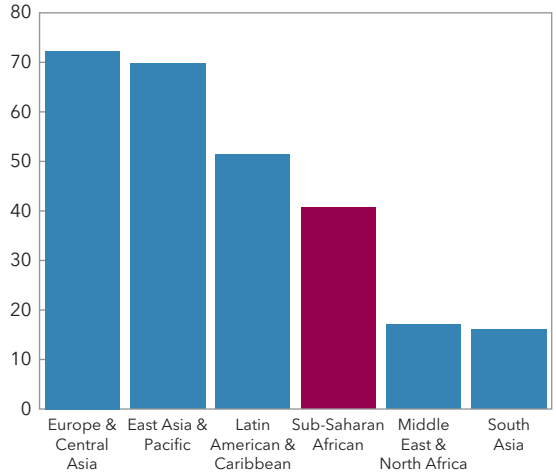
[41] The regulatory framework index includes six dimensions: Authorization, Consumer Protection, Transaction Limits, CDD, Agent Networks, and Investment and Infrastructure.

Figure 10. Mobile Money Account Ownership and Digital Payments Adoption in 2021

1. Mobile Money Account Ownership
(Percent of adults)

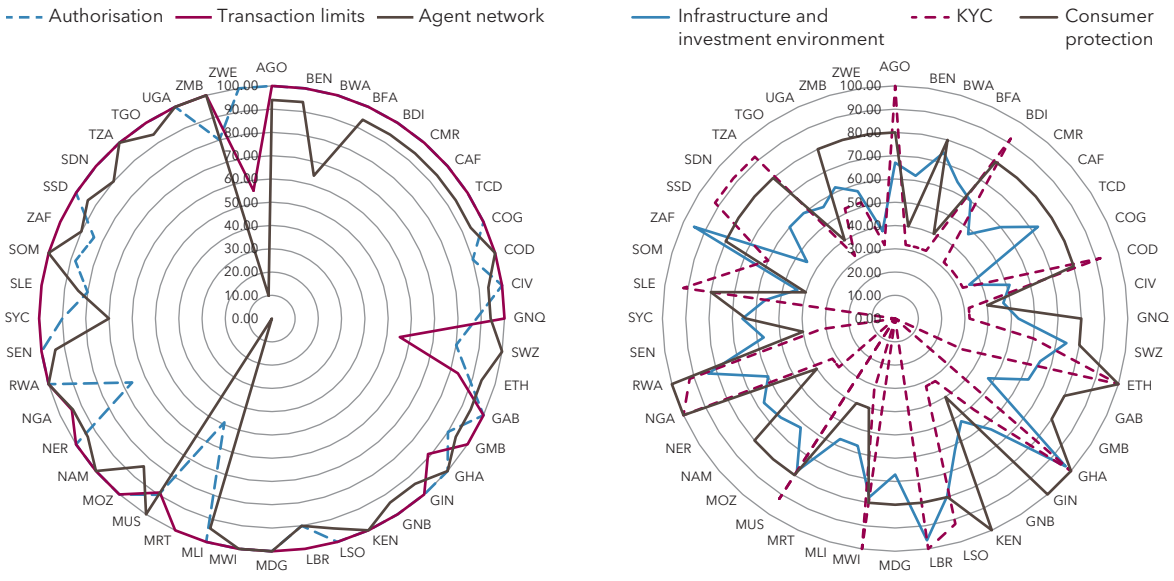


2. Digital Payments (P2P, G2P, P2G, P2M, and others) Adoption through a Mobile Phone
(Percent of adults with mobile phones)



Sources: The global Findex (World Bank, 2021a) database and IMF staff's calculation. The left figure shows mobile money account ownership among adults (extensive margin). The right figure shows digital payments adoption conditional on having a mobile money account (intensive margin).

Figure 11. Cross-Sectoral Mobile Money Regulatory Score in Sub-Saharan Africa, 2021



Source: GSMA (2021).
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

One further challenge in the mobile money landscape is potential uncompetitive behavior by entrenched firms that undermines the overall efficiency of the system. Dominant mobile money providers can often resist efforts to promote interoperability, so they can preserve their competitive edge. Several countries in sub-Saharan Africa have achieved significant mobile money adoption with limited interoperability. Moreover, mobile network operators (MNO) can also limit access to their network or apply discriminatory pricing for mobile money operators to use their network, which occasionally has led to sanctions and fines (ITU 2017).[42]

As mobile money expands, policymakers need to be prepared to manage potential unanticipated effects on monetary policy transmission. Emerging evidence suggests that in countries with a relatively low level of financial inclusion, once mobile money sufficiently penetrates the economy, there is a higher pass-through from the monetary policy rate to retail lending rates, as mobile money balances are more sensitive to monetary policy instruments (Huang and others 2024). Other studies (Erel and others 2023) document that deposits tend to shift from traditional to online banks during monetary policy tightening cycles, suggesting that our understanding of the interplay between mobile money and monetary policy is incomplete.

Overall, when sub-Saharan African countries support the development of private sector solutions in mobile money payments while ensuring competition, they can move closer to achieving their public policy objectives. Indeed, these digital payment solutions have shown great potential to enhance financial inclusion, facilitate remittances, and provide targeted transfers to the poor individuals. Countries should then assess market failures that require public intervention (including in relation to CBDC, publicly developed FPS, and possibly other policies). By offering an enabling regulatory environment, governments can aim to promote digital development, stimulate competition, minimize risks for users, and ensure that deposits are sufficiently secure and that the system remains robust to operational risks.[43] If mobile money becomes systematically important, the regulatory capacity and expertise of the central bank to supervise this sector will need to be scaled up appropriately. In addition, competition authorities need to adapt their analytical tools to the uniqueness of digital markets, which may require legislative changes and adapted processes to match the speed of evolution in mobile payment services and ensure that potentially anticompetitive conduct is scrutinized.

Key Policy Implications

Government regulations should aim to promote the development of mobile money, by stimulating competition, portability, and innovation in this sector, while minimizing risks for users—ensuring that their deposits are sufficiently secure, and that the system remains robust to operational risks.

- Mobile payments are an excellent solution to enhance efficiency and financial inclusion, together with fast payments. However, the payment system needs to be simple enough to reach all populations, including those without a smartphone or internet connection or those with limited financial education.
- Mobile money can help reduce informality by widening financial access. Lower informality and the ability to pay taxes through mobile phones can potentially lead to greater tax collection when supported by adequate public financial management and legal frameworks.

[42] Access to USSD is becoming increasingly essential for providing advanced Digital Financial Services (DFS) and other offerings to people with limited access to technology. Data is generally only effective on smartphones and most e-money services that are not accessed through smartphones use USSD, which presents an interactive menu on the mobile device.

[43] Alvarez and others (2023) find that digital payment systems exhibit strategic complementarity, meaning the value of the technology increases with the number of users. However, the benefits of using the digital payment system might diminish in the presence of too many service providers or different payment apps that subject users to obstacles to interoperability or high transaction costs when interacting across platforms.

- Regulation needs to be supportive of firms entering and operating in a competitive environment while ensuring interoperability across different mobile money providers and portability of users across operators. This would limit the possible dominance of a few firms, hence supporting competition, efficiency, and fairness, while promoting an environment conducive to innovation and financial stability.
- It is essential to ensure that mobile money deposits are adequately backed and protected, particularly in the absence of deposit insurance plans for mobile money users (or lack of capacity to implement such plans). Initially, and at least until the system is developed and other safeguards can be established, mobile money operators can be required to place their customers' deposits mainly in safe assets: placing them in bank accounts would reduce concerns of bank disintermediation while leveraging existing oversight mechanisms for the protection of customers; placing them in government assets would deepen the domestic financial market for sovereign assets. Providers could consider relying on central bank reserves to back their funds to ensure safety for user funds, though this may entail additional oversight requirements which may affect their business model (IMF 2021a). A potentially systemic mobile money system would also call for the strengthening of supervision and arrangements for user protection.
- Whereas lending by electronic money issuers (EMIs) is generally not desirable (IMF 2021a), to the extent that they provide such additional financial digital services (like lending), it is essential that they are regulated in line with the corresponding traditional service, that is, as other lending institutions.
- Furthermore, the use of mobile money to provide targeted transfers such as the successful practice during the COVID-19 pandemic could be further enhanced in the region.

6. Crypto Assets in Sub-Saharan Africa

Sub-Saharan Africa is an active and growing market for crypto assets. The underlying blockchain technology of crypto assets can support and facilitate not only fast financial transactions but also a number of innovations such as smart contract enforcement, tokenization of assets, fractionalization, and decentralized finance. Moreover, currency volatility, high inflation, and general macroeconomic instability and uncertainty create significant incentives to use crypto assets in sub-Saharan Africa, to hedge against these risks. However, in the absence of proper regulatory oversight, crypto assets can pose significant additional risks for users and policymakers, including excess valuation volatility, circumvention of capital flow restrictions, compromised financial stability, and weakened tax collection. Moreover, cryptoization, or crypto dollarization—the phenomenon of substituting domestic currency for crypto—can threaten monetary sovereignty. Fully-backed stablecoins would present more limited consumer and financial stability risks. In most sub-Saharan African countries, at present, regulatory frameworks for crypto assets are either weak or missing. In the long term, comprehensive regulatory frameworks are essential to manage risks from crypto, and where such risks are pressing, regulators could consider targeted restrictions on crypto assets or activities. Crypto assets should not be adopted as official currency or legal tender.

Sub-Saharan Africa is an active and growing market for crypto assets (Figure 12), owing in part to macroeconomic instability. Although crypto asset use remains low compared with other regions, significant trade in crypto assets and the development of local exchanges with some crypto-mining activities are happening in several countries (for example, Kenya, Ghana, Mauritius, Nigeria, Seychelles, and South Africa). In a few countries, local businesses have started to accept crypto assets as forms of payment (Kenya, South Africa; BBC 2019; Reuters 2022b). Figure 12, panel "2" confirms the common notion that crypto adoption is positively related to macroeconomic instability: the sub-Saharan African countries that stand out in crypto adoption are those with high fiscal imbalances and exchange rate volatility. Similar evidence is reported globally by Chainalysis (2023). However, in the sub-Saharan African region, broad uptake of crypto is limited or concentrated in niche groups, with most trading occurring peer to peer without the involvement of a central authority or a cryptocurrency exchange (Chainalysis 2022).

Hedging against currency volatility, high inflation, and macroeconomic uncertainty can create significant incentives to use crypto assets in sub-Saharan Africa. Unlike other payment instruments such as mobile money or Central Bank Digital Currencies (CBDCs), crypto assets can also be held as investment products or stores of value as they are typically not pegged against the local currency. Prospects of high returns on crypto assets, relative to local assets or currency, can increase their attractiveness, particularly in sub-Saharan Africa because of relatively weaker monetary policy frameworks. Although being highly volatile, risk-adjusted returns on crypto assets in local currency can be higher than those of alternative local assets in countries experiencing significant inflationary or exchange rate pressures. Moreover, stablecoins, which are fully backed and pegged into stable currencies, can also be attractive instruments[44] for those trying to avoid the volatility of instruments such as Bitcoin or Ether[45] while at the same time hedging currency risks. These factors driving demand for crypto assets, in turn, underscore a fear of cryptoization or crypto dollarization

[44] For example, the USD Coin (USDC) stablecoin pegged to the USD is modernizing finance, streamlining payments, and enhancing economic connectivity, strengthened by regulatory clarity, innovative product developments, and growing institutional adoption of a digital financial system (Circle 2025).

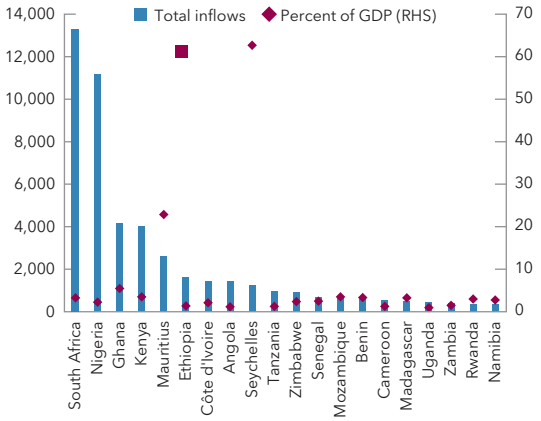
[45] The collapse of stablecoins such as TerraUSD, together with weak governance structures and lack of transparency in some of the stablecoin providers, suggests that stablecoins are not risk-free either (unless fully and verifiably backed by safe assets). For a listing of some of the largest crypto frauds, see Crypto's Biggest Scams of All Time–Alts.co (https://alts.co/cryptos-biggest-scams-of-all-time/).

among central banks in the region (as witnessed from the recent IMF survey; see Ricci and others 2024), especially for countries with unstable currencies, high inflation, and weak monetary systems. The associated currency substitution could undermine monetary policy sovereignty and transmission.

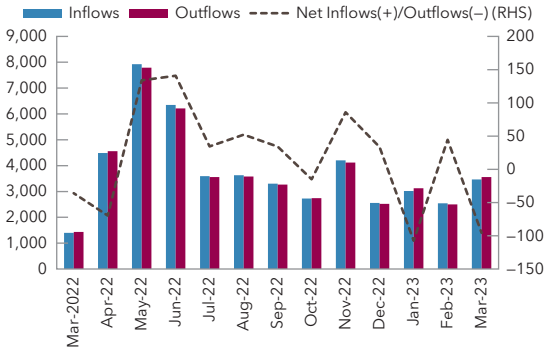
Figure 12. Crypto-Asset Flows

1. Total Crypto-Asset Flows to Sub-Saharan Africa, March 2022–23

(a) Top 20 Countries with Highest Crypto-Asset Inflows
(Millions of US dollars)



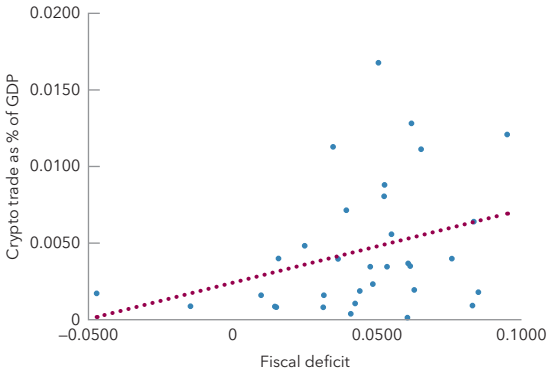
(b) Crypto-Asset Total Flows
(Millions of US dollars)



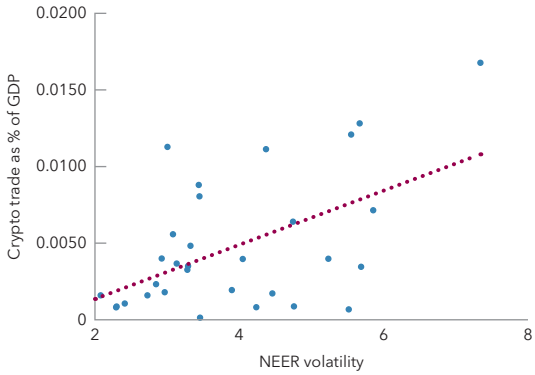
Sources: Chainanalysis 2023 and IMF staff calculations.
Note: Nominal GDP is the value for year 2022 from the January-2023 World Economic Outlook.

2. Crypto Adoption Is Related to Macroeconomic Instability, such as High Fiscal Imbalances and Exchange Rate Volatility

(a) Crypto adoption is larger when fiscal imbalances are high …



(b) … and with greater exchange rate volatility.



Sources: Chainanalysis 2023 and IMF staff calculations.

Note: SSA countries: Angola, Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, Congo DRC, Republic of Cango, Cote Divoire, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Tanzania, Toqo, Uganda, Zambia, and Zimbabwe.

Sources: Chainanalysis 2023 and IMF staff calculations.

The underlying blockchain technology used by crypto assets can support and facilitate a number of innovations. Like CBDCs, crypto assets can be used for fast financial transactions as well as to enforce smart contracts whereby payments are completed automatically once certain preagreed conditions are met. The underlying blockchain technology can also support and facilitate tokenization whereby assets are represented as a digital token in a blockchain and allowed to be bought and sold using crypto assets. A wide range of assets, ranging from a painting to real estate, can be tokenized and traded digitally (*Forbes* 2024). McKinsey projects the market capitalization of tokenized assets to reach $2 trillion by 2030 (McKinsey and Company 2024).[46] Tokenization also facilitates fractionalization—the process of dividing a single asset into smaller transferable units—and hence widens investment opportunities for individuals with little capital. Low-income households (HHs) in sub-Saharan Africa, for example, may struggle to buy a piece of land or home and may generally have limited investment opportunities. But tokenization and fractionalization can allow them to own a portion of an asset they would struggle to own as a whole and hence support savings, wealth creation, and financial resilience. This, in turn, can increase liquidity in asset markets by widening the pool of potential owners. Finally, blockchain technology and the distributed ledger system can support financial services such as lending and investing without the need for a centralized intermediary—and thus open the door to decentralized finance (DeFi).

Crypto assets are associated with significant risks, including subjecting users to excess volatility. Trade in crypto assets requires digital, financial, and technological knowledge, which is less prevalent in sub-Saharan Africa than in other regions and hence makes the sub-Saharan African population more susceptible to income loss and other operational risks. Moreover, this risk is heightened by the more limited access to information and relatively low user protection through regulatory oversight, making the sub-Saharan African population vulnerable to crypto-related fraud or scams. For example, before its downfall, the crypto exchange FTX aggressively recruited customers in Africa (Wexler 2023). Furthermore, the high correlation of crypto assets with other traditional financial assets such as stocks and bonds may introduce increased contagion risks to the region. In addition, given crypto valuation volatility, if many consumers are invested in crypto assets, they might need to compress their expenditure if the price of their crypto investments goes down significantly, and such sudden, unexpected shifts in demand represent an extra shock to monetary policy and growth. A notable distinction should be made for well-regulated and fully-backed stablecoins, that is, crypto assets whose issuer places 100 percent of the received purchase revenues in safe assets (such as government paper); this should ensure a stable value (cases of instability so far are linked to stablecoins whose backing was not 100 percent), thus largely reducing the valuation risk for the user.

In the absence of proper regulatory oversight, crypto assets can be used as a conduit for flouting capital flow restrictions and other regulations in sub-Saharan Africa. Most countries in the region have stringent controls on capital outflows. Some face foreign exchange (FX) shortage and accordingly impose administrative measures to control the supply of FX (IMF 2023h). The decentralized and anonymous features of certain crypto assets make regulation challenging and allow for easier circumvention of existing capital control measures. This can be particularly evident if inward remittances or other payments received from abroad are channeled through crypto payments, which then remain in local crypto accounts (thus separate from the domestic financial system) and could contribute to capital outflows on demand (otherwise, in countries with FX restrictions, operators would need permission to access FX to buy crypto or any other foreign asset and potentially generate capital outflows). Moreover, the pseudonymity of crypto assets could be exploited to finance illegal activities and flout anti-money laundering/combating the financing of terrorism (AML/CFT) regulations.

Crypto assets can also undermine financial stability, especially if they are not appropriately regulated. Balance sheet exposure to crypto assets—either directly from holding crypto assets or indirectly from lending to crypto-related businesses or investors—can leave banks and other financial institutions particularly vulnerable.

[46] Estimates do not include the valuation of crypto assets such as bitcoin and stablecoins.

Given their volatile and highly speculative nature, as well as the absence of credible backing, in some cases even for stablecoins, sharp swings in crypto assets' prices can adversely affect the balance sheets of both institutional and retail investors. Regulation in some African countries, such as Nigeria, addresses this by restricting transactions between banks and crypto-asset service providers. In high inflation or financial turmoil episodes, crypto assets may become more attractive as a store of value than commercial bank deposits and disrupt the banking system, even more so if financial institutions are interconnected. Although exposure of banks and traditional financial institutions to crypto assets in the region is low, crypto assets could spread fast and start to compete with traditional banking, underscoring the need for banks to improve services to mitigate risks and for regulators to monitor these developments and introduce regulation for the usage of crypto.

A more widespread use of crypto assets could present fiscal risks, even more so in sub-Saharan African countries struggling with low revenue mobilization. Crypto assets' pseudonymous nature could facilitate tax avoidance and weaken domestic resource mobilization, particularly if crypto-related activities fall outside of the scope of the regulations of tax authorities. Offshore tax evasion is another concern. The pseudonymous nature of crypto assets could be used to transfer income and profits which have been legally generated but would be illicitly shifted abroad to avoid or evade taxes. Transactions in crypto assets are often channeled through unregulated crypto exchanges, which may undermine tax authorities' efforts to address offshore tax evasion.

Crypto assets have been touted to facilitate remittances by lowering costs, but their success has been limited so far. Transferring money through crypto assets usually incurs a lower fee, and the easy access to crypto networks through mobile phones makes these digital assets more convenient than rigid traditional banking services. However, the reliance on the internet and the local currency conversion difficulty in less developed areas (unlike mobile money) are obstacles for a more widespread use in sub-Saharan Africa. Fully backed stablecoins are likely to present not only more limited risks (given the lower volatility) but also more beneficial opportunities for transferring remittances. Authorities may want to ensure the CDD and AML/CFT checks are implemented adequately, particularly at the entry and exit points of the chains.[47]

The regulatory and supervisory frameworks for crypto assets are either inadequate or absent in sub-Saharan Africa. Most sub-Saharan African central banks report that the regulatory frameworks for crypto assets are underdeveloped in their country (see Ricci and others 2024). Weak supervisory capacity, together with the decentralized nature of crypto assets and the new and evolving underlying technology, make it more difficult to regulate crypto assets compared with mobile money and CBDC. The aforementioned risks are particularly acute in contexts of weak financial institutions and integrity regimes, which are often common in many sub-Saharan African countries.

Adopting a crypto asset as a legal tender—as was done by the Central African Republic (CAR) over a brief period in 2022—can pose significant macroeconomic risks.[48] Widespread use of crypto assets by the population (which could happen more easily if the crypto is a legal tender) can increase price volatility and intensify some of the risks highlighted earlier. When considering risks for the public sector, if a government accepts and holds crypto assets, it can be subject to large losses (IMF 2023e): the volatility of crypto assets would translate onto public finances, for instance, if used for paying taxes or public spending, with possible currency mismatches creating sizable costs. Moreover, if the country is part of a monetary or economic union, unilateral adoption of a crypto asset as a legal tender is not compatible with monetary commitments with the union and can undermine the union's macroeconomic and financial stability. The CAR, a member of the Economic and Monetary Community of Central Africa (CEMAC) and Central African Monetary Union

[47] A more refined distinction could be made but it is beyond the scope of this paper to provide related policy advice: (i) fully backed stablecoins (separated again between fiat and other assets), (ii) crypto-collateralized (semi-backed) stablecoins, (iii) non-collateralized (algorithmic) and (iv) commodity-collateralized. Each of these has its own benefits and risks.

[48] See IMF 2022a.

(UMAC), passed a law in 2022 to introduce Bitcoin as legal tender (alongside CEMAC's CFA franc), but the law was subsequently amended to remove the reference to the legal tender status as the CAR agreed with BEAC to harmonize the crypto legislation with that of UMAC.

Crypto assets should be appropriately regulated and not be adopted as legal tender. By strengthening monetary policy and legal frameworks, countries can safeguard monetary sovereignty and financial stability (IMF 2023d). Appropriate regulation for crypto assets includes (1) guarding against excessive capital flow volatility and maintaining the effectiveness of capital flow measures; (2) analyzing and disclosing potential fiscal risks from crypto assets (such as tax evasion) and accordingly adopting unambiguous tax treatment of crypto assets; (3) establishing legal certainty of crypto assets and addressing legal risks; (4) developing and enforcing prudential, conduct, and oversight requirements for all crypto market actors, including local exchanges, and implementing the Financial Action Task Force standards for AML/CFT with additional regulations for systemic players; (5) establishing a joint monitoring framework across different domestic agencies and authorities; (6) entering international collaborative arrangements to enhance the legal framework, supervision, and enforcement of crypto asset regulations (IMF 2023d); and (7) adopting an effective consumer communication strategy on crypto risks.

The crypto regulatory framework should make an adequate distinction between fully backed stablecoins and unbacked crypto assets. Authorities can minimize risks from fully backed stablecoins by allowing licensing for the issuance of stablecoins only upon condition of meeting adequate regulatory requirements related to adequate backing, reserve management transparency, and redemption rights for such stablecoins. Adequate backing can occur through deposits at a central bank, commercial banks, or investment in government assets, while clear governance (the assets held by a custodian) and sufficient resources (such as operational capital) to ensure sufficient liquidity in case of bankruptcy can safeguard redemption rights. Fully backed stablecoins can become useful in the transmission of remittances; therefore, the implementation of regulations on CDD and AML/CFT is critical, particularly at the entry and exit points of the chains. Regulation for unbacked crypto assets should address the associated concerns related to other types of investor protection risks, such as asset price volatility and market manipulation.

In the long term, comprehensive regulatory and supervisory frameworks are the best way to manage risks from crypto, and as they are being developed, countries could consider targeted restrictions. IMF (2023d) provides guidance on how to develop a regulatory framework for crypto assets.[49] However, setting up such a comprehensive regulatory framework can take time and may require new legislation.[50] Where risks are pressing, regulators could consider targeted restrictions such as restricting crypto products or activities (such as crypto payments, marketing, or purchase and sale through bank accounts) and strengthen their capacity to enforce these restrictions. These restrictions are likely to be more effective to the extent that they are proportional to the risks of crypto assets, particularly capital outflows, currency substitution, ML/TF, and risks to consumers and markets. Although restrictions and supervision can be circumvented by motivated actors, they can still provide effective short-term risk mitigation or slow down risky crypto adoption when combined with consumer warnings and effective monitoring.

[49] FSB and IMF (2024a) address cross-border regulatory and supervisory issues for stablecoins. FSB and IMF (2024b) discuss the status of the G-20 crypto asset policy implementation.

[50] In the US, for example, new legislation—the Financial Innovation and Technology for the 21st Century Act—was passed by the US House of Representatives in May 2024, defining which digital assets fall under the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC). The legislation, which will be enacted after passing the Senate, aims to improve consumer protection and avoid an FTX-like collapse. Also in the EU, the Markets in Crypto Assets Regulation (MiCA) institutes uniform market rules for crypto assets that are not currently regulated by existing financial services legislation. Key provisions for those issuing and trading crypto assets cover transparency, disclosure, authorization, and supervision of transactions. The new legal framework will support market integrity and financial stability by regulating public offers of crypto assets and by ensuring consumers are better informed about their associated risks.

Blanket bans are likely to be undesirable and ineffective. Some limited and well-regulated usage of crypto may be valuable as an additional financial tool and may help promote innovation. Hence, blanket bans are likely to be undesirable. Moreover, bans could prove to be ineffective as they would be difficult to enforce and would increase the incentives for circumvention and drive illicit activities underground. In the absence of substitute assets in legal markets, users may be more motivated to seek illegal markets and willing to pay higher prices for these assets (IMF 2023d). Hence, bans can inadvertently heighten some of the risks that countries are trying to avoid. In principle, bans may be more suitable in countries where there would be very limited capacity to adequately regulate and supervise crypto activity; however, those countries are likely to be the ones which would find it difficult to enforce the bans and may also be experiencing macro instability which raises the benefits of using crypto. Decisions to ban, therefore, should be informed by thorough assessments of effect, efficacy, and risks, and of alternative approaches available to policymakers through comprehensive regulations or targeted restrictions.

Key Policy Implications

Crypto assets should not be adopted as official currency or legal tender, and it is important to regulate them appropriately.

- In principle, crypto could be seen as a valuable addition to the financial tools to make transfers, payments, and investments at low costs, especially in countries with weak monetary frameworks. However, the risks of financing illegal activities, capital outflows, dollarization, and loss of monetary sovereignty are also high in sub-Saharan Africa. Moreover, it could be difficult to regulate and protect users, to ensure reliability, avoid scams, and manage volatility. Hence, crypto assets should not be adopted as official currency or legal tender, and their use should be adequately regulated.

- A robust legal and regulatory framework for crypto assets in sub-Saharan African countries would: (1) avoid excessive capital flow volatility and maintain the effectiveness of capital flow measures; (2) analyze and disclose fiscal risks and adopt unambiguous tax treatment of crypto assets; (3) establish legal certainty of crypto assets and address legal risks; (4) develop and enforce prudential, conduct, and oversight requirements for all crypto market actors, including local exchanges; (5) set up a joint monitoring framework across different domestic agencies and authorities; and (6) establish international collaborative arrangements to enhance supervision and enforcement of crypto asset regulations (IMF 2023d). The regulatory framework should envisage a clear distinction between crypto assets which are fully backed and those that are not, as the former present lower risks for consumers and the financial system, notably in relation to valuation volatility.

- In the absence of comprehensive regulatory frameworks to manage risks from crypto assets, countries could consider targeted restrictions on crypto activities (such as payments, marketing, purchase, or sale through bank accounts). These restrictions should be proportional to the risks that crypto assets pose, particularly in relation to capital outflows, currency substitution, ML/TF, corruption, consumers, and markets. Jurisdictions are required to implement the Financial Action Task Force (FATF) standards for virtual assets and virtual asset service providers. Further, as is the case for other financial sector intermediaries covered by the Financial Action Task Force standards, crypto asset service providers are required to apply the full suite of AML/CFT preventive controls.

- An alternative strategy to contain the adoption of crypto solutions would be to speed up the creation and implementation of other digital solutions (CBDC, FPS, mobile money). Avoiding "crypto dollarization" and safeguarding monetary sovereignty also require strengthening monetary policy frameworks and policies that promote macroeconomic stability.

7. Policy Recommendations to Strengthen the Digital Payments Ecosystem across Sub-Saharan Africa

The chapter emphasizes the need for tailored digital payment policies for sub-Saharan Africa because of its unique economic and structural characteristics. These include insufficient infrastructure, low financial inclusion, and high remittance costs. The paper argues for nuanced policy recommendations related to expanding digital infrastructure, promoting financial and digital literacy, mitigating risks, and supporting private sector innovation. Public sector digital payment innovations, such as Central Bank Digital Currencies (CBDCs), can ensure that the public continues to have access to central bank money in digitalizing economies, as well as enhance financial inclusion, but should not have undue advantage over private providers. Enhancing central bank capacity to understand and regulate digital payment innovations is crucial, and Central Bank Digital Currency (CBDC) implementation should be tailored to each country's specific needs and conditions. The chapter also highlights the importance of maintaining cash provision to avoid financial exclusion, regulating crypto assets (with a notable differentiation for fully-backed stablecoins), and managing financial stability and anti-money laundering/combating the financing of terrorism (AML/CFT) concerns. Governments can leverage digital payment systems for public transfers and tax payments to reduce informality and improve fiscal transparency. In addition, digital finance can potentially facilitate global investment in sub-Saharan Africa and enhance climate-related financing through artificial intelligence (AI) and smart contracts. Regional collaborations can improve cross-border payment systems and trade integration. Overall, the chapter advocates for a balanced and inclusive digital payment ecosystem in sub-Saharan Africa, leveraging both public and private sector innovations to address the region's unique challenges and opportunities.

The main emphasis of this paper is that the unique features of sub-Saharan African countries call for nuanced policy choices and design for digital payments, with respect to those that have been discussed for advanced and other emerging market countries. Although the literature (IMF CBDC Virtual Handbook, https://www.imf.org/en/Topics/fintech/central-bank-digital-currency/virtual-handbook; BIS 2016; Alberola and Mattei 2022, and Group of Central Banks 2023) offers key policy recommendations for a broad set of countries, this paper highlights the key policy issues associated with the economic and structural features of sub-Saharan African countries. These economic characteristics encompass several interrelated factors, such as structural issues, financial development issues, cross-border flow issues, and weak technical capacity challenges. ***Structural deficiencies*** relate **to insufficient mobile and internet infrastructure and penetration,** unreliable electricity supply, large information technology (IT) skill gaps, low financial and digital literacy, and a **slow and costly payment system,** particularly for cross-border operations. ***Financial development issues*** relate to **low financial inclusion**, **significant informality**, and shallow financial systems with weak traditional banking penetration. ***Cross-border flow issues*** relate to **high dependence on remittances** (in many countries), **high cost of receiving and sending remittances**, and the **prevalence of capital flow management measures, which are often used to support reserve management**. Finally, ***additional issues*** include **weak administrative capacity** and **low tax revenue-to-GDP** ratios.

Risks are also elevated in sub-Saharan African countries, calling for tailored policies to boost digital payments. These risks include potential threats to financial integrity (including AML/CFT considerations), capital controls, consumer protection, privacy, competition, and rule of law, as well as corruption vulnerabilities and poor adoption from limited trust. These are exacerbated by the growing use of crypto assets,

weak regulatory capacity, and limited financial education. From the structural side, the limited infrastructure and capacity increase the risks of network failures, including from internet disruptions, and cybersecurity breaches. Risks related to weak reputation, limited trust, poor adoption, rapid obsolescence of new technological platforms, and inadequate interoperability would be enhanced not only by weak capacity but also poor design and fast technological progress. Like in the rest of the world, risks to banking disintermediation and financial instability, monetary policy transmission, currency substitution, capital account volatility, and other cross-border issues are often associated with inadequate instrument design or regulation, especially where macroeconomic frameworks are weak. The rest of the chapter offers key policy recommendations tailored to sub-Saharan African countries.

A. Addressing Structural Impediments and Bottlenecks for the Development of Efficient Digital Payment Innovations

- **Expanding the digital infrastructure** (electricity, internet, and mobile connectivity) would ensure wider and safer connectivity with limited disruptions, facilitating the development of digital payments and thus helping advance financial (and economic) development and inclusion.
- **Widening the coverage of national and digital IDs** would broaden access to digital systems while facilitating operators' and regulators' ability to ensure ML/TF concerns are addressed. Such IDs are generally a precondition for opening a digital account and facilitate the customer due diligence (CDD) process. To avoid the complete marginalization of those who operate completely informally without any public record, digital IDs could be phased in for small transactions and imposed as mandatory only for large transactions in the initial development phase.
- **Greater investments in human capital,** geared toward developing and expanding new skills in digital finance, would unlock the potential of digital payment innovations. This process could yield synergies with other economic activities and deliver a growth dividend beyond the direct efficiency gains from digital finance. It would also help harness the potential of the growing youth population, which is more digitally savvy, in the continent's development.
- **Promoting financial and digital literacy** would not only advance financial inclusion, efficiency, and fairness but also enhance consumer protection and reduce risks of consumer fraud.
- **Exploring options for the possible introduction of offline-compatible systems would be very helpful**, at least until adequate mobile and internet infrastructure systems are in place, especially in areas that are remote or where natural disasters affect such infrastructure.

B. Mitigating Specific Risks

- **Maintaining central bank provision of cash and the obligation to accept it as a form of payment would ensure that the risk of financial exclusion is not exacerbated by the declining use and acceptance of cash.** Indeed, cash is the principal form of payment for financially excluded people, and its need is not likely to disappear for some time. As mentioned previously, a parallel strategy utilizing CBDC may be necessary to ensure access to digital payment services (either private or public) at an affordable cost to enhance financial inclusion. In addition, cash remains vital in case of widespread outages that disrupt the digital payment system.
- **It is important for sub-Saharan African policymakers to bring crypto assets into the regulatory environment while strengthening regulatory capacity and implementing risk-based supervision.** Although crypto assets, through the underlying blockchain technology, have the potential to support

innovations such as smart contracts, tokenization, and decentralized finance, they are also associated with several risks. These risks are heightened in sub-Saharan Africa compared with other regions because of a weaker regulatory environment, reliance on capital restrictions, and generally low financial literacy among the population. Mitigating the risks associated with crypto assets requires that sub-Saharan African policymakers focus on several key areas: consumer protection (given the more limited financial education), AML/CFT considerations (given the generally weaker regulatory and supervisory environment), and capital flow risks (given the higher exposure to these risks). In this connection, promoting financial education is crucial (especially to contain the risks associated with trading volatile and opaque digital assets). Key unresolved questions at the global level include the effectiveness of banning certain crypto transactions, such as payments through crypto.

- **The crypto regulatory framework should make an adequate distinction between fully-backed stablecoins and unbacked crypto assets**. The former can provide greater benefits if they are perfectly stable and predictable, effectively serving as digital cash. Achieving this requires full backing through deposits at a central bank, commercial banks, or investment in government assets, coupled with clear governance (the assets held by a custodian) and sufficient resources (such as operational capital) to ensure sufficient liquidity in case of bankruptcy. Hence, regulation of fully-backed stablecoins needs to focus on guaranteeing adequate backing by safe assets, their management transparency, redemption rights, and so on. Fully backed stablecoins are likely to become particularly useful in the transmission of remittances; therefore, implementation of regulations on CDD and AML/CFT is critical, particularly at the entry and exit points of the chains. Regulation for unbacked crypto assets should address the associated concerns related to other types of investor protection risks, such as asset price volatility and market manipulation. A general regulatory umbrella for all types of cryptos should focus on preventing the circumvention of capital controls and tax compliance.

- **Concerns about financial stability and those related to ML/TF may in part be addressed through adequate limits on transaction amounts and identification requirements**. Addressing CDD and ML/TF concerns related to payments (CBDC, crypto, or mobile) usage requires imposition of CDD requirements on agents responsible for the personal identification of users at the entry and exit points into the mobile money or cryptosystem. In addition, there should be further controls based on transaction limits and the frequency of transactions (*Financial Times* n.d.).

- **Policymakers need to guard against financial disintermediation risks.** Money can be moved from traditional banks to digital currencies and assets relatively easily. This, in turn, can leave banks exposed to financial disintermediation, especially at times of stress or financial uncertainty. Central banks would hence have to carefully consider fees and amount limits associated with CBDC, mobile money, and crypto assets transactions and generally guard against such risks.

- **Policymakers need to stand ready to manage potential unanticipated effects on transmission or bank disintermediation to safeguard financial stability**. Emerging evidence suggests that in countries with a relatively low level of financial inclusion, once mobile money sufficiently penetrates the economy, there is a higher pass-through from the monetary policy rate to retail lending rates, as mobile money balances are more sensitive to monetary policy instruments (Huang and others 2024). Other studies (Erel and others 2023) document that deposits tend to shift from traditional to online banks during monetary policy tightening cycles, suggesting that our understanding of the interplay between mobile money and monetary policy is incomplete. A broad development of mobile money operators may potentially induce the emergence of large systemic depositors, which require the Central Bank to remain vigilant in safeguarding financial stability.

- As the authorities work to expand mobile money, they need to find the right balance between safeguarding bank intermediation and ensuring monetary policy transmission by carefully considering the effect of decisions related to fees, interest rates, and amount limits associated with CBDC transactions relative to mobile money.

- **Risks of network failures, disruptions, or breaches, as well as those related to the rapid obsolescence of new technological platforms and essential interoperability, would require efforts on multiple fronts**. First, it is essential to ensure adequate investment in infrastructure, as discussed previously. Second, promoting the development of a system involving multiple actors and systems enhances resilience in the event of a failure in any one component. Third, collaborating with other central banks to develop regulations that conform to leading international standards is essential.
- **Risks to reputation, limited trust, and poor adoption could be managed through adequate design and regulation**. In addition, allowing private sector solutions to address consumers' and businesses' needs, to the extent possible, can further mitigate these risks.

C. Supporting Private Sector Development and Innovations through the Promotion of an Enabling, Competitive, and Safe Environment

- **Encouraging the private sector to continue taking the lead would support innovation and the development of efficient mobile money and digital payment solutions**. Because private mobile money is filling a gap left by the traditional banking system in serving large segments of the population, the potential for digital innovations can significantly enhance financial inclusion, facilitate remittances, and help provide targeted transfers to the poor households (HHs).
- **Governments can promote the development of digital payment innovations by creating an enabling regulatory, operational, and supervisory environment, thereby leveling the playing field while minimizing risks**. Developing adequate and comprehensive legal, regulatory, and supervisory frameworks to govern digital payment systems, services, and providers is essential for the development of safe and efficient digital payments. These frameworks can help avoid arbitrage, contain disintermediation, and stimulate fair competition. They should also aim to minimize risks for users, ensuring that their deposits are sufficiently secured and that the system remains robust to operational risks. This includes managing risks related to AML/CFT, the use of crypto assets, and cybersecurity, as well as enhancing consumer protection. The central bank can support competition and innovation by ensuring that private and public platforms are open to all digital payment operators, as well as by ensuring domestic interoperability. In light of the large financing need and complexity of such platforms, and the shallow financial markets in sub-Saharan African countries, central banks could consider developing such interoperable digital payment platforms based on fast payment systems or partnering with the private sector for this purpose. Furthermore, by ensuring adequate backing and regulating digital currencies, central banks can enhance consumer trust and protection. An adequate FPS jointly with a competitive and efficient mobile money sector would significantly enhance the effectiveness and inclusiveness of the digital payment system, while demanding—at present—less human and financial resources than developing and maintaining a CBDC, in light of also of the lack of international standards for CBDC.
- **To forestall regulatory arbitrage, private digital service providers generally should be subject to similar prudential rules for comparable activities (if any) offered by other financing actors, including banks**. All electronic money institutions (EMIs) must meet statutory minimum capital requirements for licensing on an ongoing basis. Their initial capital should be sufficient to undertake the proposed costly new activities, absorb startup losses as needed, and meet the cost of nonproductive assets. To the extent EMIs do not engage in lending activities, they would not need to follow the whole set of regulatory and supervisory requirements set for banks. However, many central banks require EMIs to hold customer deposits in liquid and safe assets for consumer protection and financial stability of the sector. Depending on the business model and potential systemic significance of EMIs, complementary risk-based capital requirements may be considered (Dobler and others 2021).

- **A well-governed and robust data management framework, jointly with adequately balancing privacy and financial integrity, are paramount to instill strong confidence in digital payment systems**. Data privacy regulations should conform to the appropriate CDD and AML/CFT international standards.

D. Exploring Public Sector Digital Payment Innovations—Including CBDC—as Complements Rather Than Substitutes for Private Sector Digital Solutions

- **sub-Saharan African central banks should avoid being seen as competing with mobile money providers and commercial banks.** This is important in light of the crucial role that central banks play in safeguarding financial stability and safety also in the digital payments area. By supporting adequate fast payment systems and competitive private digital payment solutions, or by adopting a CBDC only in the presence of market failures or other strategic rationales, public sector digital plans and initiatives would not be seen as competing with mobile money providers and commercial banks. Indeed, a stable, secure, and equitable financial system requires a well-balanced payment ecosystem where the public and private sectors work together in complementary roles.

- **A first standard criterion for public sector solutions is the presence of persistent market failures of private digital systems**. Specifically, this requires assessing first whether the regulatory framework provides an adequately conducive and competitive environment for the private sector, which influences the development of the digital infrastructure and services, including interoperable platforms. If the obstacle is of a technical nature, such as inadequate infrastructure and connectivity, then the first best policy solution may require addressing the obstacle rather than, for example, developing a CBDC. Similarly, if alternative policy solutions (such as subsidizing access to underserved populations) could efficiently increase financial inclusion, a CBDC may not necessarily be the preferred solution. When no alternative policy tools could ensure market-based digital payment solutions can sufficiently reduce transaction costs, reach the disadvantaged population (both for domestic transactions and remittances), mitigate risks of failures, or interact with well-advanced digital markets, CBDC (or publicly developed FPS) may have a role to play. In addition, public digital payment solutions, such as FPS or CBDC, can potentially have a disciplining effect on private money providers, thus containing the risk of excessive market power by private market players and fostering a competitive and efficient digital payment system.

- **In addition to market failures, other strategic reasons may induce central banks to pursue public choices such as CBDCs.** CBDCs can reduce the high cost of managing and meeting the demand for central bank physical cash, support business continuity in the event of technical failures of private digital payment solutions, and offer programmability of public money in the digital payment space. Moreover, a wholesale CBDC could allow the central bank to interact more efficiently with well-advanced digital markets including tokenized markets.

- **CBDC and FPS could well complement each other, particularly in countries with sufficient human and financial resources to develop, maintain, and update a CBDC.** Both systems require a rich ecosystem, typically provided by private firms incentivized to participate. CBDC could complement FPS by potentially allowing settlement on a fast payment infrastructure, ensuring greater resilience in payments, reducing fragmentation, and helping to discipline the market without necessarily being widely adopted. A well-functioning FPS available to nonbanks, backed by central bank reserves, would closely replicate CBDC and could potentially be more efficiently provided than CBDC itself. However, the resources needed for CBDC development are currently larger than those required for establishing an adequate FPS, given existing standards.

- **Central banks should develop capacity in managing and understanding digital payment innovations.** Such capacity would allow the central bank to follow the development of the rapidly evolving digital payment landscape, supervise and regulate new digital technologies, and design systems capable of mitigating the associated risks while actively contributing to the new digital payment systems. Central banks with limited resources can take advantage of peer learning to boost capacity, particularly from central banks with more advanced digital payment systems. Analyses may be warranted to understand the costs and benefits of a different user fee structure for CBDC transactions relative to mobile money, as well as the implications of paying CBDC interest income on bank disintermediation and monetary policy transmission (see Koonprasert and others 2024).

- **Even central banks with no plans to implement a CBDC at present should be prepared to act promptly when changing circumstances make a CBDC desirable.** Given the fast-evolving pace of the digital landscape in sub-Saharan African countries, it is beneficial that central banks explore CBDC, including conducting technology tests and pilots (in some cases, regional collaboration could help leverage other country resources). Countries should consider the trade-off between costs and benefits of developing a CBDC, particularly given the limited public resources in the region, the high cost of CBDC development, the uncertainty in international interoperability, and fast technological developments. A decision to implement CBDC would also need consultations with all stakeholders, including the government, financial institutions, and the broader private sector.

- **In light of heterogeneous circumstances across countries, the appropriate choice of and progress toward potential CBDC implementation will undoubtedly vary across countries.** This depends on various factors listed previously, such as the central bank's capacity on digital issues, an assessment of the effectiveness and efficiency of existing digital payment systems, as well as identified digital payments and financial market failures that CBDC can address, and other competing public sector priorities. Importantly, CBDCs need to be accompanied by sound macroeconomic policies which support confidence in the local currency. Their introduction could also be timed to coincide with a period of macroeconomic stability in the country, as CBDCs are likely to operate more effectively in a stable economic environment.

- **The business case for CBDC may increase over time**. Currently, many countries in the region still have room to further leverage private digital solutions—like mobile money—or other solutions that require strong public-private collaborations—like fast payment. Such developments may in part weaken the business case for a CBDC. The case may, however, increase over time as the digitalization of the financial sector deepens locally, regionally, and globally. For instance, once countries advance to a level where international interoperability becomes a key issue, internationally coordinated issuance of CBDCs may help in that respect. Moreover, CBDC could become an alternative way to access central bank money as digitalization progresses.

- **In addition, the government can use public digital innovations to promote private digital payments, making them more fungible and widely used by vendors.**[51] India's experience demonstrates such an approach: it developed a world-class digital infrastructure, including interoperability standards and specifications, and a set of open-source software that features flexible digital blocks that can be customized to various needs, including achieving the transition from paper-based to digital-based social assistance programs (Alonso and others 2023).

[51] In principle, CBDC could be priced at a lower cost than private options if the cost is structurally lower (because of lower risks and less intermediation) and in light of the absence of a profit incentive.

E. Leveraging Digitalization in Public Finance

- **The authorities could leverage mobile money, FPS, or CBDC for public transfers and tax payments, which can help address challenges of high informality and difficulties in targeting vulnerable people.** More generally, digital payment systems could be used by the governments for public expenditure. This would widen the digital network and potentially reduce informality. The higher efficiency gains, improved access to services, and network externalities may provide adequate incentives for the private sector to engage in digital transactions with the public sector, even though people may initially be reluctant to become formalized and subject to taxation. Digital payments and their underlying technology can be leveraged to improve fiscal transparency. In Guinea-Bissau, for example, blockchain technology has been used to enhance government operations in wage bill management, enabling the detection of discrepancies in salary information and reducing the audit and reconciliation burden (IMF 2024b).

- **Governments could develop a fractionalized digital lending system for the public sector, allowing individuals with limited income or wealth to access savings tools in smaller, more accessible increments.** Reducing the denominations of government bonds and allowing investors to use e-money or CBDC to purchase government securities would create new savings opportunities for the lower-income populations.

- **More broadly, countries can expand fractionalized access to digital finance instruments to promote financial development**. Going beyond digital payments, countries should aim over time to evaluate the potential to develop far-reaching digital payment systems that could efficiently integrate with both digital credit systems and digital investment vehicles. By ensuring these digital services are appropriately regulated and supervised, the authorities can avoid regulatory arbitrage and ensure consumer protection. In this context, the right balance between anonymity versus efficiency and fairness of information sharing will need to be carefully addressed.

F. Synergies of Digital Finance with Capital Flows, Climate Financing, and AI for a Broader Effect

- **Digital finance will continue to evolve way beyond payments including in sub-Saharan Africa, serving as catalyst for broader financing opportunities.** In addition to the valuable opportunity of fractionalization of public borrowing, and beyond promoting cheaper remittances, innovative solutions may make it easier for sub-Saharan African countries to receive financing from other countries. Indeed, the fractionalization of lending enhances global investors' ability to assess and buy local assets—for example, **diaspora bonds**—which would increase financing to sub-Saharan Africa and other developing countries. New technologies—such as blockchain, distributed ledgers, and smart digital contracts—in conjunction with the rapid emergence of large data sets, are likely to make it easier to precisely identify collateral and assess risk profiles, thus promoting private sector's access to both domestic credit and international capital markets.

- **AI capabilities can offer impressive opportunities (and risks) for digital instruments, also in relation to climate-related financing, for example, by facilitating the collection and validation of information for smart digital contracts.** By making it easier to collect essential information for pricing and determining climate-related contingencies, AI capabilities can be harnessed to design smart contracts based on a broad set of contingencies. For example, in sub-Saharan Africa where data can often be scarce, machine learning algorithms can be used to process the large data sets maintained by digital payment platforms to provide risk assessments and credit scoring including for climate and agricultural ventures. These risk assessments can enable the crafting of customized, cost-effective insurance solutions tailored specifically for the agriculture sector, protecting farmers against unpredictable climate variability in a timely manner. In addition, AI models can analyze extensive customer data from payment histories

and usage patterns to generate credit scores for borrowers. This more efficient and broader information process could be particularly beneficial to those who are traditionally excluded from the formal financial sectors and lack formal credit histories (such as many farmers), thereby potentially facilitating their access to credit (see Box 7). Meanwhile, several authorities (Argentina, Hong Kong, Kenya, Portugal, and Spain) have expressed concerns regarding issues such as data privacy, lack of information, and potentially abusive user terms (Berwick 2024).

Box 7. Harnessing Payments and Fintech Innovations for Climate Change in Sub-Saharan Africa[1]

Payment system innovations are linked to the broader financial technology (fintech) progress seen in Sub-Saharan Africa (sub-Saharan Africa) over the past two decades. Indeed, these innovations have also served as starting points for using other technologies (such as artificial intelligence (AI)) to reach various policy or development objectives including for climate change. For example, in sub-Saharan Africa, where data can often be scarce, fintech companies use digital platforms to collect large data sets from their operations. Using AI to leverage data from fintech companies and other sources, new companies provide risk assessment and credit scoring including for climate and agricultural ventures. In the agriculture sector: (1) accurate risk assessments enable the crafting of more tailored insurance policies, protecting farmers against unpredictable climate variability; and (2) AI models generate credit scores for farmers, many of whom lack formal credit histories, thereby facilitating enhanced access to credit.

The following cases illustrate how companies are leveraging existing payment and fintech technologies to advance innovations in other areas.

M-KOPA was initially launched to provide affordable solar power solutions in East Africa with a pioneering "pay-as-you-go" solar energy model, enabling customers to purchase solar systems on affordable payment plans using mobile money services. As the company evolved, it expanded into a broader fintech role, incorporating AI and machine learning to analyze extensive customer data collected from payment histories and usage patterns. This analysis helps M-KOPA build detailed credit profiles, refine its credit scoring systems, and manage financial risks, allowing it to offer tailored financing options through smartphones. This strategic use of technology underpins M-KOPA's role in driving financial inclusion by extending essential services beyond solar power to a wider range of consumer products, like electric bike or solar-powered water pumps.

PULA, an innovative Insurtech startup based in Kenya, leverages advanced data analytics and AI to deliver customized, cost-effective insurance solutions tailored specifically for the agricultural sector. Its pioneering Weather Index Insurance uses real-time weather data to automatically trigger compensation to farmers facing adverse weather conditions, thereby eliminating the cumbersome traditional claims processes and ensuring timely and accurate payouts. Furthermore, PULA has developed user-friendly mobile applications that not only simplify the insurance purchase process but also provide ongoing policy updates and crucial agricultural information which is accessible even in the most remote areas. PULA has successfully expanded its operations from Kenya to multiple other African countries, helping reinforce farmers' resilience to climate variability.

Looking forward, the potential for AI and machine learning in Africa's fintech sector is promising. Although the development of AI technologies is still in its nascent stages relative to the broader advancement of digital solutions, AI could enhance the resilience of the most vulnerable to climate change.

[1] By Laila Drissi Bourhanbour.

G. Collaborating across Borders to Enhance Efficiency and International Interoperability of Payment Systems

- **Regional collaboration through resource pooling to explore regional solutions for fast payments and CBDCs can be particularly beneficial within sub-Saharan Africa.** Indeed, many central banks in the region are capacity constrained and would benefit from pooling resources. Moreover, regional efforts can lead to more harmonized technology and regulations related to digital payment instruments, which can enhance the efficiency of regional cross-border flows and minimize regulatory arbitrage. This, in turn, may positively affect exports and trade integration.[52] In sub-Saharan Africa where traders are often credit constrained, pooling transaction data from various digital payment systems can help small and medium enterprises—with limited or no credit history—get access to trade financing and further enhance trade, with initial creditworthiness judged on transaction data. Moreover, advancements in payment technology can improve customs procedures and reduce customs clearance time, further supporting trade. In turn, stronger trade integration is likely to reinforce financial integration, thus promoting a virtuous cycle. An additional benefit of international collaboration is that it will also help manage the rapid obsolescence of existing technological platforms. A key open question is how to leverage other countries' experiences, especially those outside sub-Saharan Africa.

- **For the efficient functioning of an interoperable cross-border payment system, sub-Saharan African countries should collaborate with the broad international community on the harmonization of technology, along with the coordination of legal, regulatory, and supervisory frameworks.**[53] In this respect, it is essential that domestic technological choices related to digital payment systems (such as fast payments or potential CBDC) are flexible enough and closely aligned with international standards, so that they can be made interoperable across countries with minimal cost and effort. A bigger obstacle is the harmonization of the legal, supervisory, and regulatory frameworks: significant efforts will be necessary to adjust country-specific frameworks to make them compatible with challenges posed by cross-border transactions and to ensure clear responsibility and strong governance. In particular, clarity is needed on which jurisdiction and legal authority would apply to supervision and dispute resolution for such transactions. It is essential to ensure a fair balance of power and responsibilities across countries by adequately designing the governance structure. Equally essential is a fair sharing of design and maintenance costs, as well as potential benefits (for example, if one currency is chosen as the currency of settlement).

- **Concerns about the volatility of capital flows and sudden stops would need to continue to be addressed.** This would not only require authorities' efforts to ensure appropriate macroeconomic policies but also their ability to rely on ongoing capital flow management measures, alongside adequate regulation of new digital financial instruments.

- **Efforts toward an interoperable regional system are likely to yield substantial benefits, as they would naturally align with international regulatory standards.** Although engaging in the harmonization of regulatory and supervisory procedures may incur costs, such initiatives would automatically create a new framework that enables member countries to efficiently adhere to international norms for CDD and AML/CFT through the new interoperable digital solutions. This environment would bring significant efficiency gains to all individual countries in meeting the standards, thus also facilitating broader market access.

[52] Trade patterns in SSA are consistent with the continent's limited integration into global value chains, reflecting its fragmented trade policy landscape marked by multiple regional economic communities, a challenging trade environment with gaps in structural factors such as transport networks, customs and border processes, and access to finance (see ElGanainy and others 2023).

[53] Interlinking payment systems across borders, for example, would require consideration of capital flows.

- **The ongoing initiatives to promote an integrated African payment system are highly welcome and urgent.** Annex 4 lists numerous initiatives aiming to create cross-border financial market infrastructure that enables payment transactions across several countries in Africa without requiring transactions to pass through international correspondent banks outside of the continent. Key challenges include effective management of several issues related to governance, data management, scalability, currency of settlement, and coordination of regulatory frameworks. In this respect, the ongoing agenda of all African central banks to establish an interoperable, continent-wide fast payment system is particularly commendable. This agenda aims to assess the foundational elements, identify best practices, and determine technological requirements, the scalability of existing systems, and ensure adequate governance of the system.

H. Sound Macroeconomic Policy as the Essential Foundation for the Digital Reform Agenda

Sound macroeconomic policies and adequate governance institutions should remain the foundation of any digital finance policy system. Designing an efficient digital payment system and regulatory framework is not enough to ensure financial development and stability. These efforts must be accompanied by sound macroeconomic policies and robust governance institutions that buttress confidence in the local currency and in the overall economy, as well as foster consumer trust and protection.

Annex 1. CBDC as Complement or Substitute to Private Mobile Money?[54]

This annex focuses on the potential development of a retail CBDC and its likely relationship with private payment systems, particularly mobile money, given its prevalence in sub-Saharan Africa.[55] The focus of this annex is on the case of a central bank that has chosen to implement a retail CBDC, and needs to decide whether its Central Bank Digital Currency (CBDC) will compete with or complement mobile money—a question particularly relevant in sub-Saharan Africa. A competitive relationship with mobile money may be justified on the grounds of competition policy but at the cost of enlarged public footprints. A complementary relationship could be an easier and better option, for example, with CBDC used mainly as a bridge for interoperability with mobile money, while refraining from retail competition with it.

Consideration of a CBDC leads to layers of decisions to be made. After contemplating the rationale for having a CBDC, central banks that choose to introduce a CBDC must determine whether to embark on a wholesale and/or a retail CBDC. For those that choose the retail option, a crucial consideration arises regarding the CBDC's interaction with private payment systems, including existing mobile money systems. Specifically, they must decide on the nature of the relationship between the CBDC and mobile money platforms.

A retail CBDC has the potential to either compete with or complement the existing benefits of private payment platforms, particularly mobile money.[56] And the decision on the nature of the desired relationship between the two would in part depend on the design choices for retail CBDC. Mobile money platforms are the predominant payment system in sub-Saharan Africa providing access to financial services including for people without bank accounts. Mobile money has enabled the unbanked to:

1. Deposit cash (for savings and safekeeping).
2. Receive transfers (for example, salary).
3. Make payments (for example, utility bills or retail purchases) and transfers (for example, remittances).
4. Withdraw cash.

A retail CBDC offered directly to end users can provide all these functions, as it generally operates like a deposit account directly held at the central bank, but it faces significant operational hurdles, mainly in relation to on- and off-boarding. Direct-account-based retail CBDCs could allow users to hold deposit accounts directly with the central bank without relying on other intermediaries (like banks). The main hurdles for such a CBDC, particularly in the context of financial inclusion, are the absence of its own agent network and infrastructure to allow customers to undertake on- and off-boarding and other exchanges between CBDC and cash. Mobile money services often thrive in regions with limited banking infrastructure, providing services to unbanked populations. CBDCs would require a reliable digital infrastructure and internet access, which may be lacking in some areas, unless they have offline capabilities.

[54] By Jack Ree.

[55] This should be considered after addressing two other fundamental questions that are not discussed in this annex, as they are covered in Chapter III: whether central banks should like to have a CBDC, and second whether to develop a wholesale and/or a retail CBDC.

[56] Some jurisdictions seem to establish a case for CBDC with beliefs that they may spur competition and thus foster innovation and good standards in private money (Das and others 2023).

Other forms of retail CBDC reaching end users indirectly can overcome these hurdles by outsourcing through existing or new networks. To deal indirectly with end users, one option would be to offer access to the public through a tiered system involving financial intermediaries, mainly banks, focusing on regulated access. Another option would be to leverage a broader decentralized system, such as through application programming interfaces (APIs), enabling a more flexible and open structure that encourages innovation from a wider range of private sector entities, including technology companies, through diverse array of access points.[57] In this second option, payment initiation service providers (PISPs) may interact with CBDC systems to read data from and/or write data to the CBDC ledger using APIs based on predetermined terms and protocols. However, mobile money operators would normally not have full read or write access but only implement transfers for onboarding and off-boarding. Although customers may receive electronic funds (for example, payroll) either to their mobile money accounts or CBDC accounts (or initiate electronic fund transfers or payments from either), they will likely use mobile money accounts for transactions, as CBDC accounts may not provide retail bank-like services.

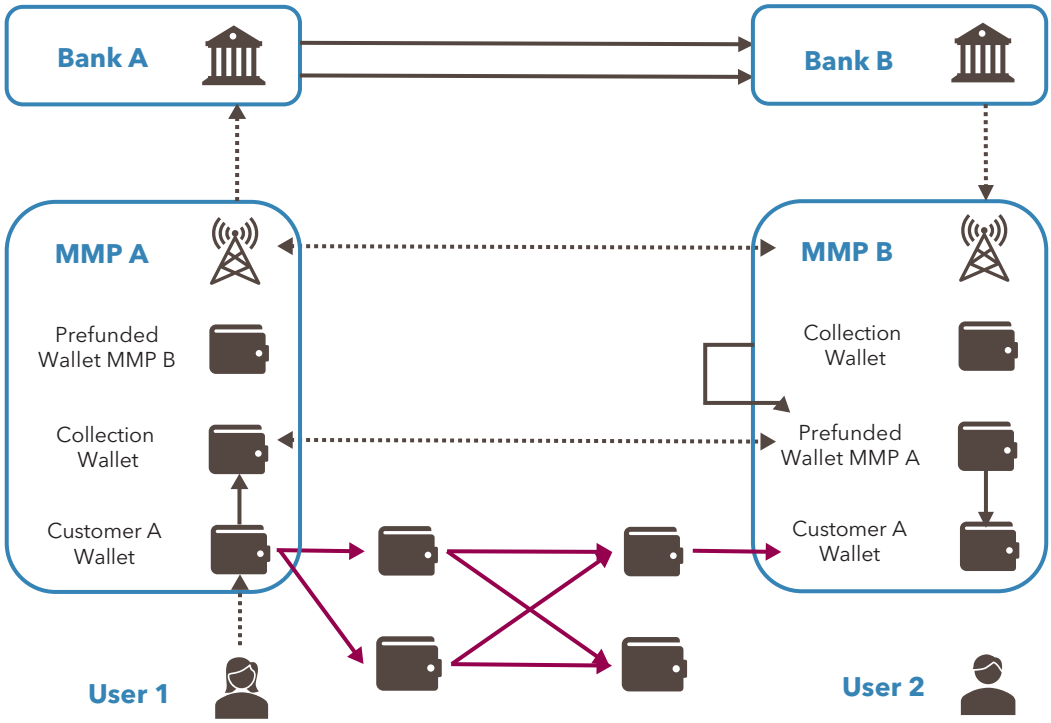
These two broad categories of retail CBDCs could expose a trade-off related to more direct and trustworthy access to legal tender versus complementarity and supporting innovation, depending on the design. A direct account-based retail CBDC could be more efficient than existing mobile money in terms of allowing people to hold legal tender more directly. A retail CBDC through financial intermediaries or other PISPs could instead be more conducive to enhancing competition and promoting innovations. Obviously, the degree to which these changes would materialize would heavily depend on the design details. Overall, CBDCs could potentially offer a more secure environment for transactions, as they are liabilities of the central bank; in contrast, mobile money platforms face creditor and settlement risk and, in many jurisdictions, are subject to limited regulations focused on service provision.

The complementarity of CBDC with other digital payment systems can enhance mobile money user experience and adoption, and offer benefits:

- **Seamless transfers between CBDC and mobile money would supplement the store-of-value function of mobile money by reducing risks**. Money stored in mobile money accounts is subject to credit risk, which can sometimes be more severe than bank deposits, considering: first, operational or fiduciary risks involving mobile money providers (MMPs); second, credit risks of the partner banks where mobile money depositors' funds are safekept in pool accounts. The ability to implement seamless transfers between mobile money and CBDC reduces exposure to such risks.
- **A CBDC can also significantly lower interoperability costs in countries lacking an efficient interoperable payment platform among operators**. For example, when a customer from MMP A sends 100,000 units of currency to a subscriber of MMP B, the current process often involves complex interoperability arrangements. However, once MMP A integrates its customers into a CBDC system, the funds can be transferred to customer A's CBDC wallet and then pushed to customer B either directly (CBDC wallet-to-CBDC wallet) or indirectly (with MMP B serving as the intermediary for the recipient's CBDC wallet). This streamlined process eliminates the need for reconciliation between two different MMPs prior to final settlement.

[57] See Mittal and others (2024).

Annex Figure 1.1. Mobile Money Interoperability: Before and After CBDC



Source: GSMA (2021) and authors' elaboration.

[1] Gray arrows represent money and order flows under the current model of interoperability arrangement between two MMPs (a prefunded model). Red arrows illustrate possible path of interoperability after CBDC introduction in four different scenarios: (1) both A and B have CBDC wallets, (2) only A has a CBDC wallet, (3) only B has a CBDC wallet, and (4) neither A nor B has a CBDC wallet.

Annex 2. Robust Determinants of Crypto Asset Adoption[58]

While crypto assets can potentially improve financial inclusion, reduce the costs of payments and cross-border remittances, and enhance the overall efficiency of the financial system, their pseudo-anonymous nature can make them a vehicle for illicit flows or tax evasion. In addition, their price volatility can pose risks for consumers and financial stability. It is therefore of paramount importance to understand what drives crypto asset adoption. Weak economic fundamentals (such as inflation and exchange rate volatility), capital controls, and high informality are identified as robust drivers of crypto asset adoption, making the case for strengthening monetary frameworks and sovereigns' fundamentals.

The trade-offs presented by crypto asset adoption place them at the center of policy debate. By design, crypto assets' financial and digital innovations offer the potential to improve the efficiency of the financial system, reduce the costs of payments and cross-border remittances, and increase inclusiveness for those with limited access to conventional banking. However, the inherently pseudo-anonymous nature of crypto assets can make them a potential vehicle for cross-border illicit flows and tax evasion, among other issues. Though not yet of systemic importance (as of September 2024, crypto assets make up about 1.8 percent of world GDP), their rapid growth since inception may pose risks to financial stability and challenge some countries' monetary sovereignty (IMF 2021c). This places them at the center of academic and policy debate, as policy-makers around the world investigate what drives crypto asset adoption and the means for their regulation.

Little is understood about the factors that drive crypto asset adoption in some countries compared with others. Research on why crypto asset adoption has accelerated markedly in some countries while remaining insignificant in others is limited, owing to the lack of data availability on crypto asset usage by country. Although the literature has separately examined the effect of a wide range of country fundamentals and initial conditions on crypto asset usage, there is little consensus regarding the most relevant ones. Furceri, Gonzalez-Dominguez, and Tawk (forthcoming) try to bridge this gap by using Chainalysis data and Bayesian model-averaging techniques to determine a robust set of drivers of crypto asset adoption by relying on a wide number of potential determinants and millions of models. Specifically, they employ a weighted-average-least squares (WALS) approach (Magnus, Powell, and Prüfer 2010), which runs a maximum combination of possible models for a large number of explanatory variables that could drive crypto asset adoption, using a cross-panel specification that examines the variation in crypto asset adoption in a sample of over 105 countries.

Weak economic fundamentals, capital controls, and high informality are identified as robust drivers for the rate of crypto asset adoption across countries. The results validate the relationship between crypto asset adoption and weak economic fundamentals: in countries with higher inflation and lower control of corruption, crypto assets can be used as a hedge to protect economic agents against these weak sovereign fundamentals (Annex 2, Annex Table 1, Annex Figure 2.1, panels 1 and 2).

Meanwhile, economies with lower degrees of capital account openness (proxied by the Chinn-Itoh index) have a higher share of crypto asset adoption, suggesting that crypto assets may be used to circumvent capital controls (Annex 2, Table 1, Annex Figure 2.1, panel 3). Informality also emerges as a robust driver of crypto asset adoption, as informal markets (black markets) are areas where crypto assets' relative anonymity and efficiency can be used as an alternative currency (Hileman 2014; Annex 2, Table 1, Annex Figure 2.1, panel 4).

[58] By Davide Furceri and Nour Tawk.

Countries with lower degrees of financial inclusion and development, or higher reliance on remittances, also see a higher rate of crypto adoption. A higher reliance on the traditional banking system (proxied by bank deposits to GDP) is negatively associated with the rate of crypto asset adoption (Annex 2, Table 1, Annex Figure 2.1, panel 5). Higher reliance on international remittances is positively associated with a higher rate of crypto asset adoption, as economic agents in those countries may turn to crypto assets to reduce transaction and transfer costs (Annex 2, Table 1, Annex Figure 2.1, panel 6). In addition, a stronger digital infrastructure (proxied by access to secure internet servers) allows for a faster rate of crypto asset adoption. Economic uncertainty appears to be a deterrent to crypto asset adoption, as recently evidenced by the 2022 crypto asset selloff during heightened market uncertainty and risk aversion (Annex 2, Table 1). Other results using a panel regression also suggest that exchange rate volatility and a country's history of inflation crises are robust determinants of crypto asset adoption, further strengthening the argument that crypto assets are used to hedge against weak sovereign fundamentals.

Strengthening regulatory frameworks for crypto assets and sovereigns' fundamentals can protect countries' monetary sovereignty, while improving financial inclusion can protect consumers. As the results suggest, the rate of crypto adoption is higher in countries that rely more on remittances and are characterized by higher inflation, exchange rate volatility, informality, corruption, and the degree of capital controls. This makes a case for strengthening regulatory frameworks to prevent unwanted use of crypto assets, as well as strengthening countries' fundamentals. In addition, as results suggest that crypto assets may be used to circumvent capital controls, implementing improved CDD and anti-money laundering/combating the financing of terrorism (AML/CFT) requirements and better tracking of crypto transaction flows would help countries determine if that is indeed the case. Finally, while countries with greater reliance on the traditional financial system (proxied by the size of bank deposits to GDP) are less likely to turn to crypto assets, broadening financial inclusion could potentially reduce the reliance on crypto assets, which can be volatile and therefore lead to losses for users with little access to traditional banking. However, in countries with lower financial development, the presence of crypto assets and digital currencies could help broaden financial inclusion.

Annex Table 2.1. Robust Determinants of Crypto Asset Adoption

Variables	Rate of Crypto Adoption (Log of (l + Crypto Volumes/ GDP))
Inflation (log)	**1.994**
Control of corruption index (higher= more control)	**–1.116**
Real GDP growth	0.294
Remittances (% GDP)	**3.025**
GDP per capita (log)	0.93
Bank deposits to GDP	**–1.281**
Unemployment rate	–0.401
Share of population (15-24) years of total population	0.306
Population (log)	**–3.127**
Secure internet server users per million (log)	**3.691**
Chinn Itoh Index (higher= liberalized capital account)	**–1.47**
GDP volatility (SD of log GDP)	0.308
Uncertainty Index	**–1.09**

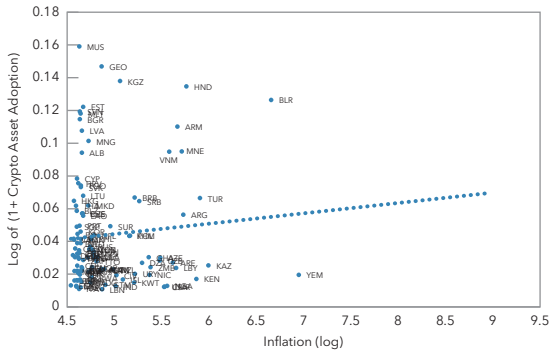
Variables	Rate of Crypto Adoption (Log of (l + Crypto Volumes/ GDP))
Informal employment (% GDP)	**1.139**
Urban population to total population	−0.455
Trade openness	0.116
Manufacturing VA to GDP	0.206
Number of historical inflation crises	−0.916
People borrowing from a financial institution (% age 15+)	0.344
Growth of gross government debt	0.0836
Exchange rate volatility	−0.449
Constant	−0.868
Observations	105

Source: Authors' estimations, Gonzalez Dominguez, Furceri and Tawk (forthcoming)

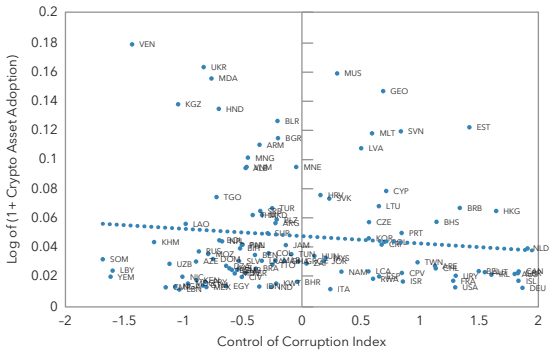
Note: t-statistics reported in the table. A regressor is considered robust if the associated t statistic is in absolute value larger than 1. In bold are regressors that can be considered "robust." Estimates based on equation: $C_{i,t} = \alpha_i + \beta' X_{i,t} + \varepsilon_{i,t}$, where X is a vector of k covariates for countries i characteristics and C is measure of crypto adoption, and $\beta^x = \Sigma_{i=1}^{M} w_i \beta_i^x$, with w_i denoting a measure of goodness of fit of each model, M = different models, β^x= coefficient related to variable X.

Annex Figure 2.1. Rate of Crypto Adoption versus Key Macroeconomic Determinants (2015–21)

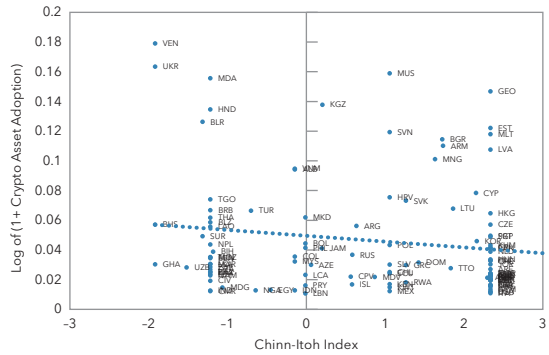
1. Inflation



2. Control of Corruption



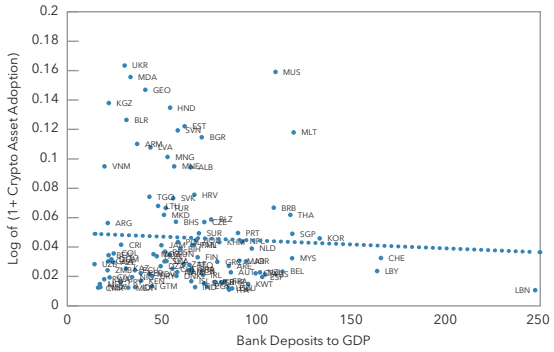
3. Capital Account Openness



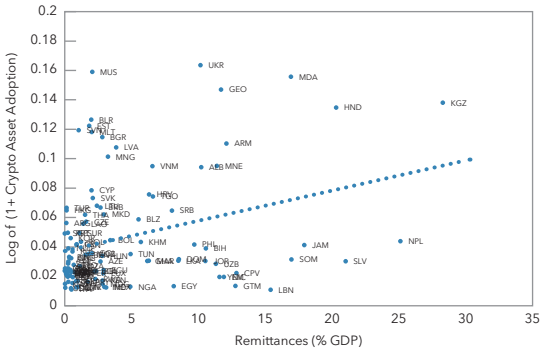
4. Size of Informal Economy

Annex Figure 2.1. Rate of Crypto Adoption versus Key Macroeconomic Determinants (2015–21) (Concluded)

5. Bank Deposits to GDP



6. International Remittances



Source: Authors' estimations, Gonzalez Dominguez, Furceri and Tawk (forthcoming)
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex 3. Digital Payment Innovations and Remittances[59]

Digital payment innovations, such as mobile money, are lowering the costs of sending and receiving remittances in sub-Saharan Africa, a region highly dependent on this source of external financing. By creating more competition, these are reducing the costs and time needed for transactions, compared with traditional money transfer operators. Where these costs remain elevated, sub-Saharan African countries could also explore a Central Bank Digital Currency (CBDC). The use of crypto assets for remittances has been limited so far.

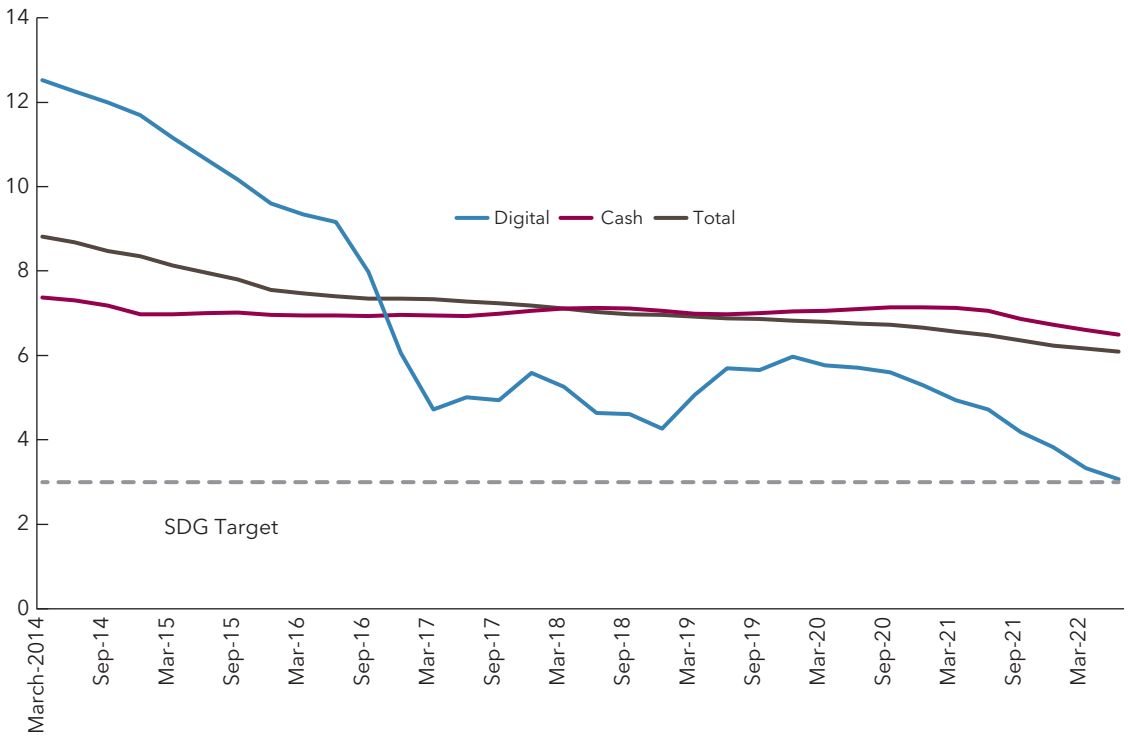
Sub-Saharan Africa received over US$50 billion in remittances in 2022, representing one of the largest sources of external financing for the region. Much of this money goes to low-income households (HHs) who may not have a bank account. The cost of sending remittances to sub-Saharan Africa was 8 percent on average in 2022, higher than for other regions, and significantly above the Sustainable Development Goal (SDG) 2030 target of 3 percent (World Bank 2023b). If these costs were at the SDG target today (hence lower by 5 percent), low-income HHs in the region would receive about US$2.5 billion more per year, representing savings from lower transaction costs (taking the amount in 2022 as a benchmark).

Digital payment innovations can play an important role in lowering these costs, as remittances sent through digital means tend to be cheaper and faster compared with sending cash. Digital payment innovations that introduce more competition can potentially decrease costs in these corridors. Indeed, the cost of sending $200 in remittances to sub-Saharan Africa digitally was nearly half the cost of sending it nondigitally through cash (World Bank 2023a).[60] Beck, Janfils, and Kpodar (2022) find that remittance corridors dominated by traditional banks and few players are characterized by higher fees.

[59] By Saad Qayyum and Silvia Guadalupe Núñez.

[60] According to the World Bank (2023a), the average cost of sending $200 in cash to SSA was $18.30 of which the foreign exchange margin was $5.70. Sending the same amount digitally cost $10.32 including a foreign exchange margin of $3.62.

Annex Figure 3.1. Cost of Sending $200 in Remittances by Methods, 2014:Q1–2022:Q2
(Average of last four quarters, percent of total transaction cost)



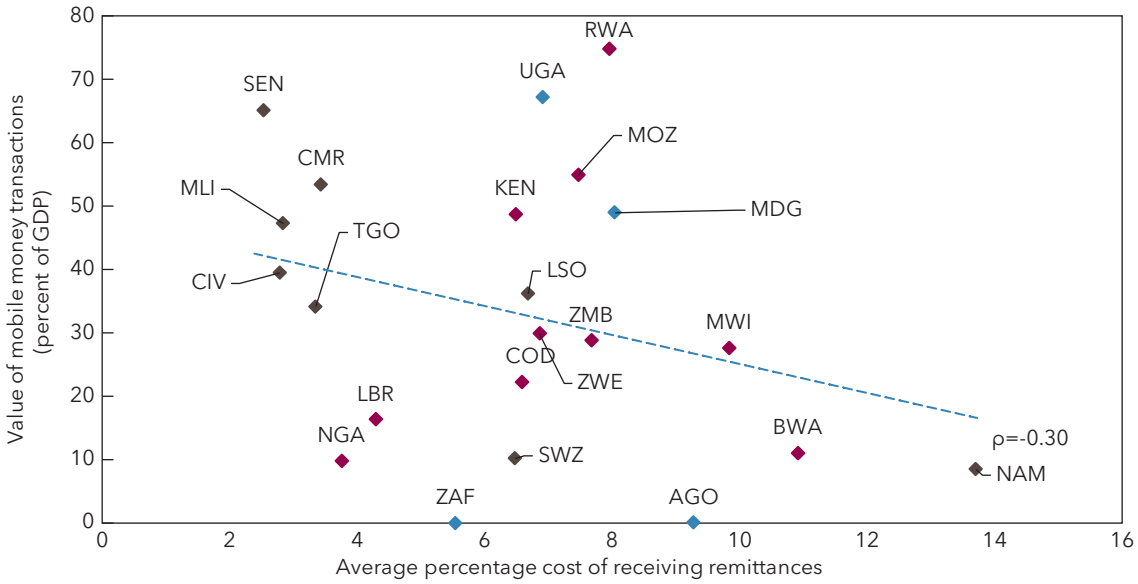
Source: World Bank; Remittance Prices Worldwide.
Note: Digital transactions are sent by bank transfer or online and received into a transaction account. Cash transactions are those sent and received in cash.

Mobile money was the least costly way to send remittances in 2022 (World Bank 2023a). Correspondingly, the cost of receiving remittances was generally lower in countries with a greater prevalence of mobile money (see Annex Figure 3.2 on next page).[61] There is some evidence that the presence of mobile money in remittance corridors also helps reduce the cost of sending remittances through traditional money transfer operators as a result of enhanced competition. For example, Mbiti and Weil (2016) find that M-PESA was associated with decreases in the cost of competing money transfer services such as those from Western Union. Mobile money operators' wide network and their arrangements with local shops to cash-in and cash-out make mobile money popular with the unbanked and a convenient option for receiving remittances.

[61] In 2022, the cost of sending and receiving remittances through mobile money was significantly cheaper than through bank accounts, cash, or debit cards (World Bank 2023a).

Annex Figure 3.2. Cost of Receiving Remittances and Value of Mobile Money Transactions Sub-Saharan Africa

(In percent of the transaction and in percent of GDP)



Sources: IMF staff calculations, Financial Access Survey and The World Bank, Remittance Prices Worldwide, available at https://remittances.worldbank.org.

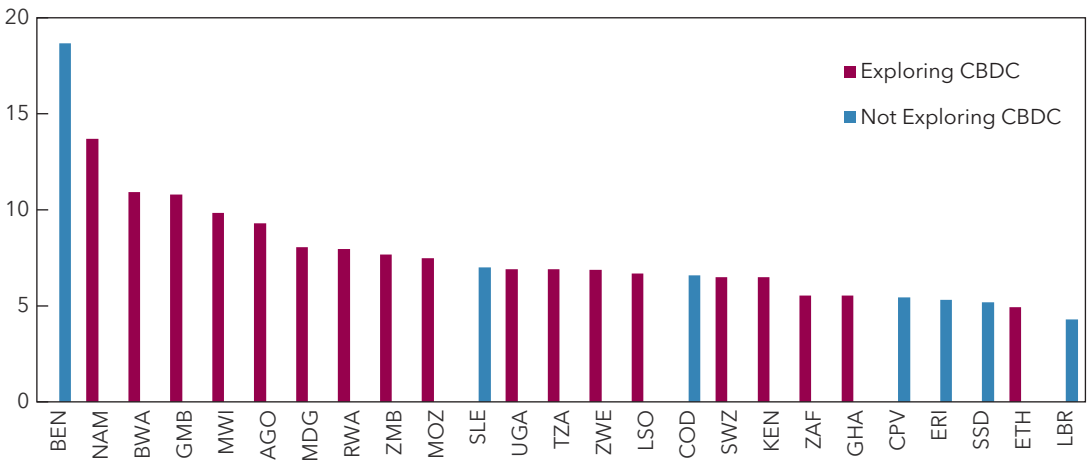
Note: The color represents the exchange rate regime – blue represents floating, red indicates managed float, and green dots are conventional pegs, according to 2021 Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The value from Namibia comes from the response of the country's authorities to the IMF survey conducted in April 2023. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Most countries with high remittance costs are exploring CBDC (please see Annex Figure 3.3). Although CBDCs can potentially lower the cost of sending money across borders, they need to be well designed, glitch-free, and widely adopted before they can be widely used for remittances.[62] Delivery of remittances to the final intended recipient can also be challenging, particularly if they do not have a CBDC wallet. This challenge can be partly overcome if CBDCs can be transferred to mobile money wallets across and within countries. Large spreads between the official exchange rate and the parallel market rate should be avoided as they may deter the use of CBDCs for remittances. Finally, cross-border flows through CBDCs should adhere to anti-money laundering/combating the financing of terrorism (AML/CFT) regulations and customer due diligence (CDD) requirements, though implementing these in areas where people may lack proper identification can be challenging.

Crypto assets have been touted to promote remittances, but their success thus far has been limited. Although the average cost of sending remittances through bitcoin can be as low as 2.9 percent (IMF 2023d), additional costs may be involved, for example, when cashing out using bitcoin ATMs. Moreover, the volatility of crypto assets, reliance on the internet, and the difficulty in converting bitcoin (to local currency or goods in less developed areas) make bitcoin inconvenient for sending remittances. Stablecoins may be able to overcome the volatility challenge (especially if fully-backed), but delivery in the last mile to people particularly in less developed areas with limited access to the internet or easy cash-in and cash-out options can be a difficult challenge to overcome.

[62] Cerutti, Firat, and Pérez-Saiz (2025) note that high remittance costs will benefit the most from the potential role of CBDCs in cost and efficiency reduction.

Annex Figure 3.3. Sub-Saharan Africa: Average Percentage Cost of Sending Remittances (2021)
(In percent of the transaction)



Sources: IMF staff calculations, The World Bank, Remittance Prices Worldwide, available at https://remittances.worldbank.org, and IMF African Department CBDC and digital payments survey.

Note: The average percentage cost of sending remittances is computed as the simple average of the total cost of the transaction in percentage of all the transactions sent by each country during the year. These represent the 25 Sub-Saharan African countries with the highest cost of sending remittances. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Annex 4. Regional Trade Benefits[63]

This annex explores how digital payment systems can benefit regional trade in sub-Saharan Africa. Limited cross-border payment processes, alongside high tariffs and challenging nontariff barriers (weak transport infrastructure, cumbersome border procedures, and divergent regulations) impede intra-sub-Saharan African trade, which accounts for only 15 percent of total regional trade. Digital payment systems and enhanced interoperability between them could substantially reduce trade costs and stimulate economic activity, addressing the region's substantial trade financing gap. The African Continental Free Trade Area (AfCFTA) and initiatives related to promoting an interoperable regional fast payment system represent promising steps toward supporting regional integration and facilitating more efficient, secure, and cost-effective cross-border transactions. However, governance, data management, and financial infrastructure challenges must be addressed. Key measures to enhance digitalized cross-border payments include developing interoperability between national payment infrastructures, coordinating regulatory frameworks, promoting cooperation, digitalizing trade procedures, and increasing awareness within the business community.

Trade flows within sub-Saharan Africa are low and constrained by limited cross-border payment systems, on top of tariff and other nontariff barriers (African Development Bank 2022b). Intra-sub-Saharan African trade currently stands at about 15 percent of total sub-Saharan African trade, significantly below the 25 percent seen in Emerging Asia and 22 percent in Emerging Europe, and comparable to 15 percent in Latin America and the Caribbean.[64] Expensive and complex cross-border payments are key barriers to trade in sub-Saharan Africa, along with high tariffs, cumbersome border procedures, and divergent rules and regulations. sub-Saharan Africa also lags behind other regions globally in the logistics performance index (LPI).[65] Moreover, only about 12 percent of intra-African payments are cleared within the continent, according to SWIFT (2018). The rest are routed through overseas banks, mostly in Europe and North America, resulting in higher costs. More efficient and interoperable digital payment systems, along with other digitalization solutions (including for customs procedures), could lead to more efficient and less costly cross-border payments. The resulting lower trade costs would stimulate trade and may also help address the approximately US$81 billion trade financing gap for the African continent (African Development Bank 2022a).

Ensuring interoperability between domestic payment systems is crucial for digitalization to improve cross-border payments and thus facilitate regional flows of trade and remittances. As Africa works toward building the AfCFTA, ensuring compatibility between payment systems, including for low-value payments through mobile money, is essential. Several regional settlement platforms, with the the Southern African Development Community Real-Time Gross Settlement (SADC-RTGS) and Pan-African Payment and Settlement System (PAPSS) being the two largest ones, are interoperable within certain sub-Saharan African regions, helping promote regional financial integration. However, they are not interoperable with each other and with countries not part of the two groups (Annex Table 4.1). These regional settlement systems are a step in the right direction to improve transaction settlements between participating banks within regions, which would otherwise have required more complex and expensive correspondent banking arrangements with partners outside sub-Saharan Africa. Before regional payment systems, banking transactions between a region's member states were treated as international transactions and processed by foreign banks outside

[63] By Anna Belianska.

[64] IMF, Direction of Trade Statistics (DOTS); and IMF staff calculations. Intra-regional trade share is the ratio of total trade within the region to the sum of total trade of the region, where total trade is the sum of the value of exports and imports.

[65] The logistics performance index (LPI) (https://lpi.worldbank.org/) reflects the global logistics community's perception of a region or country's capacity and capability to participate competitively in global trade and value chains.

the region. Nevertheless, governance, data management, scalability, currency of settlement, and coordination of regulatory frameworks need to be addressed for several of these initiatives to potentially become a continental payment system. The ongoing initiative of the AACB to plan a regionwide interoperable and efficient fast payment system is highly welcome in this respect.

Annex Table 4.1. Regional Multilateral Payment Platforms in Africa

Category	Platform	Geographic Coverage	Market Segment
Multi-currency, hub and spoke, operated by public entity	East African Payment System (EAPS)	East African Community (EAC)	Wholesale
Single currency, hub and spoke, operated by public entity	Regional Payment and Settlement System (REPSS)	Eastern and Southern Africa Common Market for East and Southern Africa (COMESA)	Wholesale
Single-currency, common platform, operated by public entity	Southern African Development Community Real-Time Gross Settlement System (SADC-RTGS)[1]	Southern African Development Community (SADC)	Wholesale
Single currency, common platform, operated by the monetary authority	STAR-UEMOA, RTGS	West African Economic and Monetary Union (WAEMU)	Wholesale
Multi-currency, common platform	West African Monetary Zone (WAMZ) Payments System	West African Monetary Zone (WAMZ)	Wholesale
Single currency, common platform, operated by the monetary authority	SYGMA-RTGS	Central African Economic and Monetary Community (CEMAC)	Wholesale
Private initiative	MFS-AFRICA	Multiregional mobile money hub	Retail, mobile payments including remittances
Multi-currency	BUNA	North Africa and the Arab region	Retail including remittances and wholesale
Multi-currency, common platform	PAPSS	Africa	Retail including remittances

Source: BIS (2023b).

[1] South African Reserve Bank, Regional Settlement Services (https://www.resbank.co.za/en/home/what-we-do/payments-and-settlements/SADC-RTGS).

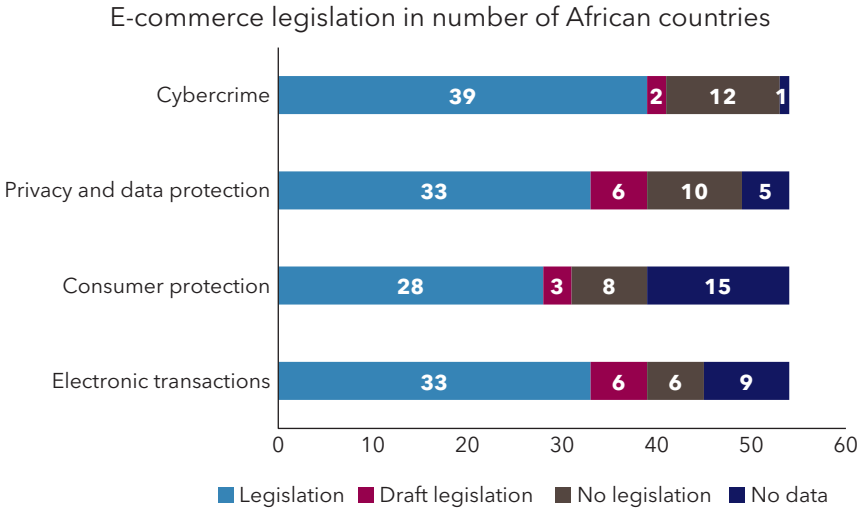
Both private digital payment systems and Central Bank Digital Currency (CBDC) could increase the efficiency of cross-border payments and facilitate regional trade flows through several channels:

- Increase the speed of cross-border payments and settlements, provided future regulatory compliance requirements on digital currency service providers and foreign exchange (FX) controls are efficient.
- Ease trade financing, as records from digital payment systems could provide alternative credit information for SMEs, who typically do not have well-established financial records to underwrite loans for trade (especially across borders), provided strong privacy protocols are enforced.

- Alleviate the "de-risking" phenomenon in certain countries, which implies terminating or restricting business and banking correspondent relationships, by providing alternative financing and payment methods to those countries.[66]
- Provide potential alternatives to the use of traditional corresponding bank relationships and dominant currencies for sub-Saharan African regional trade.
- Generate data on small-scale cross-border trade (SSCBT) and informal trade. Informal trade or SSCBT is of substantial importance in sub-Saharan Africa (World Bank 2020b).[67]
- Reduce the cost of small-value transactions (which normally tend to be disproportionately higher), thus benefiting small cross-border traders.

Key obstacles for sub-Saharan African regional trade to benefit from digitalized cross-border payments resonate with challenges associated with digitalization in general. These are often similar to the obstacles affecting digital payments, and constitute weak financial infrastructure, including access points such as mobile phones, the lack of identification documents such as government-issued identity cards or birth certificates (often required to use digital services), and low financial literacy.

Annex Figure 4.1. Adoption of E-Commerce Legislation in Africa



Source: The UNCTAD Global Cyberlaw Tracker (https://unctad.org/topic/ecommerce-and-digital-economy/ecommerce-law-reform/summary-adoption-e-commerce-legislation-worldwide).

[66] De-risking is related to a situation where global financial institutions terminate or restrict business relationships with companies and local banks in certain regions of the world because of the cost/benefit considerations to avoid, rather than manage, concerns about ML/FT risks (World Bank 2020).

[67] Unrecorded cross-border transactions are sometimes referred to as "informal trade" or "illegal trade." Informal cross-border trade is trade between neighboring countries conducted by vulnerable, small, unregistered traders. In major cross-border posts within East Africa, women account for a high percentage of informal traders.

A combination of measures can help intra-sub-Saharan African trade benefit from digitalized cross-border payments:

- Developing interoperability between domestic or regional fast payment infrastructures and arrangements, integrating retailers into the payment landscape, and connecting customers on a wider scale.
- Coordinating legal, regulatory, supervisory, and oversight frameworks across jurisdictions. Countries need to iron out regulatory discrepancies, such as between AML screening requirements for cross-border transactions.
- Promoting public–private, international cooperation and coordination of exploration of CBDC.
- Enhancing domestic connectivity infrastructure as well as the development of identification systems.
- Digitalizing trade, particularly customs procedures.

Annex 5. The Emergence of Digital Assets, CBDC, and Informality in SSA[68]

This annex explores the channels that could shape the relationship between digital payments (DPs) and informality in sub-Saharan Africa, where both informality and cash transactions are more pervasive than in other parts of the world. Informal actors may move toward formality (such as opening a bank account or registering for internet services) to take advantage of efficiency gains in digital payments. However, the development of mobile money coupled with the digital network revolution can also entrench the informal economy (for example, if transactions are not traced for privacy reasons). Private sector DPs and Central Bank Digital Currencies (CBDCs) can widen the digital divide by becoming accessible only to the formal economy, exacerbating the inefficiencies of the informal economy. This risk inherent in highly informal economies might warrant a more comprehensive and deliberate digitalization effort encompassing DPs and CBDCs as one element of a broader digital policy strategy.

Informality is pervasive in sub-Saharan Africa, with a prevalence of cash transactions and limited access to formal banking (IMF 2017). In some countries, estimates put the size of the informal economy at as high as 65 percent of GDP (Medina, Jonelis, and Cangul 2017), making high informality a defining feature of the region. In this annex, informality is primarily defined by tax evasion.

The effect of private sector DPs or CBDCs on informality in sub-Saharan Africa does not necessarily lend itself to a clear, one-way direction. Indeed, as elaborated subsequently, DPs and wider digitalization can simultaneously enhance informality and reduce it, while also being affected by it. However, in the short term it is unlikely that informality would fall significantly, including because of its persistent nature (Goyal and Heine 2021). The enhancement channel could dominate in the short term, before the benefits of lower informality are internalized by a wider set of actors over a longer horizon. In the long term, digital payments can help lower informality, especially if they are developed in the context of a broader and deliberate digitalization strategy that encompasses a wider set of services and sectors than just finance and payments.

The Enhancement Channel

The most direct enhancement channel would be through the challenge DPs would pose to the banking sector. To the extent traditional banking services are increasingly replicated by private sector DPs operating without the obligation to report public records, the informal sector can become entrenched while becoming more efficient, but without necessarily integrating into the taxation network. Traditional banking could become initially less relevant through the decoupling of payments from credit intermediation; it could also become increasingly obsolete if informal actors gain new access to digital credit by building a payments history, especially if they lack access to traditional banking. By enabling avoidance of traditional banking and the obligation to present a tax ID, the provision of alternative services by DPs would effectively shield informal actors from the scrutiny of tax authorities. Whereas the authorities could regulate the emergence of these new services and require more transparency, they may be reluctant to do so as excessive regulation could stymie broad adoption and backfire, especially in early stages where efficiency and network effects are highly desirable targets.

[68] By Mehmet Cangul.

Beyond the replication of banking, decentralized mobile money can entrench the informal economy more fundamentally in combination with the digital network revolution, leading to a digitalized informal economy. There is evidence that informal firms are using digital platforms outside formal banking (through third parties) to conduct business and remain unregulated, using the safety and anonymity provided by block-chain technology (Girollet 2023). As digital platforms for financial transactions and new financial vehicles (such as virtual currency) proliferate, informal actors could gain access to information and markets, reaching clients in new digital payment platforms in addition to social media platforms giving rise to an informal economy that is more digitalized.[69] During COVID-19 in Uganda, a leading e-commerce company, Jumia, connected over 2,000 informal street vendors on its virtual platform with a new product line tailored to low-income earners. In the Gambia, a digital e-commerce platform "My Lumo" was specifically tailored to informal actors. Overall, the dynamic interaction of private sector DPs, crypto assets, e-commerce platforms, and information networks in the digital space could initially offer informal actors' ways to remain informal and largely anonymous, while reaping benefits hitherto available only to formal actors.

The Reduction Channel

One primary reduction channel of informality would be through customers desiring to take advantage of efficiency gains from formally recorded DPs in predominantly cash economies and their network benefits launched from specific initiatives. Initial steps such as payments through mobile transfers of government salaries (at the inception stage in Senegal)[70] or social assistance (as in Namibia and Togo)[71] could spread to the informal sector progressively through network externality, as informal actors may make inroads into formality to receive additional benefits or take advantage of efficiency gains. In countries where financial inclusion is costly, mobile money would thus be an effective bridge to higher access. This channel is documented by Jacolin, Massil, and Noah (2021), as wider use would make the requisite technology and infrastructure more economically viable in the long term.

A basic comparison of the variation in informality between Kenya and Nigeria does not indicate that the spread of digital payments reduced informality significantly. A study examining 60 global markets for 10 years as of 2007 compares, inter-alia, indicators of informality between Kenya and Nigeria, (AT Kearney 2018). The data reveal that informality has largely remained flat in both countries in the same period despite a significant increase in mobile transactions, especially in Kenya. Although the existing level difference in informality between Kenya and Nigeria could be correlated with the difference in digital penetration, increases in digitalization have not necessarily caused any meaningful reduction in informality yet, lending credence to the hypothesis that the positive expected effect is likely a longer-term mechanism.

The sticky nature of informality might explain its slow responsiveness to DP penetration. The behavioral dominance of cash transactions, combined with high entry costs to the formal economy could outweigh the relatively early benefits from digital transactions. For informality to register significant declines, network externality gains to digital transactions should emerge over time. However, if these digital transactions are segmented into sectors with limited spillover potential to the rest of the economy (for example, in cases where the digital divide is particularly severe), network externality benefits may not emerge as quickly or could be limited. Furthermore, the enhancement mechanism might explain why informality would persist

[69] Brunnermeier, James, and Landau (2019) argue that the structure of digital networks has the potential to reduce the information barriers to market entry that existed in the traditional setting.

[70] Senegal has launched a strategy to digitalize a wide cross-section of salaries including for civil service and plans to promote universal health coverage for informal workers if they accept payments digitally from their employers. The commissioned study observed that payments to informal employees represent some of the most frequently made by employers, and cash management costs can account for up to 7 percent of the total payroll.

[71] Namibia uses mobile wallets to distribute cash transfers and is digitalizing its social registry while Togo's Novissi platform for social protection uses machine learning and mobile metadata for better targeting.

when informal actors take advantage of certain features of digitalization without becoming fully formal. To effectively increase adoption rates and reduce informality, policies might need to focus on lowering the entry costs into the formal economy, such as reducing tax rates for small firms.

The Potential Effect of Informality on the Evolution of DPs and Policy Choices

Different levels of initial informality could also shape the development of private DPs and CBDCs differently. As much as DPs and CBDCs might eventually affect informality, in the initial stage, their evolution might have to adapt to the existing level of informality (especially if structurally entrenched) and country characteristics, implying a dynamic relationship.

High informality may impede the adoption of DPs and broader digitalization. For example, to the extent the informal economy is suffering from digital exclusion, including through digital literacy, its dominance in the economy could hinder the overall adoption of digital technologies because of inherent constraints. In turn, if not widely available or adopted, private sector DPs and CBDCs could also further widen the digital divide and exacerbate inequality. This dynamic could take hold if commercial viability would only emerge from concentrated segments.

This trajectory underlines the risk of a vicious cycle, where structural weaknesses could hinder the adoption of new technologies, whose relative lack of development could in turn reinforce those weaknesses. The policy challenge would then be to ensure that the economy does not remain stuck in this suboptimal equilibrium and can eventually shift to a virtuous cycle where the adoption of technology can advance. To achieve this shift, policymakers could make design choices, such as those adopted by India's Digital Public Infrastructure (DPI) (Alonso and others 2023), making it easier and costless for informal agents to adopt e-wallets and for informal vendors to accept digital payments. But, as discussed subsequently, there should be sufficient flexibility in design choices to promote interoperability and system-wide integration into a common framework, which would eventually facilitate a transition to the formal economy rather than the informal economy, simply becoming more efficient through a patchwork of DPs and digital platforms.

CBDC and Informality

Whether CBDC and its associated regulatory framework affect informality may depend on the extent of digital payment penetration in the country. The relationship between CBDC and informality is explored by Oh and Zhang (2022), who analyze why CBDC should be preferred to electronic money issued by commercial banks. In economies such as Kenya, where mobile money and digital transactions are abundant through independent third parties (M-Pesa), informal actors might have already adjusted their economic choices. But in countries where private digital transfers are still at the inception stage, as in parts of West Africa, CBDC and the early development of a regulatory framework could help pave the way for a smoother adoption by informal actors. However, if private agents perceive the government's involvement as too intrusive, private participation could backfire, especially in economies dominated by informality.

Approaches to encourage the uptake of CBDC could pay off. As argued by Oh and Zhang (2022), usage can be encouraged through remuneration of CBDC deposits or elimination of fees involved in more traditional processes such as wire transfers (this should be balanced against the risks of bank disintermediation discussed in the main text). To foster formalization, policymakers might also consider restricting some of the advantages, such as remuneration, to only those agents with tax IDs. However, benefits of differentiation might distort the natural evolution of DPs. An alternative approach might be not to restrict benefits but rather encourage widespread adoption, and only at a later, more "mature" stage, authorities would aim to widen the tax base through restriction of benefits or additional tools.

CBDCs could offer a relative advantage over third-party payment platforms or commercial bank-issued mobile money if they can also facilitate cross-border payments. Given the challenge of easing cross-border transactions in sub-Saharan Africa, especially in regions with security problems such as Sahel, digital assets including CBDCs have the potential to make cross-border cash transactions and associated exchange rate convertibility less costly. If CBDC can provide interoperability across borders, the exposure and traceability risk to informal actors could be outweighed, especially in a context where cross-border payments using commercially issued digital currencies are in their relative infancy.[72]

However, the interoperability feature could increase the risk of digital dollarization—local transactions being carried out in foreign-currency-denominated digital assets or currencies. The risk of currency substitution is particularly high in countries with high inflation and weak monetary policy frameworks unless adequate safeguards (such as effective CFM and financial integrity measures) are in place (IMF 2020a, 2024a). Digital dollarization, in turn, could exacerbate the confidence erosion in the domestic central bank and in formal mechanisms more broadly, thus becoming a vehicle for the entrenchment of the informal sector.

Generating Synergies within a Broader Digitalization Strategy

The considerations above for both DPs and CBDCs point to the need for developing a broader digitalization strategy, combining payments and other digital services, which could help reduce informality over the long term. To mitigate the enhancement of informality, consideration might be given to integrating CBDC and DP development into a broader digitalization strategy, which would promote the digitalization not only of payment services but also of the provision of other public services. This joint broader development would offer stronger incentives to informal actors to become formal. One example is the DPI adopted by India, where public incentives, along with a flexible and interoperable block-based platform, move in concert with private sector demand to realize a broad-based transformation. Evidence suggests that India's tax collection has indeed increased beyond the growth rate of nominal GDP because of digitalization, which offered the possibility to expand the tax net and increase the efficiency of tax filing and collection. Such a strategy may also contribute to reducing tax evasion and informality in sub-Saharan Africa (Chandra, Vaid, and Varma 2024; also see Kimea, Mkhize, and Maama 2023).

However, for this strategy to succeed, the broader strategy should also aim to tackle structural impediments to the widescale adoption of technology, including by fighting the digital divide. To prevent the digital divide from impeding the penetration of DPs, CBDCs, or other digital innovations, well-timed, complementary structural reforms and investments should ensure reliable energy and access to the internet as well as digital and financial literacy, to a broad cross-section of society. In fact, Erumban (2024) argues that expanded adoption of technology can enhance the link between the informal and formal sectors and increase the potential for formalization in the economy (Erumban 2024).

[72] Pan-African Payment and Settlement System (PAPSS) is a cross-border financial market infrastructure that specializes in payment transactions in Africa.

Annex 6. eNaira: Initial Stocktaking[73]

This annex takes stock of the experience of the initial years of the eNaira—the first Central Bank Digital Currency (CBDC) in Africa. Despite the laudable undisrupted operation since its launch in 2021, the CBDC project has not yet moved beyond the initial wave of limited adoption, calling for a robust and coordinated policy drive to make a breakthrough. The eNaira's potential in financial inclusion requires a clear strategy about its relationship with mobile money, given the former's potential to complement the latter. Cost savings from integrating CBDC—as a bridge vehicle—in the remittance process may also be substantial, but this will require consistent implementation of recent exchange rate reforms—which have resulted in a long-awaited convergence between official and parallel market exchange rates.

The Central Bank of Nigeria (CBN) officially launched the eNaira to the public in October 2021 to facilitate financial inclusion and remittance and curb the informal economy.

- **On October 25, 2021, the CBN officially launched the eNaira**—Africa's first CBDC and second fully launched in the world after The Bahamas—seeking to improve the efficiency of payment systems, broaden access to finance, boost remittances, and enhance tax collection. Contrary to The Bahamas, Nigeria did not amend its central bank law, and the CBN deemed it has the power to issue a CBDC under the current CBN Act. The intensive process of preparation dates back to 2017—when the CBN started an internal study and an external consultation, followed by a proof of concept in a sandbox environment. A direct liability of the CBN, eNaira may be owned and used by both wholesale (that is, banks) and retail (that is, merchants and individuals) clients. While all eNaira transactions are handled in real-time and recorded by a CBN system, transactions with retail CBDC clients (for example, exchanging CBDC with retail clients' cash or deposit holdings) are all handled by financial institutions, mainly banks—with CBN directly transacting only with them. In this sense, the retail end of the eNaira's system may be seen as a hybrid system according to BIS's taxonomy (Auer and Boehme 2020).
- **eNaira transactions are executed using a proprietary software platform**, called "Digital Currency Management System (DCMS)" developed by Bitt Inc., which uses Hyperledger Fabric as the underlying transaction network or ledger. The DCMS provides a variety of wallets, whose capabilities are distinguished based on the users' differentiated roles in the CBDC system (for example, central bank wallets can issue the CBDC and distribute them to financial institutions). The Hyperledger blockchain ledger allows all participating nodes to keep all records of CBDC transactions and uses a block validation mechanism based on supermajority voting. Distributed ledgers can mitigate single-point-of-failure risks by virtue of having multiple "operators" or "hosts" in geographically dispersed locations. However, blockchain technology also has technical limitations in the speed of processing and appending a block—without which a payment does not become final and irrevocable. So far, the eNaira system has not faced a latency problem.
- **eNaira uses an account-based blockchain technology,**[74] which makes transactions traceable to identified individuals or businesses as needed. Retail eNaira wallets are subject to both transaction and balance ceilings (please see Annex Table 6.1, next page)—based on a tiered customer due diligence (CDD) system—the prevailing anti-money laundering/combating the financing of terrorism (AML/CFT) backbone for Nigeria since 2013. This mitigates both the risk of deposit disintermediation and ML/TF. However, existing AML/CFT regulatory framework may not be sufficient to completely address new risks stemming from CBDC.

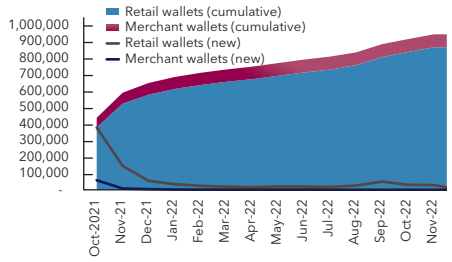
[73] By Jack Ree, based on Ree (2023)

[74] According to Crypto API, "The account-based model is a balance management system that works in a similar way to the traditional bank account" (Crypto APIs Team 2022).

- **CBN took a "phased approach"—initially granting access only to customers with bank accounts and restricting eNaira transactions to onshore uses only.** Thus, eNaira has, until recently, not presented tangible benefits to most of its wallet holders—given limited acceptance (for example, low level of adoption by merchants and other retail customers) and availability (for these customers) of alternative means of payment (for example, debit card, mobile banking apps)—which are more readily accepted. While digesting takeaways from the initial phase, CBN has moved to phase 2 of the project in August 2022, expanding the eNaira coverage to (1) people without bank accounts (but with mobile phones) and (2) those without internet access (through unstructured supplementary service data [USSD] technology). People without bank accounts may open an eNaira wallet by using their national ID number (NIN), and load eNaira balance through cash-in services provided by the agency banking network, moving[75] mobile money, or receiving eNaira from a third party.

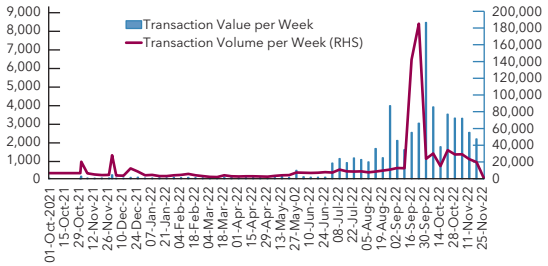
Annex Figure 6.1. eNaira Wallet Downloads

(Units)



Annex Figure 6.2. eNaira-Transaction by Weeks

(Million naira, units)



Source: CBN and IMF staff estimates.

- **The uptake of eNaira in the first year has been slow,** with retail wallet downloads amounting to 942,000 at the end of November 2022—0.8 percent of active bank accounts. The total number of eNaira retail transactions since inception (about 802,000) is less than the number of eNaira wallets, which indicates that wallets are not actively used. Although a public usage promotion campaign is making inroads, a well-designed public adoption strategy will need to address issues such as (1) setting the right relationship with mobile money and (2) creating an enabling environment for eNaira's usage in remittance.

- **With respect to its relation with mobile money, CBN will need to decide if eNaira should compete with existing mobile money providers,** for example, by acquiring last-mile contact points and outsourcing private retail customer service providers such as PISPs.[76] Such an approach is not without merits but will need to be justified economically (central banks' picking of the winners) and legally (for example, within the central bank's legally allowed purview). If not, CBN will need to focus on maximizing synergy with the mobile money by providing eNaira as the safer shelter of value and a bridge for interoperability.

- **With respect to its usage for remittances, one obstacle was the large gap that existed between official and parallel market exchange rates in previous years**. This has largely closed since January 2024 as the result of Nigeria's exchange rate unification in mid-2023, which resulted in convergence between the two rates over time as the exchange rate was allowed to find new market clearing levels. This is an important breakthrough as it would be very difficult to keep remittances flowing through the official channel if large parallel market spread persisted, as there are multiple alternative channels which are far more attractive: for example, bilateral exchange between foreign exchange (FX) payment made

[75] Unstructured Supplementary Service Data (USSD) allows users without a smartphone or data/internet connection to use mobile banking through simple codes (numbers and special characters). The USSD-based mobile banking network is well established in the SSA region.

[76] Payment Initiation Service Providers (PISPs) can initiate transactions (for example, bill payment) from a customer's account in other financial institutions based on the customer's prior approval. Collaboration with payment initiation service providers is already done with eNaira integrated into open banking apps such as Flutterwave (Reuters 2022a).

overseas (by a nonresident on behalf of a Nigerian resident) and corresponding domestic transfers of naira funds (from a Nigerian resident to another, on behalf of the nonresident). Caution is also needed on the risks that eNaira could potentially entail on dollarization and FX market volatility if and when its usage as a means of remittance commences going forward. However, this risk is mitigated by several factors: the CBN has adopted strict limits on the volume of daily transactions with eNaira that individuals and businesses can do, all eNaira transactions are fully traceable, and CBN does not allow the use of eNaira for currency speculation.

Annex Table 6.1. eNaira: Tiered Wallet System

Tier	Client Category	Requirement to Open eNaira Wallet	Identity Test	Ceiling[1]
0	Retail (including people without bank account)	Phone number	No identity information required except for phone number.	Daily transaction limit (N20,000) Balance limit (N120,000)
1	Retail (including people without bank account)	Phone number (national ID number verified)	Basic identity information (for example, photo, name, date of birth); no evidence required; no verification required.	Daily transaction limit (N50,000) Balance limit (N300,000)
2	Retail (people with bank account)	Bank verification number (BVN)	Basic identity information (for example, photo, name, date of birth); evidence required for submitted information; customer to be verified through official databases.	Daily transaction limit (N200,000) Balance limit (N500,000)
3	Retail (people with bank account)	Bank verification number (BVN)	Full identity information and evidence (including proof of address and physical presence in the address) in pursuant to CBN's AML/CFT Regulation 2009. Risk-based verification done.	Daily transaction limit (N1,000,000) Balance limit (N5,000,000)
Merchant		Existing bank account, TIN, BVN of MD/ CEO, email address, business certificate	Full CDD requirement in pursuant to CBN's AML/CFT Regulation 2009.	No limit

Source: Central Bank of Nigeria.

[1] As of end-2023, the naira's exchange rate was 901.43 Naira/USD

According to Chainalysis, Nigeria has the second largest rate of crypto adoption in the world behind India, (New York Times, April 18, 2024). This trend is increasingly driven by the currency substitution from the naira to the US dollar. At present, crypto dollarization is mainly pursued by trading stablecoins through P2P exchanges (decentralized platforms that allow people to trade without intermediaries), using naira as the settlement currency. Inflation and exchange rate volatility have recently accelerated crypto dollarization. For example, according to Chainalysis, Nigeria received $56 billion in cryptocurrencies between July 2022 and June 2023. Against this backdrop, P2P trading platforms have been alleged to provide unchecked staging grounds for currency manipulators and money launderers. This has led Nigerian authorities to intensify crackdowns and announce upcoming crypto regulations to entirely ban P2P crypto trading using

the naira (May 7, 2024). Currently, crypto P2P exchanges in Nigeria are generally settled through transfers of naira using Nigerian domestic bank accounts. Cross-border nonresident access to eNaira (or potentially naira stablecoins) could make these transactions even more difficult to regulate or monitor.[77]

Although it may still be too early to make a decisive judgment,[78] some early lessons from the eNaira can still be drawn:

- A retail CBDC program is technically feasible for countries with relatively strong central bank operational capacities (for example, cybersecurity capacity, interoperability through a national switch, internet connectivity). In this respect, international organizations like the IMF are ready to help.
- A phased approach (for example, starting with only people with bank accounts) may be sensible because it allows time for testing the resilience of the existing financial system (for example, anti-money laundering/combating the financing of terrorism [AML/CFT] framework) to CBDC adoption.
- Operationalizing CBDC's enabling potential may require a comprehensive macroeconomic policy package. For example, Nigeria's large parallel market spread proved to be the biggest impediment to using CBDC for remittances. The use of CBDC for financial inclusion may also need a closer link with the digitalization of the fiscal system (for example, digitalizing social cash transfers).[79]
- Considerations can be given to focusing eNaira's future role more on the wholesale CBDC side while allowing private sector players to flexibly operate in the retail side of the CBDC ecosystem as envisaged by CBN's eNaira 2.0 project.[80]

[77] The risk can be mitigated by maintaining adequate transaction and/or balance limits to wallets held by offshore entities if and when eNaira is used for remittances. CBN also prohibits the use of eNaira for FX speculations—although enforcement of such rules may not be straightforward in view of the need to balance data privacy with financial surveillance.

[78] The history of other digital payment systems (for example, e-money or FPS) suggests that it may take more than one or two years before being able to assess their success. For example, the BIS (2024b) showcases that FPS usually take more than 5 years for successful adoption with just one or two notable exceptions (that is, PIX).

[79] One important use case for government-to-people (G2P) transfers under consideration is to link eNaira-based programmable social wallets to the soon-to-be-launched multipurpose national id card (https://www.biometricupdate.com/202411/nimc-officials-explain-benefits-of-upcoming-multipurpose-national-id-card) for the purpose of social cash transfer program implementation.

[80] eNaira 2.0 also envisages adopting an open connectivity framework to facilitate integration and interoperability with other CBDCs and cross-border payment solutions, and to implement offline digital payment capability to initiate and finalize digital transactions without cellular or internet connectivity.

Annex 7. South Africa's Fast Payment System: PayShap[81]

In March 2023, the South African Reserve Bank (SARB) launched PayShap, a fast payment system, in collaboration with BankservAfrica (BSA) and four prominent banks in South Africa. It marks a significant milestone in implementing SARB's National Payment System Framework and Strategy: Vision 2025 (SARB 2023). The primary goal of Vision 2025 is to modernize the South African payment system, aiming to enhance financial inclusion, regional integration, interoperability, cost-effectiveness, flexibility, and adaptability, as well as to bolster financial stability and security (SARB 2018). The South African Reserve Bank (SARB) believes that faster payment services will coexist with electronic funds transfer (EFT) credit payments, card payments, and other retail payment services, providing options for transacting parties. PayShap aims to address use cases that are currently not adequately served by existing payment systems.

The name PayShap is derived from the South African slang term "shap," meaning "all good." It is a real-time payment platform for low-value transactions of up to R5,000 (effective October 2024, approximately US$281). This system complements the real-time clearing (RTC), which was launched in 2006 for higher-value transactions, such as property purchases and business payments. Both PayShap and RTC work alongside the real-time gross settlement (RTGS) system, operational since 1998, which handles large transactions for customers, merchants, and corporate and government entities through accounts held by their respective banks at the SARB.

Policy Objectives

By providing a safe and convenient digital payment solution for retail consumers and small businesses, PayShap aims to reduce reliance on cash in the economy. Despite strong financial inclusion statistics—96 percent of the country's adult population being formally served by the financial system and 82 percent having access to at least one bank account—cash remains the primary payment method, accounting for 88 percent of retail transactions. The dominance of cash is particularly pronounced in underserved communities and lower- to middle-market segments. The adoption pace of emerging digital payments has been slow, limiting the benefits of digital transformation.

SARB's Role in Driving the Initiative. SARB spearheaded this initiative as part of its Vision 2025 strategy. It is a collaborative effort involving SARB, BSA—an automated clearing house owned by South African commercial banks—and the Payments Association of South Africa (PASA). SARB conducted extensive research and consultations with stakeholders, including financial institutions, businesses, and consumers, to address needs and challenges in the payment ecosystem. SARB issued a consultation paper titled "Faster Payments in South Africa" in June 2020 and a Position Paper in May 2022.

Before full-scale implementation, SARB established a robust regulatory framework to ensure the new payment systems are secure, efficient, and compliant with domestic and international standards. They also conducted communication and educational programs to explain the benefits and usage of the envisaged new payment systems.

[81] By Xiangming Li.

Key Features of PayShap. Payments are processed in real time, with money transferred to the recipient within 60 seconds. The service operates 24/7, and senders are charged a transaction fee, which varies by service provider. There is no minimum transaction size, and the system maximum limit is set at R5,000 (approximately US$280) per transaction, although individual banks may set lower limits. Consumers access PayShap using a unique identifier called ShapID, often linked to their cell phone number or email address combined with their bank's domain, for example, 0812345678@bankname. It supports various types of transactions, including:

- Person-to-Person (P2P): Sending money to friends or family.
- Person-to-Business (P2B): Paying for goods and services.
- Business-to-Person (B2P): Such as salaries or refunds.

The PayShap request functionality went live on December 2, 2024, allowing individuals and merchants to initiate transactions and request payments, enhancing user convenience and reducing payment errors. PayShap operates through cloud architecture, with primary and secondary sites equipped with hardware redundancy and secure communication lines to the country's RTGS system, the South African Multiple Option Settlement (SAMOS) system of SARB. There are seven settlement windows throughout the day, with transactions having a maximum processing time of 10 seconds. Each participant holds reserve and settlement accounts with the central bank to meet current settlement requirements (AfricaNenda Foundation 2024b).

Governance Framework for PayShap. BSA manages and operates PayShap. As a participant-owned and industry-led platform, BSA funded PayShap's development through a shareholder loan. Transaction fees are set by participants, leading to significant variation in the early months. During 2024, most participating banks offered free PayShap transactions for up to R100 (approximately US$5). Beyond this threshold, banks implemented tiered pricing models at their discretion, allowing for flexible fee determination (AfricaNenda Foundation 2024b).

Participation and Effect. Participation in the PayShap system is voluntary. By the end of March 2024, PayShap had 10 active participating banks and a mobile operator. During its first year, 2.5 million people registered and made transactions using PayShap, processing a total of 14 million transactions, valued at over R9 billion (close to US$490 million, or about 0.13 percent of 2023 GDP). The average transaction value is R652.30, with 3 million registered ShapIDs (SARB 2024). Although the uptake of PayShap is rapid, it remains limited, with transactions amounting to less than 0.2 percent of GDP.

Challenges. These include costs, which are significant for low-value payments. Access is through each participant's app, leading to varying quality. In addition, only commercial banks can be direct participants. However, ongoing regulatory reforms will permit nonbanks to access the national payments system directly, allowing them to participate in PayShap.

Development Agenda. The system is relatively new and still developing. For instance, the launch of request-to-pay services in early December 2024 is expected to enhance adoption. PayShap also plans to introduce QR codes for initiating payments, which could improve accessibility and convenience. In addition, discussions are underway to connect PayShap to the Southern African Development Community (SADC) Transaction Cleared on an Immediate Basis (TCIB), a cross-border program, though no concrete execution plan has been established.

Annex 8. Digital Social Safety Net: The Case of Togo and Lessons Learned[82]

Launched in April 2020 in Togo, the Novissi program (a term meaning solidarity in Ewe, a local language) provides direct cash transfers to households (HHs) that have lost all or part of their income because of the effect of the coronavirus disease 2019 (COVID-19) pandemic. The Novissi program has demonstrated how digitalization and mobile banking can efficiently target the most vulnerable populations. In addition, in terms of public policy, the Novissi program's key features could inspire other developing countries to leverage digital technology to implement subsidy policies.

The fast-paced nature of the COVID-19 pandemic forced the government of Togo to quickly mobilize resources and provide emergency responses to address both the health and economic crises. The government developed a social assistance program called the "Novissi program," which envisaged the delivery of emergency cash transfers based on machine learning techniques. Given health restrictions, the government also created a contactless transfer through a digital platform, thereby encouraging the uptake of mobile money.

Several lessons can be drawn from the Novissi program for building an effective digital social safety net. First, policymakers in other countries could leverage mobile money and mobile data for better targeting social transfers. Second, the success of the program depends critically on data and digital infrastructure. Third, having a strong customer due diligence (CDD) framework can facilitate the efficient selection and enrollment of targeted beneficiaries and the transparent delivery of funds.

There are three characteristics of the Novissi program:

- **First, the beneficiary enrollment relies on national voter's card and mobile phone registries.** The main challenge of implementing social programs in Togo, as in several other developing countries, is the large share of the informal sector. According to the International Labour Organization, the informal sector accounts for about 85 percent of total employment in Africa. Using voter's cards to enroll beneficiaries ensures that the applicant is a Togolese national and allows authorities to have information on the candidate's sector of activity, which in turn can help ensure that the applicant is not employed in the formal sector. This combination of two databases greatly simplifies the process and enhances access for the most vulnerable population.
- **Second, consumption-based targeting leverages digital footprints (mobile call records) and machine learning algorithms.** The poorest villages and neighborhoods are selected through high-resolution satellite imagery and nationally representative household consumption data. Within those villages and neighborhoods, the poorest individuals are prioritized through machine learning algorithms using mobile phone metadata and phone surveys. The efficiency of using such data must be balanced against adequate privacy and consumer data protection.
- **Third, transfers through mobile money circumvent the constraint of the low access to financial services.** Togo's bancarization rate of 26.8 percent remains low compared with many other countries, particularly emerging market. With Novissi, eligible applicant receives payments swiftly on his electronic wallet without any transaction costs, which would normally apply if the public transfer operated through

[82] By Mouhamadou Ly and Solo Zerbo.

banks. The system is capable of broader reach promoting financial inclusion more effectively than if it were to operate through traditional channels. By March 2021, the program reached 819,972 beneficiaries and disbursed approximately US$23.9 million.

Although the use of mobile money services in social protection has identified quantifiable benefits, the approach also presents challenges such as data issues and targeting errors. Adapting targeting and registration to reach individuals not commonly included in social assistance databases, such as urban informal workers, can be challenging. Poverty levels can change over time, and data may become obsolete. In addition, with the mobile phone expenditure targeting approach, exclusions can occur for people who do not have mobile phones. Efficient and widespread identification and verification methods are essential to validate recipients throughout the enrollment and disbursement process, as some people have more than two phone numbers and SIM cards. In Togo, as in other many low-income countries,[83] access to official forms of identification, such as birth certificates or national identity documents, remains low, particularly among the poorest, oldest, and most remote segments of society, posing a challenge for the program.

Despite these challenges, mobile money can allow countries to build pathways to better target social security benefits.

- **Mobile payments can be adopted by governments to promptly target support to the most vulnerable segments of the population in response to shocks**. Countries could use mobile money accounts to deliver social protection, as these accounts provide a way to reach beneficiaries even in ecosystems with low traditional financial sector penetration. However, efficient implementation of social protection systems, particularly social cash transfers, requires new digital tools that can facilitate the selection and enrollment of beneficiaries and the targeted and transparent delivery of funds. Effective methods of verifying beneficiaries are essential for these processes. Mobile network operators (MNOs) are uniquely positioned to provide support because of their wide-ranging reach, even among the poorest and most vulnerable populations.
- **On the regulatory side, it is essential to strengthen requirements for CDD, consumer protection, and agent transparency**. These would influence the ease and trust with which people use mobile money while providing more efficient targeting. Finally, improving data security[84] and closing the digital infrastructure gap would increase mobile money adoption among the population and create a secure digital ecosystem capable of supporting effective and scalable digital social protection.

Beyond COVID-19 shocks, mobile money and mobile-based identification can be used to better target subsidies. Most developing countries resort to generalized subsidies for a social safety net, which are often implemented as a second-best policy. Several studies show generalized subsidies have limited positive effect on inequality and poverty reduction (for example, Grosh and others 2008) as the benefits often accrue to better-off sections of the population. Across Africa, Asia, Latin America, and the Middle East, the top 20 percent of HHs capture on average seven times more benefits of energy subsidies than the bottom 20 percent (Coady, Flamini, and Sears 2015; Clements and Parry 2018). For example, despite the relatively large amount of subsidies on the energy sector spent by sub-Saharan African authorities (5.5 percent of government revenues and 1.5 percent of sub-Saharan Africa's GDP) the effect on electricity access has remained low (485 kWh per habitant against 6021 kWh in advanced economies). Taking advantage of the Novissi mechanism and features, current generalized subsidies and social safety systems could be replaced by better-targeted transfers through mobile money using mobile-based identification.

[83] The World Bank estimates that approximately 850 million people in the world do not have an official ID, and over 90 percent of this total represents people living in lower-middle-income and low-income countries. As of 2021, official ID ownership in Togo is 40.3 percent of the total population.

[84] Data security is compromised when the CDD process relies on outdated technology and methods. By leveraging artificial intelligence and machine learning, document examination can be conducted in real time, enhancing security and efficiency.

Annex 9. WAEMU Digital Payments and the BCEAO's New Fast Payment System PI-SPI[85]

Digital payments, notably mobile money, have been a crucial driver of financial inclusion in the West African Economic and Monetary Union (WAEMU) in recent years. Similar to elsewhere in sub-Saharan Africa, digital payments have provided increased access to financial services among the unbanked population, particularly in WAEMU member states with underdeveloped traditional banking infrastructure. The Central Bank of West African States (BCEAO) is set to further propel this sector through the introduction of a new fast payments system, which holds promise to further reduce costs and promote innovation. The creation of an interoperable payment system across all WAEMU members would also support regional integration efforts, promote intra-regional trade, and is planned to eventually be linked to a broader Economic Community of West African States (ECOWAS)-wide payment system.

The traditional financial system serves under half of the regional population, with considerable variation across countries. The WAEMU region had 160 credit institutions registered as of end of 2023, of which 135 banks, along with 540 microfinance institutions (MFIs). However, only about 46 percent of adults had accounts at financial institutions as of 2022 (the latest data available), roughly split between traditional banks and MFIs. There is also significant variation by country, with 86 percent of adults maintaining some kind of account in Benin, but only about 16 percent in Niger or Guinea-Bissau. The number of bank branches and ATMs is also below the sub-Saharan African average, contributing to the lack of access.

Annex Table 9.1. WAEMU: Traditional Banking Sector, 2022

	No. of commercial bank branches per 1,000 km²	No. of commercial bank branches per 100,000 adults	No. of ATMs per 1,000 km²	No. of ATMs per 100,000 adults
Benin	1.98	2.90	2.73	4.01
Burkina Faso	1.28	2.74	2.02	4.34
Cote d'Ivoire	2.18	4.20	2.94	5.67
Guinea-Bissau	1.49	3.33	2.88	6.42
Mali	0.40	4.11	0.43	4.44
Niger	0.17	1.59	0.20	1.90
Senegal	2.90	5.51	3.76	7.14
Togo	4.82	4.93	6.53	6.68
WAEMU Average	1.90	3.66	2.69	5.08
CEMAC Average	0.60	3.59	1.37	7.58
SSA Average[1]	2.68	4.24	4.70	11.26
SSA Average[2]	7.66	6.55	15.90	15.92

Source: IMF Financial Access Survey (2023).

[1] Outliers such as Mauritius, Seychelles, São Tomé and Príncipe, Eswatini and Cabo Verde have been removed from the sample.

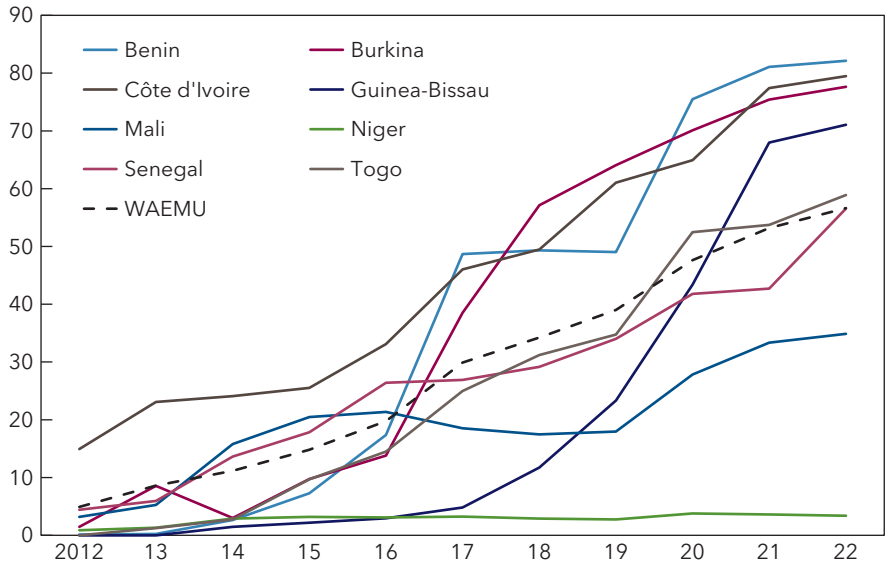
[2] This Sub-Saharan African average refers to the simple average.

[85] By Lawrence Norton.

Electronic money services, which have been a key driver of financial inclusion for the unbanked population, have seen dramatic growth. From under 5 percent in 2012, almost 57 percent of the WAEMU population held active electronic money accounts in 2022, again with substantial regional variation from just 3 percent in Niger to about 80 percent in Benin, Burkina Faso, and Côte d'Ivoire. This increase in the use of electronic money has raised the share of the adult population in the WAEMU with access to some financial services to 71 percent. The number of service points for electronic money services has increased dramatically from 7 per 1,000 square kilometers in 2012 to almost 400 in 2022. However, electronic money services have typically been limited to transactions within a single provider and can entail relatively higher fees.

Annex Figure 9.1. WAEMU: Usage of Electronic Money Services, 2012–22

(Percent of the number of individuals holding e-money accounts with EMIs, e-money issuing banks and other financial institutions over the adult population)

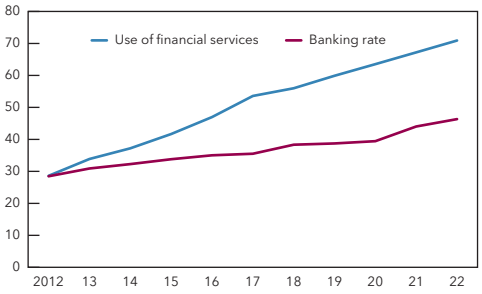


Source: BCEAO. EMIs are Electronic Money Institutions.

Infrastructure constraints remain an obstacle to mobile money adoption, particularly in some WAEMU members. Although the region as a whole has deficiencies in digital infrastructure, there are particularly large disparities by country. The Sahelian states (Burkina Faso, Mali, and Niger) and Guinea-Bissau stand out as particular laggards in terms of affordability and services, which fall below both the sub-Saharan Africa, average as well as the rest of WAEMU. Increased internet access and reliable electricity provision will be necessary to support the technology needed for further advancing electronic money payments (2024a).

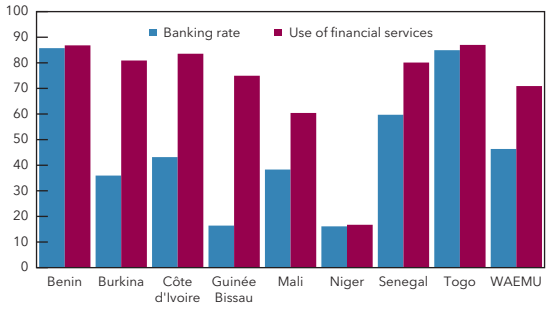
Annex Figure 9.2. WAEMU: Use of Financial Services and Banking Rate, 2012–22

(In percent)



Annex Figure 9.3. WAEMU: Use of Financial Services and Banking Rate at end-2022

(In percent)



Source: BCEAO.

Note: Overall rate of use of financial services (active accounts base), adjusted for multi-banking, and expanded banking rate which accounts for the number of individuals holding deposit or credit accounts in banks, postal services, savings banks, the Treasury and MFIs over the adult population (over 15 years old).

The BCEAO is currently in the pilot phase of a new interoperable fast payments system (*Paiement Instantané-Système de Paiement Interopérable,* PI-SPI). The platform will enable interoperable transactions among different types of accounts (bank and nonbank) across the eight-country WAEMU monetary union, regardless of the institution, instrument, and payment channel used, 24/7. Requiring only the use of a mobile application by the end user, the PI-SPI will promote financial inclusion and regional integration.

Considerable development work was needed to align this new infrastructure with international security standards. Based on the ISO 20022 standard for financial transactions, the BCEAO designed and implemented a new payment platform and the interfacing application for participants to connect to the system. The need for certification and encryption also required the development of a public key infrastructure (PKI) management system for the electronic signing of messages and the securing of connections. The BCEAO also developed specifications for a QR code for interoperability as well as an application programming interface (API) for automation. Finally, given the importance of a simple and intuitive experience for the end user, the BCEAO also designed a mobile application for the use of the instant payment services and made its source codes available free of charge to participants.

Annex Table 9.2. Digital Infrastructure Indicators

	Mobile Connectivity Index	Infrastructure Index	Affordability Index	Consumer Readiness Index	Content and Services Index
WAEMU Average	38	52	33	42	31
Benin	39	59	29	34	40
Burkina Faso	31	48	24	31	27
Cote d'Ivoire	50	54	48	57	41
Guinea-Bissau	32	45	39	33	18
Mali	35	54	30	35	25
Niger	29	33	22	39	24
Senegal	48	62	47	49	37
Togo	42	59	28	56	33
Regional Comparisons					
SSA Average	36	42	34	44	31
CEMAC average	37	44	30	46	33
EM Average	42	48	42	50	33
LICs Average	31	43	25	36	25

Source: Global System for Mobile Communications Association Dataset (2023). The GIMAC Index is based on a ranking range of score 0–100.

Note: EM = emerging countries; LICs = low-income countries.

A pilot phase was successfully launched in July 2024 and subsequently expanded to more nonbank financial institutions. The pilot phase was launched in July 2024, with 25 participants from all eight WAEMU members, including 22 banks and 3 e-money issuers. After successful tests of the hardware security modules (HSM) for cryptographic security and configurations for network connectivity, the pilot was expanded to a total of 100 institutions including 74 banks, 9 e-money issuers, and 17 microfinance institutions (MFIs). The pilot phase is now proceeding beyond simulations to executing actual transactions, once participants have robust unique identifiers (payment aliases) and fraud prevention systems in place. Next steps include plans to integrate national treasury operations into the system and promote the use of the PI-SPI system for salary payments.

Once finalized, the PI-SPI promises to promote financial inclusion and innovation. The infrastructure will be accessible to all financial institutions supervised by the BCEAO, as direct and indirect participants, allowing them to offer a range of new services to existing customers and grow their client base by offering low-cost practical solutions for everyday transactions. Regardless of the nature of the account or financial institution, users will be able to make transfers and payments to their beneficiaries' accounts, even if the beneficiary's financial institution is different from that of the sender, with instant settlement finality. Users will be able to make payments at any merchant or send a payment request, with an interoperable QR code.

The instant payments system could also support economic integration and intra-regional trade. The PI-SPI shows potential in promoting economic integration in the WAEMU by facilitating transactions across its eight member countries, which until now have relied on a large number of unique payment systems. The PI-SPI is also to be linked to the project to create an ECOWAS Payment and Settlement System (EPSS), which would eventually link payment and settlement across 15 countries in West Africa.

Annex 10. Digital Payments Landscape in CEMAC[86]

The financial sector landscape in Central African Economic and Monetary Community (CEMAC) has fundamentally changed in recent years, driven by the rapid growth of digital payment methods, especially mobile money, mirroring trends across sub-Saharan Africa. This shift has helped address the gap left by an underdeveloped traditional banking infrastructure, significantly improving access to financial services for the unbanked population. However, while these emerging payment methods offer potential opportunities for financial inclusion and economic growth, they are constrained by weak digital infrastructure in CEMAC countries, limiting broader use. National and regional authorities must address regulatory, infrastructural, and security challenges to fully leverage the benefits of digital payments.

Innovation in digital payments in CEMAC has largely occurred outside the traditional banking system because of the lack of efficient and affordable traditional financial services. The region's traditional banking infrastructure is underdeveloped compared with the rest of sub-Saharan Africa. CEMAC is home to 53 traditional commercial banks and about 400 microfinance and other payment institutions. However, the commercial banks operate with relatively few branches and ATMs, which are mainly concentrated in large cities and urban areas, thereby limiting access to traditional banking services for many businesses and individuals. On average, CEMAC has only 3.6 bank branches per 100,000 adults (or 0.6 per 1,000 km^2), well below the averages for sub-Saharan Africa and the other African monetary union (the West African Economic and Monetary Union, WAEMU), as shown in Annex Table 10.1. The distribution of commercial banks is particularly sparse in the Central African Republic (CAR) and Chad. Similarly, the number of ATMs, at just 1.4 per 1,000 km^2, is also significantly lower than the averages for sub-Saharan Africa and WAEMU.

[86] By Johanna Tiedemann.

Annex Table 10.1. Traditional Banking Sector in CEMAC and Sub-Saharan Africa, Latest Available

		No. of commercial bank branches per 1,000 km²	No. of commercial bank branches per 100,000 adults	No. of ATMs per 1,000 km²	No. of ATMs per 100,000 adults
Cameroon	2020	0.70	2.15	1.64	5.04
CAR	2017	0.03	0.71	0.06	1.38
Chad	2021	0.06	0.85	0.12	1.63
Congo	2021	0.28	2.81	1.16	11.88
Equatorial Guinea	2022	2.10	5.73	4.67	12.72
Gabon	2013	0.42	9.29	0.57	12.85
CEMAC Average		0.60	3.59	1.37	7.58
WAEMU Average	2020	1.86	3.76	2.44	4.93
SSA Average[1]	2020	2.68	4.24	4.70	11.26
SSA Average[2]	2020	7.66	6.55	15.90	15.92

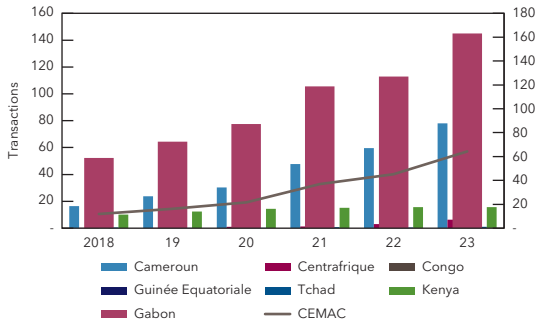
Source: IMF Financial Access Survey (2023).
[1] Outliers such as Mauritius, Seychelles, São Tomé and Príncipe, Eswatini and Cabo Verde have been removed from the sample.
[2] This Sub-Saharan African average refers to the simple average.

Although there is growing interest in various forms of digital payment methods across the CEMAC region, mobile money services have experienced the most rapid growth. The *Groupement Interbancaire Monétique de l'Afrique Centrale* (GIMAC) reports that both the transaction volume and the total value of mobile money have more than doubled since 2018, driven by increased usage in Gabon and Cameroon (Annex Figure 10.1, panels 1 and 2). This growth is largely attributed to increased mobile phone penetration, which has responded to the demand for accessible financial services among the unbanked population (Annex Figure 10.1).

Annex Figure 10.1. Mobile Money Transactions and Volumes in CEMAC

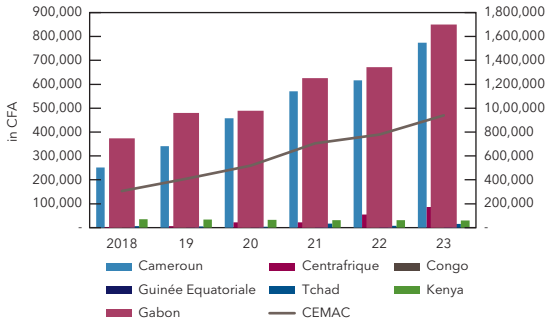
1. Number of Mobile Money Transaction

(Per capita)



2. Volume of Mobile MoneyTransactions

(Per capita)



Source: BEAC, GIMAC and IMF staff calculations.

In recent years, there has been growing interest in efficient cross-border transactions and financial inclusion, driving the interest in Central Bank Digital Currency (CBDCs) and crypto assets. The development of CBDCs in the CEMAC region remains exploratory, with the central bank assessing potential costs and benefits related to financial stability, monetary policy transmission, and the necessary regulatory framework for a secure digital currency ecosystem. Despite the global rise of crypto assets, their uptake in the region remains negligible. Some countries have shown interest in adopting crypto assets; for instance, in April 2022, the CAR announced the adoption of Bitcoin as legal tender but later retracted the decision because of legal and policy challenges as COBAC regulations prohibit the use of crypto assets within CEMAC, including all cryptocurrency transactions and their use for valuing assets or liabilities of regulated financial institutions (see Annex 7 for details).

Despite growing interest in digital payment methods across the CEMAC region, structural impediments continue to hamper the pace of development and adoption, limiting their broader use. The weakness of the current digital infrastructure is broadly comparable with other regions with similar income, yet there is disparity across the countries in the region. Countries like Chad and CAR lag behind the region in terms of affordability and available services (Annex Table 10.2). Ensuring widespread access to the internet and reliable electricity grids is essential to support the technology needed for innovative digital payment methods (IMF 2023c, 2024a).

Annex Table 10.2. Digital Infrastructure Indicators

	Mobile Connectivity Index	Infrastructure Index	Affordability Index	Consumer Readiness Index	Content and Services Index
CEMAC Average	37	44	30	46	33
Cameroon	49	52	44	66	39
Central African Republic	22	18	19	22	32
Chad	25	44	19	23	19
Congo	34	53	22	46	26
Equatorial Guinea	36	36	22	49	44
Gabon	53	58	53	66	39
Regional Comparisons					
SSA Average	36	42	34	44	31
WAEMU Average	39	52	35	45	30
EM Average	42	48	42	50	33
LICs Average	31	43	25	36	25

Source: Global System for Mobile Communications Association Dataset (2023). The GIMAC Index is based on a ranking range of score 0–100.

Note: EM = emerging countries; LICs = low-income countries.

Mobile money represents a significant opportunity for financial inclusion and economic growth in CEMAC, offering faster access and lower transaction costs, particularly benefiting the unbanked population. To harness these advantages, a collaborative effort among governments, financial institutions, and businesses is essential. This collaboration should focus on strengthening macroeconomic stability, protecting monetary sovereignty, and establishing regulatory frameworks to manage potential risks. Crypto assets pose risks of undermining monetary sovereignty and financial stability if not adequately regulated. Therefore, regulations must evolve to accommodate emerging technologies, ensure consumer protection, and maintain financial stability, including facilitating efficient cross-border payments and fostering an integrated financial market. Concerted efforts toward regional integration and harmonized regulations are critical, with CEMAC supervisors actively monitoring crypto-related risks and developing appropriate regulatory frameworks.

Annex 11. Lessons and Experiences from Countries That Adopted Crypto Assets as Legal Tender: The Case of the CAR[87]

The Central African Republic (CAR) authorities passed a law on April 22, 2022, to introduce crypto assets as legal tender (alongside the existing CFA Franc), aiming to boost investment and promote financial inclusion. In addition, they launched the "Sango project" to create the necessary conditions for a digital blockchain based economy, planning to raise about $2.5 billion (about 100 percent of GDP) through the sale of CAR citizenship, e-residency, and land property. These plans stalled as some of their aspects were in violation of the legal framework of the regional monetary union and the CAR Constitution. Granting legal tender status to crypto assets poses major risks including for sound macroeconomic policymaking. The CAR authorities later agreed to harmonize their crypto legislation with the monetary union framework, which implied abandoning the legal tender status and guaranteed convertibility of crypto assets. Nonetheless, the development goals of the "Sango project" could be reached by other means, including greater use of mobile money and a stronger policy framework.

On April 22, 2022, the CAR authorities passed a law to introduce crypto assets as legal tender, regulate transactions in crypto assets, and guarantee the convertibility of crypto assets, triggering serious concerns for the stability of the regional monetary union (UMAC). The main goal was to boost investment, including through a locally-issued crypto asset "Sango Coin," and to promote financial inclusion. In its first article, the law specified that its objectives were "without prejudice to the application of the law on monetary integration." However, such a move was at odds with the regional law defining the regional central bank as the single issuer of the only legal tender, the CFA franc. The BEAC authorities noted that this law was also at odds with the countries' commitment to regional agreements on monetary and financial integration.

In addition to the law introducing crypto assets as legal tender, the CAR authorities launched the "Sango project" to create the necessary conditions for a digital blockchain-based economy. The objectives of the project were (1) launching a crypto asset called "Sango Coin"; (2) building the African Crypto Hub, which would lead the transformation of the country through a hub located in a new "Crypto Island" financed and constructed by the authorities; (3) stimulating crypto-related activities and foreign investment through a tax-free environment, offering e-residency and citizenship for investors, as well as providing "democratization of access" to and tokenization of the country's natural resources by making them publicly available through blockchain; and (4) promoting financial inclusion by facilitating mobile access to financial solutions—especially those involving cryptocurrencies—including through a "Sango App" to help anyone with an internet connection access the global financial ecosystem with multiple functionalities (financial and payment functionalities, digital identity management, asset management, and business management). The authorities' initial plan was to issue a total of 21 billion Sango coins (see Annex Table 11.1) over one year, half of which would be sold to investors with the goal of raising about $2.5 billion (about 100 percent of GDP), split between $1 billion through Sango coins (4.2 billion tokens) and $1.5 billion through other offerings, for example, the sale of CAR citizenship, e-residency, and land property (6.3 billion tokens).

[87] By Jacques Bougha-Hagbe and Khushboo Khandelwal.

However, implementation of the CAR law on crypto assets has stalled and the implementation of the "Sango project" faced significant hurdles. On May 6, 2022, the regional banking commission (COBAC) published a decision banning banks from using crypto assets. On August 29, 2022, the constitutional court ruled "unconstitutional" anything relating to "the sale of Central African nationality [. . .], e-residence, [. . .] land and natural resources, as provided for by the official Sango Genesis Paper and on the Sango.org website." On April 6, 2023, the authorities agreed with the BEAC to harmonize their crypto legislation with the monetary union framework—including by amending key articles of the crypto law pertaining to the legal tender status as well as the guaranteed convertibility provisions. No implementing decree to make the law effective has been issued. With respect to the Sango Project, investor intake has been low. By August 7, 2024, less than US$2 million worth of Sango Coin (0.2 percent of total planned issuance) is estimated to have been purchased, despite the extension of the original time window, while the sale of CAR citizenship, e-residency, and land property has been delayed.

Annex Table 11.1. Sango-Allocation and Release Schedule

Allocation Type	Allocation %	Total Tokens to be released	Release Schedule	Minimum Investment
Country's treasury	20.0%	4,200,000,000	4 years cliff, 6 years linear unlock - yearly	N.A.
Foundation funds	10.0%	2,100,000,000	2 years cliff, 8 years linear unlock - yearly	N.A.
Rewards & incentives	15.0%	3,150,000,000	2 years cliff, 8 years linear unlock - yearly	N.A.
Liquidity	5.0%	1,050,000,000	16.67% at Public Launch, 16.67% every 6 months	N.A.
Market coins	20.0%	4,200,000,000	Genesis Cycle - Cycle 12	$500
Land offering	10.0%	2,100,000,000	Cycle 1 - Cycle 12	$10,000 10 years locking period
Citizenship offering	10.0%	2,100,000,000	Cycle 1 - Cycle 12	$60,000 5 years locking period
e-Residence offering	10.0%	2,100,000,000	Cycle 1 - Cycle 12	$6,000 3 years locking period
Total	**100.0%**	**21,000,000,000**		

Source: Sango.org.

The use of crypto assets as official currency with legal tender status poses major risks, notably for macrofinancial stability, financial integrity, and consumer protection but also more generally for sound macroeconomic policymaking (IMF 2022b, 2023a). The volatility of crypto assets greatly diminishes their effectiveness as means of payment, unit of account, or store of value, and therefore their appropriateness as legal tender.

- On **fiscal policy**, the volatility of crypto assets would translate into volatility of public finances and the country's debt burden, if crypto assets were to be used for the denomination of tax proceeds, spending or borrowing. The conduct of fiscal policy would be disrupted.

- On **monetary policy**, should the use of crypto assets spread widely in the CAR or the rest of the Currency Union, BEAC's ability to effectively conduct monetary policy could be impeded, because of creation of a parallel financial system, the consequent fluctuating money demand, and the risk of banking disintermediation.
- On **external sustainability**, free convertibility between CFAF and crypto assets in the CAR or the rest of the Currency Union could create a risk for the accumulation of pooled reserves in the region, insofar because it would create a parallel mechanism of capital inflows and outflows that are a priori hardly traceable and not controlled by BEAC. In addition, capital flow measures laws and regulations could be weakened if crypto assets were used to circumvent them.
- On **statistical transparency**, the pseudonymity of crypto assets would reduce the transparency and traceability of transactions and would therefore likely limit the completeness and reliability of economic data. In turn, a deterioration in the quality of statistical information and data gaps would impede risk assessment and disrupt economic analysis and the calibration of policy options.
- On **financial stability risks**, the exposure of banks and financial institutions to volatile crypto assets would affect their balance sheets and likely their prudential ratios, in various ways that depend on the crypto classification (for example, assets, domestic or foreign currency).
- On **other risks and challenges**, crypto assets can increase financial integrity and corruption risks in the absence of strong institutions and a robust legal framework. This is notably because of their pseudonymous and decentralized nature as well as the speed at which transactions can be done, including in a cross-border context. Crypto assets could also create a risk of loss of correspondent bank relationships if they constrain the ability of banks to exert know-your-customer procedures effectively. Fluctuations in the value of crypto assets, fraud, or cyber-attacks could dent the wealth of households (HHs) and businesses, while recourse would often be difficult because of the absence of backing or legal issuers (apart from fully backed stablecoins). While crypto assets may provide some broader financial inclusion to those left out of the banking system, they may not help the poorest segments of the population exposed to weak electricity infrastructure, limited internet access, and underdeveloped technology platforms.

Even without the use of crypto assets as legal tender, the existing blueprint of the Sango project should be reconsidered (IMF 2023a). The priority is to ensure consistency with the CEMAC legal and regulatory framework to promote frameworks for crypto assets that are coordinated and coherent, ensure monetary stability, help manage macroeconomic and financial stability risks, protect consumers, and foster compliance with the anti-money laundering/combating the financing of terrorism (AML/CFT) standards, while at the same time creating space for legitimate innovation. Fiscal risks stemming from Project Sango need to be identified, monitored, and mitigated. A sound legal and regulatory AML/CFT framework, complemented by adequately skilled, resourced, and competent authorities is essential to address the financial integrity issues presented by the crypto law and the Sango project. Clear and robust governance requirements are also essential in the Sango Project. A multi-faceted infrastructure such as Sango requires comprehensive and robust risk-management strategies and review processes. Increasing financial inclusion in CAR can arguably be more easily achieved through mobile money, a solution that has been successful in the region.[88] Sound and appropriate exploitation of CAR's natural resources can accelerate growth and should be pursued beyond the Sango project.

[88] According to BEAC (2023), the value of mobile money transactions in CAR were about 27 times higher in 2022 than in 2018, indicating exponential adoption of mobile money.

Annex 12. Bank of Ghana's Experience with eCedi Pilot[89]

This annex summarizes the Bank of Ghana's pioneering role in Central Bank Digital Currency (CBDC) exploration. The Central Bank launched a CBDC pilot in 2021, aiming to modernize the financial system and promote financial inclusion in the country. The eCedi—a retail CBDC built on blockchain technology—allows individuals and businesses to operate on a token-based system. After extensive research and stakeholder consultations, the pilot was conducted in three phases from 2021 to the present. The results are promising—showing significant transactions and strong consumer trust. Although future considerations include regulatory and technology improvements, the eCedi initiative represents a significant advance toward a more inclusive and resilient financial system in Ghana. It has provided valuable insights for other countries considering CBDCs and exploring broader digital payment systems.

The Bank of Ghana (BoG) has been at the forefront of CBDC exploration in sub-Saharan Africa, embarking on a path to modernize the country's financial system and promote financial inclusion through digital innovation. Over the past 15 years, the BoG has responded to the evolving payment landscape by implementing policies and infrastructures to accelerate the adoption of digital payments by individuals, businesses, and governments.

To advance this objective, the BoG has leveraged the existing financial sector infrastructure, collaborating with financial service providers to pilot its retail/general purpose and token-based CBDC—known as eCedi. The pilot used a two-tier distribution model, with the central bank as the issuer and wholesale distributor of the eCedi, while the financial service providers are responsible for the retail distribution of the eCedi. Individuals and businesses can use it as a medium of exchange, a store of value, and a unit of account. It operates on a token-based system, in contrast to the account-based model used by other CBDCs. Banks and mobile operators play key roles as counterparts in distribution and operation. The eCedi pilot tested its usability among diverse user groups, including individuals and merchants, using mobile applications, smart cards, and POS terminals. In addition, it bears zero interest, serving as a digital complement to cash.

Launched as a pilot project in 2021, the eCedi aligns with Ghana's Digital Transformation Agenda, which seeks to enhance financial inclusion, improve transaction efficiency, and promote economic resilience.

Pilot Overview and Development

The BoG first announcement related to a CBDC was in 2018, indicating that BoG began researching CBDC and exploring the possibility for a pilot project. Since the first announcement, the BoG has taken prudent steps to gather valuable insights and refine the eCedi's features before a broader rollout. The eCedi was officially announced in August 2021, after a comprehensive feasibility study and stakeholder consultations. In September 2021, the BoG entered the pilot stage, aiming to test the CBDC's design, implementation, and effect on the economy. The eCedi pilot was launched at a time when digital payments were gaining significant traction globally. The pandemic underscored the need for robust and resilient digital payment systems, as traditional cash transactions posed risks and logistical challenges, especially given that about half of Ghanaians do not have a bank account.

[89] By Grace Li.

The pilot involved financial institutions, merchants, and consumers to evaluate the eCedi's functionality and address any potential challenges. It was structured into three phases:

- **Phase 1: eCedi Design.** This initial phase, outlined in the eCedi Design Paper published in March 2022, established the framework for the pilot. It emphasized financial inclusion, regulatory certainty, system resilience, and user-centric design to ensure minimal disruption to existing financial structures and a seamless user experience.
- **Phase 2: Adaptation of CBDC Solution (G+D Filia).** In collaboration with Giesecke+Devrient (G+D), the BoG adapted the G+D Filia retail CBDC solution to the Ghanaian context, incorporating user feedback. This phase included creating a sandbox environment, assessing security, conducting user acceptance surveys, and rolling out communication and training plans.
- **Phase 3: Field Testing.** This phase involved extensive testing across diverse user groups, including merchants and individuals, using mobile applications, smart cards, and POS terminals. The field test, carried out for about four months, included both online and offline settings, enabling the central bank to assess the eCedi's viability and functionality.

Pilot Results

According to the BoG (2024) report, the eCedi pilot recorded total transactions of GHS 473 million and 96,000 in value and volume, respectively, during the pilot period. Offline transactions contributed 0.004 percent and 0.475 percent of transaction value and volume, indicating their small size.

Early results from consumer research conducted alongside the pilot indicated strong trust in the eCedi. Individuals and merchants generally reported favorable experiences with the eCedi and indicated their willingness to use it if it were introduced. Participants also reported affordability, user-friendliness, safety, and service availability as key factors for CBDC implementation.

Next Steps and Future Considerations

Looking ahead, the next potential step for the BoG involves scaling the eCedi pilot to a national level, including expanding the network of participating financial institutions, merchants, and users. However, the BoG has yet to decide on a road map for the full rollout and has put the nationwide eCedi on hold instead, because of recent economic developments in Ghana and the need for further discussions with technology partners. Additional policy considerations for the eCedi will focus on maintaining a balance between innovation and financial stability. The BoG will need to address regulatory challenges, such as ensuring data privacy, cybersecurity, and mitigating potential risks to monetary policy and financial intermediation.

The BoG has collaborated with the Monetary Authority of Singapore (MAS) to leverage Singapore's technological expertise in the development and implementation of the eCedi. This partnership facilitated knowledge exchange and technical support, enhancing the eCedi's design and operational framework. As of May 2024, the BoG successfully completed the first proof of concept, which included executing a cross-border transaction with a Singaporean stablecoin. This achievement demonstrated the potential for cross-border CBDC interoperability, which could further boost the efficiency of international payments and trade.

The benefits of the eCedi to Ghana are manifold. It offers a secure and efficient alternative to cash, reducing the costs and risks associated with physical currency handling. It facilitates real-time payments, enhancing the speed and convenience of transactions for businesses and consumers. In addition, it promotes financial inclusion by providing access to digital financial services to individuals without traditional bank accounts. Finally, it can improve the transparency and traceability of transactions, aiding efforts to combat money laundering and other illicit activities.

Conclusion

In all, the Bank of Ghana's eCedi initiative represents a pioneering move toward creating a more inclusive and resilient financial system. Navigating through the design, implementation, and pilot stages, the BoG's eCedi has offered valuable insights for Ghana and other countries in exploring CBDCs and broader digital payment systems.

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