Addressing Inequality:
Universal Access to Digital Financial Services for Equitable Growth

Discussion Paper DFS-01

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Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
ATM	Automated Teller Machine
CBDC	Central Bank Digital Currency
DFS	Digital Financial Services
DLT	Distributed Ledger Technology
GB	Gigabyte
GDP	Gross Domestic Product
GNI	Gross National Income
IoT	Internet of Things
IP	Internet Protocol
KYC	Know-Your-Customer
MFI	Microfinance Institution
MNO	Mobile Network Operator
NHIF	National Hospital Insurance Fund
RTGS	Real-Time Gross Settlement
SIM card	Subscriber Identity Module Card
SMEs	Small and Medium-Size Enterprises
SSA	Sub-Saharan Africa
USSD	Unstructured Supplementary Service Data

Foreword

Kenya has made significant progress towards the realization of human development. Poverty rates at the national poverty line have declined from above 50 percent in the 1990s to below 40 percent in the 2020s, with significant improvement in welfare observed in both urban and rural areas. Innovative digital financial services have played an important role in improving welfare since their introduction in the mid-2000s. In particular, financial services offered through mobile money have had a transformative impact in increasing access to finance to previously excluded or underserved individuals, enabling immediate transfers and payments of money over long distances, increasing access to credit, and providing a secure savings instrument. This success has inspired the uptake of mobile money in many countries across the world. Today, there are over 1.6 billion registered mobile money accounts globally, carrying out over US$ 1.26 trillion in transactions annually.

While a large body of research points to the positive overall impact of digital financial services, its distributive impact has received less attention. High levels of disparity in income persist across households despite overall gains in economic welfare. Today, Kenya's inequality as measured by the Gini Index is 38.9 percent. Further, there is a risk that income disparities may increase as Kenya's youthful population continues to enter the labor force in growing numbers, if these individuals are unable to find jobs. Thus, there is a major need for equitable growth and job creation.

The purpose of this report is to explore inequality in access to digital financial services in more detail, highlighting barriers that allow some individuals to obtain access to digital financial services more easily than others. These barriers are analyzed across the digital financial services ecosystem, which includes the institutions that offer financial services and the financial products they offer, the digital infrastructure and channels through which services are offered, and the underlying technologies and innovations embedded in financial products, such as machine learning for credit scoring.

As the global economy becomes increasingly digital, those who are unable to participate in the digital future risk being left behind. In turn, unequal access risks creating a digital divide, and becoming a major driver of income inequality. Universal access to digital financial infrastructure and digital financial services is important to ensure that all individuals have the ability to participate equally in the world's increasingly digital future.

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Executive Summary

Digital Financial Services (DFS) have had a transformative impact in enabling access to finance in Kenya and have had a positive overall impact on improving living standards. DFS offered through mobile money have successfully increased the reach of financial services to excluded and under-served groups, prompting adoption of the mobile money model in other countries globally. By improving the allocation of economic resources from those with an abundance of resources to those with opportunity, as well as by providing a means of resilience, DFS supports economic growth and household resilience. Thus, DFS is a direct link to improving the productivity of the real sector.

Although the impact of digital financial services on financial inclusion is unambiguously positive, the distributive impact of access to financial services has received limited attention. As the global economy becomes increasingly digital, individuals that are unable to participate in the digital future are certain to fare worse by not being able to afford services that are increasingly provided through digital channels, including finance and other social services such as healthcare and education. In turn, unequal access risks exacerbating the digital divide and becoming a major reason driving income inequality. It is therefore imperative that policies place universal access to digital infrastructure and DFS as a priority. Despite the overall positive impact of DFS on financial inclusion, financial health in Kenya, as measured by a household's ability to smoothly manage its financial obligations and to have confidence in its financial future, has been declining over the last 7 years. In particular, the poor are severely affected, with more than half of individuals in the lowest 40 percent by wealth reporting low financial health. The key driver of deteriorating financial health is the occurrence of shocks, which implies that households are either unable to build sufficient buffers to overcome shocks or are unable to access finance to buffer against shocks.

Digital financial services rely on digital technology and are offered to consumers through digital channels. Due to the success of mobile money, DFS in developing countries has become almost synonymous with mobile money. However, the DFS ecosystem is much broader than mobile money and includes the economic agents that engage in digital financial contracts, including support services, digital infrastructure that allows the transmission of digital signals including devices and channels, and technologies through which financial products are offered.

Access to digital services is contingent on ownership or access to electronic devices such as mobile phones or computers. While overall mobile phone penetration rates in Kenya are high, the costs of mobile devices are still a significant barrier for low-income individuals. More than one-third of the poorest Kenyans do not own mobile phones, and within this group almost 90 percent have never accessed the Internet. Further, the cost of data is a critical factor contributing to inequality in access to DFS. In nominal terms, data costs in Kenya are amongst the highest in East Africa, higher than costs in countries that are structurally similar in development, and amounting to 2.8 percent of Gross National Income (GNI) per capita, higher than the United Nation's target of 2 percent of monthly GNI per capita. Additionally, the pricing of mobile money transactions is regressive. A slab-based pricing model is used, where transactions within a pre-defined price range are charged a flat fee. In this model, small-value

transactions incur charges that can be up to 50 times higher than charges on higher-value transactions, as a percent of overall transaction value.

There are also significant inequalities in access to services including payments, credit, savings, investments, insurance and financial advice. Digital credit is debt issued electronically with a specified interest rate and repayment term, and which is delivered through a mobile phone application or a USSD interface. Many digital credit processes are automated and managed with little face-to-face interaction between borrowers and lenders, including lending decisions that leverage information such as credit rating history data, phone usage statistics, and mobile money history. Digital credit raises some key risks to borrowers including the potential for flawed or discriminatory credit assessment processes, unclear lending terms and conditions, lack of customer awareness on the collection and use of historical data, and the risk of high levels of indebtedness. Digital borrowers are more likely to default than other types of borrowers. Strikingly, digital credit default rates are three times higher than formal credit default rates, and 1.3 times higher than default rates of those borrowing from informal sources. Further, digital loans are borrowed much more frequently than any other types of loans, raising concerns as to whether borrowing frequency may be tied to refinancing from the same or multiple providers in a precarious cycle of ever-increasing debt.

Digital currencies have increased access to online gaming including betting, gambling and lotteries. Gaming is most prevalent amongst younger, higher-income individuals particularly those aged 18 to 25. In addition, men are twice as likely to engage in gaming as women.

Enabling technologies such as machine learning are central to lowering the costs of extending DFS by leveraging large amounts of data to make predictions, as well as improving the efficiency of decision-making processes. However, machine learning technology such as artificial intelligence can propagate inequality through algorithmic biases that unfairly exclude some population segments from accessing DFS. This is a particularly serious concern for vulnerable groups because their profiles and histories encode the realities of their environments and make them appear riskier. Additionally, financial services offered through innovations such as cryptocurrencies, which have lower levels of regulation, raise consumer protection concerns.

Policies that ensure universal access to DFS are essential for inclusive and equitable growth. Achieving universal access requires a holistic approach to address market failures that limit the provision of DFS in unserved or underserved areas, and across households that face difficulties with affordability or ability. Key considerations include policy and regulation to improve affordability, crowding in of financing through private and public sources, encouraging investment in innovations that reduce the costs of DFS, and supporting widespread education to improve digital ability. Kenya has established a policy on digital finance to create an open, digitized financial system powering a digitally driven and inclusive economy, through a supportive policy, legal and regulatory environment.

Successful implementation of the policy on digital finance is dependent on a clear understanding of the distributive impact of DFS. The following policy recommendations are central to lowering inequality in the provision of DFS:

i) Lowering the costs of digital devices including mobile phones by reviewing excise duties on imported units and SIM cards and introducing financial products to improve the affordability of devices.

ii) Implementing policies to lower the costs of access to data, given that Kenya ranks poorly amongst regional and structural peer countries in terms of nominal costs per gigabyte (GB) of data. This includes increasing competition by lowering barriers to entry for new service providers, enforcing anti-trust legislation to counter uncompetitive practices, and subsidizing data costs for low-income and vulnerable households.

iii) Lowering costs of mobile transaction fees and ensuring that pricing structures are non-regressive.

iv) Launching consistent and frequent education campaigns to increase levels of digital literacy amongst individuals, and to increase levels of trust in the use of DFS. Low digital literacy contributes to an increased likelihood of digital identity theft and fraud, which disproportionately impacts lower-income households.

v) Tracking the evolution of DFS access across locations and by demography, through implementation and monitoring of a DFS inclusion index in order to increase awareness of DFS access gaps amongst policy-makers.

vi) Implementing a comprehensive regulatory framework to ensure data privacy and promote data security, thereby promoting consumer protection. Data privacy should be embedded in all DFS product offerings as a requirement through legislation, supported by establishing and enforcing uniform standards for data privacy and enabled by making data privacy APIs widely available and easily accessible to product developers.

vii) Limiting predatory lending practices by enforcing legislation to ensure that the total cost of credit, including all lending costs and fees, is clearly and transparently shared with all prospective borrowers. Additionally, the consequences of early and late repayment, including fees payable, should be shared transparently with borrowers. The regulations recently issued to regulate digital credit providers are timely and require close monitoring to ensure compliance.

viii) Crowding in private finance to promote universal access by acknowledging the public benefits that access to DFS provides beyond private gain in underserved regions, through financing instruments such as blended finance, social impact bonds, and risk management through guarantees.

ix) Reviewing taxation policies to take into account the public good aspects of the mobile sector, which promotes financial inclusion and growth of the digital economy.

I. Overview of Digital Financial Services

1. Background

Digital financial services (DFS) have revolutionized access to finance. Mobile money was pioneered in Kenya and is now successful in many other countries across Africa, Asia, and Latin America, standing out as an example of the potential of DFS to transform financial infrastructure and positively impact livelihoods. The numbers are remarkable. As of 2020, a decade after the first application of mobile money, there were 1.2 billion mobile money accounts globally, with US$ 767 billion in transactions during the year. Sub-Saharan Africa (SSA) accounted for 45.2 percent of all registered mobile money accounts, while South Asia accounted for 25 percent, and East Asia and the Pacific accounted for 20 percent of registered accounts respectively.[1]

Despite these major advances, the potential of DFS is only beginning to be realized. DFS are the cornerstone of the budding digital economy, upon which transactions of goods and services are increasingly dependent, and an essential link between the financial sector and the real economy. Innovation within the digital economy is disrupting industry by challenging existing business models and widening the reach of economic activity not only domestically, but also vastly increasing opportunities for international trade. By doing so, the digital economy is also shifting the dynamics of labor demand, by changing the mix of needed skills and increasing the integration of technology in doing business across the Kenyan economy.

The expansion of DFS raises important questions about the impact of digital financial services on inequality. Uneven access to DFS risks exacerbating income inequality as well as unequal access to private and public services that are increasingly being provided and paid for through digital channels. It is therefore imperative that policies place universal access to digital infrastructure and DFS as a priority. The importance of universal access as well as the massive existing gaps in access to DFS was made evident during the sudden shift to a digital world triggered by the COVID-19 pandemic, where the availability of digital payments channels proved important in supporting economic activity with the imposition of social distancing measures.

Broadly, the economic value of finance derives from improving the allocative efficiency of economic resources, with the overall impact of increasing economic growth. However, this perspective does not take into account the distribution of growth across society. Economic theory posits that finance can either increase or decrease inequality, and that the ultimate impact of finance on inequality is an empirical question. There are two possible effects of finance on inequality: extensive and intensive. At the extensive margin, finance can increase access to individuals with no previous access due to costs or other barriers. Improved access may improve the set of opportunities available to disadvantaged individuals, thereby improving their livelihoods with the ultimate impact of reducing inequality. At the intensive margin, finance can enhance the set of opportunities available to those already with access to finance, thereby resulting in disproportionate returns to

1 GSMA data.

those individuals. Those with access tend to be wealthier individuals, and therefore improved access to finance at the intensive margin will tend to exacerbate existing levels of inequality (Greenwood and Jovanovich, 1990).

Digital financial services create value by increasing allocational efficiency within an economy, transferring resources to productive economic activity, and thereby enabling risk-taking and spurring economic growth. In turn growth is expected to improve living standards across households. Further, DFS increase household resilience by enabling households to smooth consumption when shocks occur, by facilitating transfers and remittances, allowing access to credit, and making payments on claims upon risk management instruments. Therefore, DFS are expected to increase the ability of households to meet their current and future obligations in the presence of shocks.

There is a wide body of research exploring the positive impact that DFS have had on financial inclusion and economic growth. Sahay et al. (2020) find that digital financial inclusion is positively associated with growth. Mbiti and Weil (2014) find that MPESA in Kenya has had a significant positive impact on individual welfare, and further that mobile money has increased competition in remittance markets, thereby leading to price reductions across existing competing services. Jack and Suri (2011) find that mobile money has increased the connectivity of individuals across large distances, dramatically reducing the costs of money transfers relative to the physical transfer of cash across distances. Jack and Suri (2016) find that the adoption of mobile money has resulted in long-term increases in household welfare by increasing household savings and consumption, with a 2 percentage point reduction in poverty rates, where reductions in poverty are higher in female-headed households.

However, there is a much smaller body of literature studying the distributive impact of DFS.[2] Cihak and Sahay (2020) empirically explore the relationship of financial depth, financial inclusion and financial stability on inequality, by analyzing cross-country datasets. The authors find that increasing financial depth, measured by the size of the financial sector relative to the overall size of a given economy, is associated with decreasing inequality only up to a certain point, after which inequality increases. Second, greater levels of financial inclusion, defined by access and use of financial services, are associated with lower levels of inequality due to benefits that accrue to lower-income individuals and to women. However, strong benefits accrue from access to payments, but results are mixed for access to credit. Finally, the authors find that increases in inequality tend to be accompanied with higher growth in credit. The occurrence of financial crises can therefore culminate in higher default rates, making lower-income households worse off and increasing inequality after a crisis.

In Kenya, although the growth of DFS has undoubtedly improved access to finance, uneven access to DFS risks creating new inequalities and exacerbating existing inequalities across individuals. A large segment of the Kenyan population still lacks access DFS, and lacks the skills to engage effectively in the digital economy. In addition, the costs of access to DFS are prohibitively high for large segments of the Kenyan population. Thus, although at the extensive margin there has been an improvement in access to finance through services such as transfers, payments and credit,

2 Cihak and Sahay (2020) find that 14 percent of studies on inequality included a direct reference to financial inclusion or access between 2015 and 2019 (p. 23, Figure 11).

at the intensive margin, those lacking access to DFS are at risk of being left behind, particularly lower-income and lower-education households.

There is some evidence that increased access to DFS at the extensive margin has not translated into an improvement in financial health across Kenyan households, as measured by the ability of a household to smoothly manage its current financial obligations and to have confidence in its financial future (FSD Kenya, 2021). Financial health across Kenyan households has been steadily eroded since 2015, with the share of Kenyan adults reporting low financial health more than doubling from 15 percent to 39 percent over six years to 2021. The poor are even more severely impacted, with 55 percent of individuals in the lowest 40 percent by wealth reporting low financial health. Conversely, only 5 percent of those in this category report high financial health.

The key driver of deteriorating financial health is the occurrence of shocks, which implies that households are either unable to build sufficient buffers to overcome shocks or are unable to access adequate resources to weather shocks. In response to shocks, the primary coping mechanisms used by households include receiving transfers from friends and family, cutting back on expenses and selling assets. In contrast, access to credit and the use of savings are infrequently used coping strategies.

Therefore, while access to finance has increased as a result of the digitization of financial services, a large and increasing share of the population remains underserved. Access to DFS has not increased sufficiently to increase overall household resilience to shocks and smooth consumption, with the majority of households unable to save adequately, obtain access to credit, or use insurance. DFS has a major role to play in increasing access to finance, addressing informational constraints that contribute to credit rationing, allowing the leveraging of household assets as securities for credit, and supporting overall economic growth that improves household incomes and the ultimate ability to save.

With the expansion of DFS, uneven adoption patterns across different population segments risk excluding some individuals and creating enduring access gaps. These patterns are leading to disparities in access to services as financial innovation is creating new product offerings. Inequalities are arising due to the cost of digital devices, the cost of transactions, access to new financial services, and risks arising due to digital fraud, data privacy, and the use of technology. Digitally offered financial services benefit only those households and institutions with access and are likely to contribute to a concentration of capital amongst the most successful institutions. In addition, the supply of DFS is dependent on data-intensive models, which place institutions that already have access to personal data at a competitive advantage relative to other institutions, and raise data privacy concerns.

The expansion and deepening of DFS represents a major economic opportunity that Kenya is well placed to benefit from given its historical track record as a dynamic hub and global leader in financial innovation. However, policies that ensure universal access to DFS are essential to promoting an equitable improvement in living standards for all Kenyans. In this vein, Kenya has established a policy on digital finance to create an open, digitized financial system to underpin a digitally driven and inclusive economy, through a supportive policy, legal and regulatory environment. In particular, the role of policy and regulation is to promote open digital financial infrastructure that supports competition, enhances innovation and enables inclusion while ensuring consumer protection,

security and resilience, and nurturing future market development. A clear understanding of the relationship between DFS and inequality is essential to informing the development of an inclusive policy on digital finance.

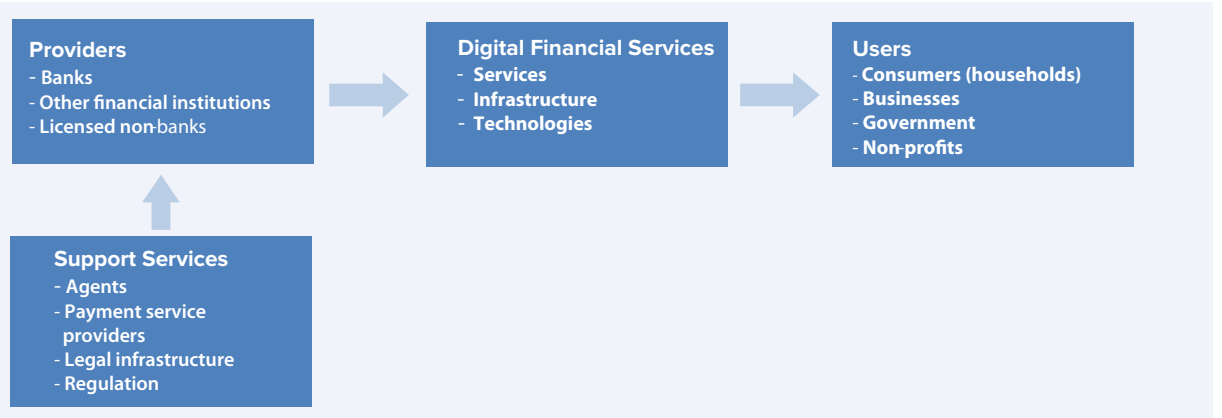
2. Classification of the DFS Ecosystem

Digital financial services refer to financial services that rely on digital technology and are offered to consumers through digital infrastructure. Due to the success of mobile money in improving access to digital transfers and payments, access to DFS in developing countries has become almost synonymous with access to mobile money. However, DFS are much broader than mobile money. Therefore, a taxonomy of the DFS ecosystem is important to map out the broad scope of DFS, which in turn enables a comprehensive discussion of inequality through digital financial services.

The DFS ecosystem includes the economic institutions that intermediate transactions (including support networks of agents and intermediaries including payment service providers), the users of digital financial services, the financial instruments and products that are intermediated, the digital infrastructure that enables services to be intermediated, the underlying enabling technologies upon which financial services are created, and the supporting regulatory and legal environment (Figure 1). Mobile money is an example of an innovative technology within the DFS ecosystem that has had success in increasing access to a number of digital financial services including transfers, payments and credit, where users have access to these services without owning a bank account.

DFS providers include financial institutions such as banks and MFIs licensed to provide financial services, and which offer services through both digital and non-digital channels, non-bank financial institutions such as insurance companies, institutions such as funds that provide non-deposit-taking financial services, licensed non-financial institutions that typically include mobile network operators (MNOs) and financial technology (fintech) companies, and non-licensed institutions in some jurisdictions. Within the ecosystem are also enabling support services, including agents and other

Figure 1. The DFS Ecosystem



Notes & Sources: Author.

intermediaries that play an important role in intermediating the conversion between physical legal tender (cash) and digital instruments, payment service providers that provide clearing and settlement services, and institutions that provide the enabling legal and regulatory framework within which DFS providers operate. Retail and commercial DFS within the private sector are the largest and most developed market segments, although innovations are increasing the scope of digital services offered by the government such as utility and tax payments, as well as the availability of services offered by non-profits such as digital transfers to vulnerable households in response to emergencies.

Digital infrastructure refers to the devices and channels through which digital financial products and services are offered. At the most basic level, digital infrastructure includes the devices such as mobile phone handsets, point-of-sale devices at retail stores or automated teller machines (ATMs) that transmit data, as well as the transmission of digital data packets encoding financial transaction information by means of electromagnetic waves or electrical pulses through optical fibers, copper wires or wireless signals, using communication media including the Internet, mobile apps, mobile text-based channels including USSD or SMS. Additionally, digital infrastructure includes retail and wholesale channels that facilitate the execution of financial services. Established banking sector retail channels typically allow small-value transfers and payments through credit transfers, direct debits and debit and credit cards. These channels are frequently used to enable transactions between individuals and business organizations, or transactions amongst individuals. Conversely, wholesale channels allow large-value transfers, typically amongst institutions, through systems such as the real-time gross settlement (RTGS) system.

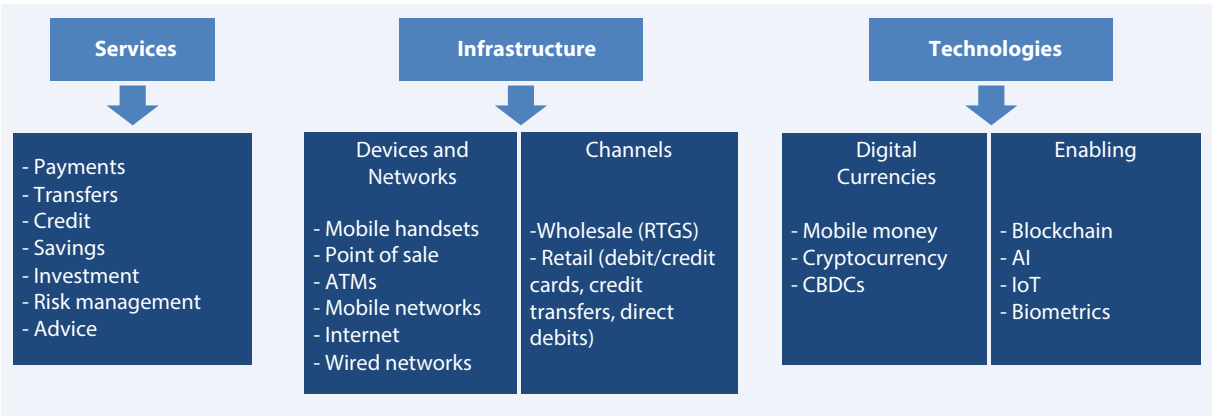
Digital services encompass payments, transfers, credit, savings, investments, insurance and financial advice. The most successful digital services that pioneered the growth of DFS in developing and emerging economies include payments and transfers. In contrast, within advanced economies the most developed retail digital systems are card-based payment and credit systems. With pervasive access of mobile phones, there has been significant growth in credit with the development of application programming interfaces (APIs), which have increased the ability of third-party vendors to offer credit as well as other services including savings, investment, risk management and financial advice.

Digital currencies are technological innovations that have the properties of cash, and are therefore used as a store of value, a unit of account and a medium of exchange. These include mobile money, cryptocurrencies and central bank digital currencies (CBDCs). Unlike bank notes, which are used as a universally recognized medium of payment that is physically transferred from one party to another upon execution of a transaction, digital currencies reconcile transactions by increasing or decreasing the balances of each party on a ledger. The ledger may be centralized, decentralized or fully distributed, but must be immutable in all cases. Mobile money is offered through licensed MNOs, or through partnerships between MNOs and licensed financial institutions. Conversely, cryptocurrencies are decentralized innovations where trust amongst users is established through mechanisms other than through a centralized regulatory body.

Enabling technologies are critical components of DFS infrastructure that increase access, efficiency, transparency and security. These include artificial intelligence, digital identity and biometrics, blockchain and Internet of

Things (IoT). Artificial intelligence leverages historical transaction data as well as data from other sources such as social networks or satellites to improve the pricing of products such as credit or insurance. Digital identity and blockchain improve and secure identification and transparency of digital transactions.

Figure 2. Digital services, infrastructure and technologies



Notes & Sources: Author.

II. DFS Ecosystem and Inequality

1. DFS Infrastructure

Digital infrastructure refers to digital channels, devices and networks through which digital financial services are offered across transacting parties. Data are transmitted through digital media that encode and transmit information through wired (copper or optical fiber) and wireless connections, with communication protocols governing the exchange of data. Communication occurs across digital devices that both originate and terminate data transmissions, and which include mobile phones, computers, tablets, point-of-sale devices and automated teller machines (ATMs). The major digital networks through which digital financial services are offered include the Internet, mobile voice, data and text-based systems (such as USSD), and cable or optical fiber networks.

As of the first half of 2023, there were 66.4 million mobile SIM subscriptions in Kenya, corresponding to a penetration rate of 131.3 percent. The vast majority of subscriptions, 98 percent, are pre-paid. Over the same period, there were 38 million mobile money subscriptions, corresponding to a penetration rate of 75.1 percent, as well as 49.3 million mobile data and 33.3 million mobile broadband subscriptions. By contrast, there were 1.1 million fixed data and broadband subscriptions. In total, the number of mobile phone devices connected to mobile networks stood at 62.9 million, with the relative penetration rates of feature phones and smartphones at 63.5 percent and 60.9 percent respectively.[3] Average pay-as-you-go tariffs during the period corresponded to KES 3.92 per minute for voice, KES 1.19 for SMS and KES 4.59 per MB for data communications.[4] On average, these statistics indicate high levels of access to mobile phones, mobile money and data.

However, MNO statistics are provided at an aggregate level and therefore do not indicate access at the household or individual level, and neither do the statistics indicate the distribution of access across households by level of income. Levels of access at the individual level are lower due to the fact that individuals subscribe to several networks, or own several devices. According to the 2019 Kenyan Census, 47.3 percent of the Kenyan population aged 3 and above owned mobile phones, relative to 55.2 percent that had access to and used mobile phones. The statistics also indicate low usage of Internet and usage of computers, with only 22.7 percent of Kenyans aged 3 and above using the Internet, and 10.7 percent of Kenyans aged 3 and above using computers.[5] Across both mobile phone and Internet usage, there are significant disparities across urban and rural areas, as well as by level of education.

Demand-side surveys indicate that disparities in levels of access and affordability of digital infrastructure are a major source of inequality in access to DFS. Remote access to digital services requires access to electronic devices such as mobile phones or computers, which require a minimum level of investment. Although mobile phone penetration rates are high in Kenya, individuals earning low incomes are much less

3 Communications Authority of Kenya, "Fourth Quarter and Financial Year 2022/23 Sector Statistics Report, 2023. Note: mobile broadband refers to connectivity that delivers services at a minimum speed of 2Mbps.

4 Ibid., Table 8.

5 Kenya National Bureau of Statistics, "2019 Kenya Population and Housing Census: Analytical Report on Information and Communication Technology", April 2022, Volume XX.

Table 1. Access to digital devices and internet

	Does not own mobile phone	No access to mobile phone	Phone can access Internet	Phone can download and install apps	Never accessed Internet
Poorest	38.5	22.9	7.7	6.7	89.8
Second-Poorest	30.2	14.8	14.6	12.9	82.4
Middle	20.6	9.7	23.9	22.7	72.1
Second-Wealthiest	12.2	5.3	40.4	39.5	55.1
Wealthiest	6.1	3.2	69.5	68.5	24.0

Notes & Sources: Data from 2021 FinAccess survey. Statistics by wealth quintile.

likely to own mobile phones or pay for the energy necessary to operate the devices. Of those adults that do not own a mobile phone, 50.3 percent cite the cost of the device as the main reason for not having a phone.[6] Further, access to electricity is not universal. From the 2019 census, 50.5 percent of Kenyan households are connected to mains electricity in Kenya, with a proportion significantly lower in rural areas, at 26.5 percent. However, the use of off-grid solar energy has improved access to lighting fuel particularly in rural areas, with 30 percent of rural households using solar energy.[7]

Mobile device and Internet access costs are prohibitive to most individuals and preclude them from accessing DFS. Statistics from the 2021 FinAccess Survey[8] indicate that by income, 90 percent of individuals in the lowest wealth quintile have never accessed the Internet. Further, 39 percent of the poorest individuals do not own mobile phones, although a smaller percentage, 23 percent, do not have access to a mobile phone. Of those with access to a mobile phone, whether individually owned or shared across multiple individuals, only 8 percent have a phone that can access the Internet. A similar share of households has access to a smartphone that can download or install apps. Even across the wealthiest individuals, 30 percent do not own mobile devices that can access the Internet, and 24 percent have never accessed the Internet. Access to technology by levels of wealth is summarized in Table 1.

Data access costs are prohibitive for low-income families. In Kenya, a data-only mobile broadband package on average costs $4.30 for 2GB of data, while a 5GB fixed broadband package costs $25.78.[9] As a share of GNI per capita, Kenya's costs for data-only mobile broadband are the lowest in the region, but higher than countries that are structurally similar, including Ghana, Sri Lanka, Vietnam and Bangladesh, and countries that are aspirational peers, including Malaysia, India, South Africa and Thailand (Figure 3). Mobile data access costs in Kenya are 2.8 percent of GNI per capita, higher than the United Nation's target of 2 percent of monthly GNI per capita. In nominal terms, Kenya's costs for mobile and fixed broadband data access are amongst the highest in East Africa.

The World Bank estimates that for welfare-enhancing activities, which include accessing websites for public services, health information,

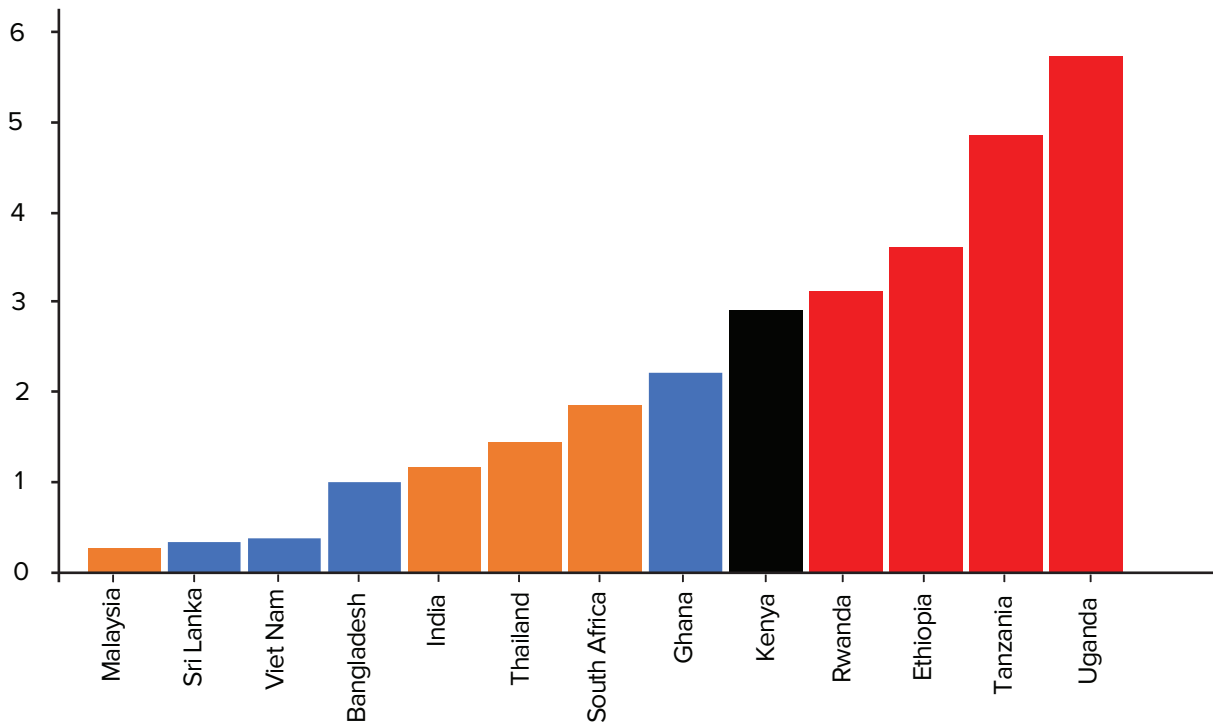
6 Kenya National Bureau of Statistics, "Basic Report on Wellbeing", 2016, p. 161, Table 9.11.
7 Kenya National Bureau of Statistics, "2019 Kenya Population and Housing Census: Analytical Report on Housing Conditions and Amenities", April 2022, Volume XIX, p. 27, Figure 4.6.
8 The 2021 FinAccess Household Survey was collected in collaboration by the Kenya National Bureau of Statistics, Central Bank of Kenya and Financial Sector Deepening Kenya. The survey includes individuals aged 16 and above, and the sample size is 22,024 individuals.
9 International Telecommunication Union (ITU) data, 2022.

shopping, learning and news, 660MB of data usage are needed per month. However, common recreational activities are estimated to utilize an extra 5.2GB of data, for an average of 6GB of data monthly.[10] Thus, a basic mobile data package includes enough data to support welfare-enhancing activities but not recreational activities.

Mobile money transaction costs also contribute to inequalities in access to DFS. Pricing of mobile money transactions varies by the type of service and by the recipient's network. Transactions within the same mobile money network are cheaper than transactions to other networks. Additionally, different rates are charged for person-to-person transfers, payments to businesses or for utilities, and withdrawals from agents. Third parties that build platforms on mobile money networks typically must pay fees for the utilization of mobile money APIs, and this in turn is also reflected in the pricing of their products.

Two main models are used to price mobile money transactions: slab-based pricing and percentage-based pricing. The slab-based pricing model is used in Kenya, where

Figure 3. Data-only mobile broadband access costs(Percent of 2022 Gross National Income per capita)



Notes & Sources: Data from International Telecommunication Union (ITU).

10 World Bank, Minimum Data Consumption, 2021.

transactions within a pre-defined price range are charged a flat fee. Transactions below KES. 100 in value are free using MPESA, providing significant value to consumers. However, the pricing model is regressive for transactions greater than KES 100 in value, such that smaller-value transactions incur higher fees in percentage terms than large-value transactions. For example, MPESA transactions slightly above KES. 100 incur a 7 percent fee, whereas transactions in the range of KES. 100,000 incur a 0.1 percent fee.[11] Thus, smaller transactions are charged a fee that is more than 50 times higher in relative terms. Percentage-based pricing, by contrast, charges a flat percentage regardless of the amount transferred.

The mobile sector is a key contributor to public tax revenue collections. According to GSMA, the mobile sector contributed 3 percent of Kenya's GDP in 2018 while its tax and fee payments accounted for about 6.5 percent of total government tax revenue, corresponding to a mobile tax contribution that was 2.2 times the size of the sector's contribution to the economy (GSMA, 2020). With the implementation of the Finance Act 2023, the government imposes excise duty at 15 percent on fees for mobile money transfer services, as well as telephone and internet data services. Further, an excise duty of 10 percent is charged on imported cellular phones.

According to GSMA, in 2018 Kenya's mobile sector-specific taxes were 5 percentage points higher than the average in SSA (15 percent relative to 10 percent), driven mainly by high excise duties. Overall, the mobile tax contribution of Kenya was 37 percent of the market value relative to an average of 26 percent for SSA (GSMA, 2020). The relatively high contribution of the Kenyan mobile sector to tax revenues contributes to higher prices for mobile transactions, therefore contributing to lower affordability and hence negatively impacting rates of access.

High costs of device and data access have major consequences on the ability of individuals and SMEs not only to access DFS but also to participate in the digital economy. Kenya has a young population including unskilled and semi-skilled individuals, the majority of whom are employed in the informal sector. This large and youthful labor force offers great potential to offer a 'demographic dividend' through labor input that can significantly contribute to higher levels of growth. The digital economy offers a massive opportunity to realize higher growth through higher market connectivity that vastly increases the set of domestic and international opportunities for small-scale and informal enterprises. However, high costs are a barrier to digital opportunities, and risk perpetuating the high rates of unemployment and under-employment amongst the youth.

2. Digital Financial Products

Digital financial products include payments, transfers, credit, savings, insurance, investments and financial advice. The availability and accessibility of digital devices and channels have a direct impact on the reach of digital products. In addition, the digital nature of these products gives rise to new risks that contribute to increasing inequality. The focus of this section is mostly on digital payments, transfers and credit, which have been more widely researched and which have more widely available data and statistics than other products.

11 See https://www.safaricom.co.ke/personal/m-pesa/mpesa-charges. Charges are as of September 2023.

a. Digital transfers and payments

Mobile money has been successfully adopted in a large number of economies globally and has had a transformative impact on digital transfers and payments particularly in sub-Saharan Africa. As of 2022, there were 1.6 billion mobile money accounts globally, with a daily transaction value of US$ 3.45 billion, totaling US$ 1.26 trillion in transaction value for the year. Additionally, US$ 22 billion in international remittances were processed during the year. The highest adoption rates are in sub-Saharan Africa, where there are 763 million registered accounts and a transaction value exceeding US$ 830 billion. Other regions, particularly South Asia, East Asia and the Pacific, have also seen rapid growth in mobile money usage in the recent past (GSMA, 2023).

In Kenya, MPESA was launched by Safaricom, Kenya's largest MNO, in 2007 following a pilot that began in 2003. Critical to the success of the innovation was an extensive network of agents that Safaricom grew to reach areas that had previously not been served or that were underserved by financial institutions. The agent network allowed the conversion between cash and mobile e-currency, and played a central role in improving digital ability by educating individuals on digital services available through mobile money. This resulted in rapid uptake of mobile money for the purposes of remittances and transfers, particularly from urban to rural areas.

Economic, social and cultural factors have played an important role in influencing the uptake of mobile money, leading to significant differences in rates of uptake across various demographic segments. These similarities have also been observed in other countries that have adopted mobile money. In Kenya, mobile money adoption was initially led by wealthier, young, urban individuals with high levels of education, but has grown over time to include other segments of the Kenyan population. In part, initial adoption rates were influenced by the technical ability to use mobile money technology, as well as the levels of trust accorded to using digital technology. In recognition of this barrier, expansive informational campaigns were implemented through mobile money agent networks to improve levels of knowledge and comfort in the use of mobile money.

Pre-existing cultural and behavioral factors have also contributed to differences in the rates of adoption of mobile money based on preferences and trust. This is evidenced by a large segment of the population, both within Kenya and globally across other countries that have adopted mobile money, that maintains a preference in using cash for transactions despite the availability of mobile money. Thus, a large cash economy continues to exist alongside the growing digital economy. However, the adoption of other digital currencies, such as central bank digital currencies (CBDCs), may prompt a further shift towards a cashless economy.

b. Digital credit

Digital credit is debt issued electronically with a specified interest rate and repayment term, and which is delivered through a mobile phone application or using a USSD interface. Advances in technology have led to the rise of digital credit processes that are automated and managed with little face-to-face interaction between borrowers and lenders, including lending decisions which leverage information such as credit rating history data, phone usage statistics and mobile money history. In Kenya, mobile money platforms have crowded in innovation by fintech companies by making open application programming interfaces (APIs) available, thereby allowing third parties to offer digital credit and other financial services on mobile money rails. However, rates of adoption

for digital credit and other financial services are lower relative to transfers and remittances.

According to a recent study of digital lending in Kenya by FSD Kenya[12], formal digital borrowers are predominantly young and male, on average under the age of 35, and living in urban areas. Access to formal digital credit is also higher for wealthier individuals. On average, digital loans account for 30 percent of lending by volume to the wealthiest 20 percent of individuals, but only 9 percent of lending to the poorest 20 percent. Thus, despite access to digital credit, 82 percent of the poorest individuals still rely on informal credit. Further, digital loans account for 31 percent of loans in urban areas, relative to 10 percent in rural areas.[13]

The digital credit lending model significantly lowers the costs of debt issuance because of the high levels of automation and limited direct customer interaction, and increases the viability of issuance to individuals in geographically remote areas. Unsecured digital credit is information-based and relies on historical financial and social network data to assess an individual's credit risk, while secured digital credit is typically issued in partnership between a mobile money provider and a bank, and links an individual's bank account to the availability of credit.

The digital credit model is therefore not relationship-based, in contrast to the traditional lending model, but rather is data-driven. Therefore, several risks arise due to the decision-making model, as well as the large and fragmented number of lending firms offering digital credit. These risks include the potential for flawed credit assessment processes, unclear lending terms and conditions, lack of customer awareness on the collection and use of historical data, and the risk of high levels of indebtedness.

Digital borrowers are more likely to default than any other type of borrowers. In 2021, default rates on digital loans or loans from mobile banking were 46.3 percent and 50.9 percent respectively, higher than any other type of loan. In contrast, defaults on loans from banks were 22.1 percent, and defaults on loans from microfinance institutions were 30.8 percent.[14] Prior to the COVID-19 Pandemic, in 2018, default rates for digital borrowers were three times higher than formal credit default rates, at 21.1 percent relative to 6.9 percent. Digital credit default rates were even higher than those of borrowing from informal sources, at 15.9 percent.[15] In addition to the highest default rates, digital credit was the most recurrently used in Kenya, averaging 8 loans over 12 months per borrower, or an average duration of 1.5 months. In comparison, the average duration of a loan from a commercial bank or MFI was about 10 months, corresponding to 1.2 loans over a year per borrower.[16] As a consequence of this high level of repeated borrowing, digital loans were the most common type of loan in 2018, accounting for 54 percent of the total observed market for yearly loans by volume. In comparison, commercial bank loans and MFI/SACCO loans accounted for 3 and 4 percent of total loans by volume respectively.[17]

Levels of indebtedness due to digital credit are high because the annualized interest rates charged by private issuers of digital credit tend to be significantly higher than those charged

12 FSD Kenya, "Digital Credit in Kenya: Facts and Figures from FinAccess 2019", December 2019.
13 Ibid, Figure 2, p. 4.
14 Central Bank of Kenya, KNBS and FSD Kenya, "2021 FinAccess Household Survey", December 2021, Figure 4.8, p. 49.
15 FSD Kenya, "Digital Credit in Kenya: Facts and Figures from FinAccess 2019", December 2019, Figure 12, p. 12.
16 Ibid, Figure 3, p. 4.
17 Ibid, Figure 5, p. 5.

by commercial banks, and due to the lagging implementation of adequate know-your-customer (KYC) processes by lenders. For example, interest rates for Tala, a popular digital lending application, are as high as 110 percent on an annualized basis, although the rates are quoted as 0.3 percent daily. Safaricom's M-Shwari product offers an interest rate of 9 percent for a one-month loan, corresponding to an annualized interest rate of 108 percent.[18] By comparison, commercial bank lending rates are 5 times lower on an annualized basis.[19] High levels of churn of digital credit also raise serious concerns on the frequent rolling over of debt, simultaneous borrowing from multiple sources, and the possibility of high liquidity risk should access to short-term borrowing suddenly dry up. Empirical evidence shows that 16 percent of digital credit is used to pay off existing loans.[20]

Empirical evidence illustrates some characteristics of digital borrowers that are correlated with default rates. Early-morning borrowers are less likely to default than after-work-hours borrowers, in part because informal trade is supported by borrowing for liquidity in the morning to purchase stocks that are turned over quickly during the day at a positive margin, in contrast to borrowing later in the day that is likely for consumption purposes. Additionally, first-time borrowers are much more likely to default, in part reflecting deficiencies in credit screening processes.[21]

c. Gaming

Gaming activities, which include betting, lotteries and gambling have become a widespread pastime in Kenya, in particular amongst the youth. However, despite the prevalence of gaming, there is little research or empirical evidence on the impact of gaming on livelihoods, particularly of vulnerable individuals. Gaming is most prevalent amongst younger, higher-income individuals, particularly those aged between 18 and 25. Further, men are twice as likely to engage in gaming as women, with 18.6 percent of men gaming relative to 9.2 percent of women. Kenya leads Africa in terms of the number of individuals that have ever tried gaming, with 84 percent of Kenyans having ever participated in gambling or betting.[22] Additionally, Kenya ranks highest in the continent in terms of frequency of betting, with 34 percent of individuals betting once to several times a day. The average betting spend is less than US$ 5 per bet. Across the continent, Kenya ranks second after Nigeria in spend per bet.

Digital currencies have increased access to online gambling, which is enabled by using mobile money to place bets through the integration of mobile money wallets with sports betting platforms, which increases the ease and reliability of sports betting. The highest share of gaming activity is football betting, which accounts for more than half of online gambling in Kenya. Beyond football betting, other significant gaming activities are lotteries, casinos, and betting on other sports.[23]

Studies show that the demand for gambling increases with the need for lumpy expenditures. Heskowitz (2016) finds that for individuals with a low ability to save, or in the absence of positive returns from savings, individuals will engage in

18 Interest rates obtained from Tala and Safaricom websites, as of September 2023.
19 For example, KCB offered personal unsecured non-check-off loans at an interest rate of 13 percent, plus 2.5 percent negotiation fees, for individuals holding accounts within the bank, as of September 2023.
20 CGAP, "It's time to slow digital credit's growth in East Africa", September 25, 2018.
21 Ibid.
22 Kibuacha, Frankline, "Report: Betting in Africa", GeoPoll, January 17, 2022. The GeoPoll survey was conducted in December 2021.
23 Ibid.

Figure 4. Gaming (betting, lottery and gambling)

	Age-group					
	16-17	18-25	26-35	36-45	46-55	>55
Poorest	3.8	12.4	7.1	5.7	3.2	1.7
Second-Poorest	9.6	16.1	14.2	11.2	7.6	2.8
Middle	6.2	20.5	18.6	9.0	7.9	3.0
Second-Wealthiest	14.5	21.8	18.9	13.5	10.5	5.5
Wealthiest	16.0	23.5	23.0	17.4	12.7	7.0

Notes & Sources: Data from 2021 FinAccess survey. Statistics by wealth quintile.

gaming to generate liquidity, which increases the likelihood of financing such expenditures despite high expected losses. However, the implementation of commitment-savings technology reduces the demand for betting.

d. Other digital financial products

Other digital financial products including savings, risk management and wealth management are relatively less researched in comparison to transfers, payments and credit. Thus, although some evidence is available on the uptake of other financial products, more research is required to reach a comprehensive understanding of their uptake as well as the factors influencing uptake. The existing empirical evidence on these innovations suggests a positive overall impact.

Savings and risk-management instruments are essential tools that enable individuals to manage unexpected expenditures and to plan for investments or lumpy expenses. Low-income households frequently do not have sufficient income to save, given their inability to lower their consumption significantly, a lack of economic opportunities, and limited access to financial education and commitment devices that can encourage savings habit formation. Income-constrained households typically spend a large share of their incomes on food consumption, and even then, many households are unable to meet basic food consumption needs. As of 2016, almost one-third of Kenyan households were living below the food poverty line, with large variations across counties, ranging from 16.1 percent in Nairobi to as high as 66.1 percent in Turkana.[24] In the absence of savings and risk management, individuals frequently resort to undesirable coping mechanisms when shocks occur.

Savings are motivated by a large number of reasons, including access to safe and secure storage, ease of access, maintaining emergency buffers, and interest payments. However, the most cited factor amongst those who do not save is lack of sufficient money, cited by 54.6 percent of Kenyans.[25] Digital savings innovations include mobile banking products such as Mshwari, KCB MPESA or MCoop Cash, or savings through mobile money providers such as MPESA or Airtel Money.

Risk management through digital insurance includes digital products that require payment of premia in exchange for a payout upon the

24 KNBS, "Kenya Integrated Household Budget Survey", 2016.
25 Central Bank of Kenya, KNBS and FSD Kenya, "2021 FinAccess Household Survey", December 2021, Figure 3.16, p. 33.

realization of an exogenous shock. The uptake of insurance in general tends to be low, with usage of the National Hospital Insurance Fund (NHIF) at 20.6 percent, and insurance excluding NHIF at 6.9 percent.[26] The distribution of health insurance is highly unequal across the country, with usage rates in Northern parts of the country lower than in other regions.

3. Digital Technologies

Digital technologies include digital currencies and enabling technologies that underpin the availability of DFS products. Digital technologies are an area of high levels of innovation and disruption, where successful new products address fundamental issues including identity verification, improving transparency, enforcing contracts, lowering costs, or widening geographical reach.

a. Digital currencies

Digital currencies include proprietary network e-currencies such as mobile money, as well as distributed ledger technologies such as cryptocurrencies or central bank digital currencies (CBDCs), which are based on blockchain technology. In all cases, digital currencies involve the maintenance of and reconciliation of individual balance sheets, unlike paper currencies that involve the actual physical transfer of legal tender. Digital currencies can be centralized and therefore offered through a central clearinghouse that performs reconciliation, as in the case of mobile money, or can be partially decentralized or fully distributed, and therefore dependent on a costly mechanism to ensure the accuracy of data within the network.

Although mobile money has been widely researched, the body of literature on other cryptocurrencies in Kenya is much more limited. Further, CBDCs are yet to be implemented in Kenya, although there is a high level of interest in developing and testing CBDCs. Understanding potential inequalities that may arise with the widespread use of these technologies is critical to ensuring proper design and regulation that promotes equity in access. For example, the cost structures in place for transfers within mobile money networks are of importance in the design of CBDCs.

Kenya imposes some restrictions on the use of cryptocurrencies, but crypto markets are for the most part unregulated. Kenya, in addition to Nigeria and South Africa, is one of the largest users of cryptocurrency in Africa. As of 2020, Kenya was ranked as one of the top 10 countries globally in terms of adoption of cryptocurrency, with a higher score than the United States.[27] The trade of crypto assets has unlocked access to finance in Kenya, for example with Pezesha, a fintech focused on MSME lending, which has enabled the cryptocurrency community to lend directly to Kenyan enterprises.[28] However, historical data also show high levels of volatility in the value of cryptocurrencies. As an asset class, cryptocurrencies are accessed through exchanges that typically attract transaction fees. A large number of cryptocurrencies are traded on exchanges and require a level of understanding of what cryptocurrencies are to identify and trade different assets. Low levels of regulation and barriers to access can therefore pose significant risks that may in turn contribute to inequalities.

26 Ibid., Figure 3.17, p. 33.
27 ChainAnalysis, “The 2020 Geography of Cryptocurrency Report”, September 2020.
28 Ndemo, B. “The role of cryptocurrencies in sub-Saharan Africa”, 2022.

b. Enabling technologies

Enabling technologies support the extension of DFS by addressing barriers to access such as lack of identity, information asymmetry across counterparties, access to collateral, enforcement of contracts, the efficiency of processing and operational procedures, and the costs of financial services. Amongst the major enabling technologies are digital identity, artificial intelligence, and blockchain, as well as technologies that allow leveraging of assets as collateral, such as the Internet of Things (IoT) and pay-as-you-go.

The use of artificial intelligence (AI) has greatly improved access to DFS by leveraging large amounts of data to make predictions, and greatly decreased the duration of time taken for decision-making processes. However, AI also raises a serious concern about the possibility that algorithmic bias can exclude some segments of the population from accessing DFS.

Algorithmic bias can arise from input data used to train machine-learning algorithms, the actual code written by computer scientists, and the context within which a particular application is developed. Algorithmic bias is a serious concern for vulnerable groups because their profiles and histories encode the realities of their environments and make them appear riskier. Thus, women may appear to be a greater credit risk than men not because of default rates, but because men may be more likely to borrow and may be quicker to adopt digital credit, and thus have more readily available credit histories than women. These inputs, when used in machine learning training algorithms, may bias lending decisions towards men. The real risk posed by algorithmic bias has been documented in some global examples. In the United States, AppleCard, a partnership between Goldman Sachs and Apple, was investigated by financial regulators for discrimination against women upon complaints that for couples with comparable credit scores, husbands received 10 to 20 times the credit limit of their wives.[29]

Lack of proof of identity or poor documentation, when identity exists, is a significant barrier impacting access to DFS and other services across Africa. One in nine individuals worldwide, corresponding to 850 million people, lack the means to prove their identity, and more than half of that population resides in sub-Saharan Africa. On average 25 percent of adults in sub-Saharan Africa do not have legal proof of identity.[30] In Kenya, 9 percent of the adult population does not have IDs. The largest share of individuals without IDs is in the age group between 18 and 25. Of these individuals, 27.9 percent do not have IDs.[31]

Digital identity and biometrics are critical enablers that uniquely identify individuals and allow easier access to DFS. Digitally available services have also lowered the threshold in terms of the information required for registration relative to requirements in institutions such as banks, but registration is only available to those with some form of identification. Low-income individuals, those with low levels of education, and those displaced due to exogenous shocks are more likely to have poor identification or to be undocumented, and therefore excluded from DFS.

Distributed ledger technologies such as blockchain carry significant potential to increase

29 Rizzi, A. A. Kessler and J. Menajovsky, "The Stories Algorithms Tell: Bias and Financial Inclusion at the Data Margins", Center for Financial Inclusion, March 2021.
30 World Bank, Identification for Development Global Dataset, 2021, Figure 4, p. 23.
31 FSD Kenya (2021), p. 14, Table 2.1.

transparency, governance and to support contract enforcement (for example through smart contracts, whereby contractual clauses are automatically implemented upon the occurrence of already agreed criteria). Thus, blockchain-enabled services can address information asymmetries and moral hazard problems that result in credit rationing, and therefore increase the issuance of credit. In turn, blockchain-enabled economic activity can boost productivity and unlock capital flows to underserved sectors. For example, the implementation of blockchain within supply chains has increased the visibility of trade by producing immutable transactions data, and therefore improved the quality of inputs and outputs in supply chains and aided in informing credit decisions.

However, differences in access to blockchain-enabled services can result in improved access to DFS only to certain population segments. Those unable to leverage the potential of blockchain are therefore likely to be left behind.

III. Universal Access to DFS

Universal access to DFS is central to ensuring that no Kenyan is left behind as a consequence of his or her inability to access finance or participate in opportunities arising within the digital economy. The case for universal access is evident: the global economy is becoming increasingly integrated through the digitalization of trade in goods and services, which in turn is also generating large amounts of data that are driving innovation. Increasingly, job opportunities are becoming digital with the growth of remote working, and public services such as education and health care are also increasingly being offered digitally. The digital economy in turn is dependent on financial services to pay for goods and services offered, as well as to support investment in opportunities. Individuals that are unable to participate in the digital future are certain to fare worse, and a digital divide both in participation within the digital economy and access to DFS is likely to be a major reason driving income inequality.

Achieving universal access requires a holistic approach to address market failures that limit the provision of DFS in unserved or underserved areas, and across households that face difficulties with affordability or ability. Key considerations include policy and regulation to improve affordability, crowding in financing through private and public sources, encouraging investment in innovations that reduce the costs of DFS, and supporting widespread education to improve digital ability.

In addition, efforts to track access to DFS across all dimensions are necessary to identify those locations with low access, make local authorities aware of low access, and encourage them to close access gaps and monitor the evolution of access gaps over time. However, as policies are implemented to improve DFS access and usage, it is equally important to implement and enforce comprehensive data privacy and cyber-security frameworks to build trust in the usage of DFS, prevent unauthorized usage of individual data by DFS vendors, and protect individuals from identity theft and financial crime.

1. Policy and Regulation

Universal access requires the implementation of policy and regulatory measures to create an enabling environment encouraging the provision of DFS, as well as to address market failures. Key policies include the encouragement of private sector participation in the provision of DFS, improving the digital ability to spur greater levels of adoption, and supporting innovation.

Major inhibitors to universal access to DFS include the costs of access to services. Personal investment in digital technology such as mobile phones, as well as recurrent costs of mobile data or Internet access are real barriers to DFS access for large numbers of Kenyans. Policies to lower costs can be directly targeted towards lowering access costs for poorer, marginalized, or vulnerable communities. Policy options include targeted subsidies to user groups or subsidies to providers that offer services in select geographies. Additionally, broad-based taxes or industry taxes can be used to finance universal access funds. Further, the costs of network access can be lowered by encouraging competition by promoting lower entry costs for new digital financial service providers.

The widespread implementation of education campaigns is necessary to close gaps in digital and financial ability. A key reason limiting the adoption of DFS is a lack of knowledge and

comfort in handling digital technology, as well as an understanding of financial products. In particular, some segments of the population, such as the elderly, are less likely to have the ability to use apps on mobile phones. Additionally, financial literacy levels are low, particularly across individuals with low levels of education as well as those in rural areas. Increasing adoption through education will increase the demand for DFS and therefore improve profitability and the likelihood of service provision in areas that are currently underserved.

Policies that provide incentives to support innovation are important to lower the cost of DFS and improve the tailoring of products to address demand. Regulatory sandboxes enable testing of products, increase reputability and ensure adherence to consumer protection and data privacy standards, while at the same time allowing regulators to keep track of innovations. Further, incubators and accelerators are effective environments within which support is provided for innovative activity. Additionally, the collection and analysis of data is important in increasing transparency and pricing risk, which in turn supports innovations that lower the costs of providing financial services including credit. Data collection also supports regulatory tracking of risks including overborrowing and gambling. However, data utilization requires a strong data governance and privacy framework to ensure data are not misused, and individual privacy is protected.

Tracking access gaps in DFS is important to support policy implementation. The development of an index that measures access to DFS across dimensions of access, affordability, digital ability and vulnerability is an important informational tool to increase levels of awareness of cross-county gaps in DFS access, and to encourage policy implementation by local authorities to address gaps appropriately. Further, an index would allow the identification of gaps across demography, including by age and gender, as well as by income levels.

2. Financing Universal Access

Financing is central to the achievement of universal access to DFS. By financing network infrastructure, the availability of mobile data and broadband Internet can be increased. Further, by financing innovative activity in the provision of DFS, gains in productivity and increased competition can lower the costs of DFS supply.

A variety of financing instruments can be used to increase the supply and demand for DFS, and to incentivize the crowding in of pools of capital from various actors. Private sector actors with various incentives to participate in ensuring universal access to DFS include banks, MNOs, and fintech companies, which directly supply digital finance, private equity and venture capital funds that invest in innovative activity, and philanthropic funds, development finance institutions, bilateral and multilateral organizations, which target public good aspects of DFS beyond profit.

A variety of financial instruments can be effective in crowding in private pools of capital. Blended finance can provide cheaper pools of capital from development finance institutions structured into instruments with private capital to lower the costs of DFS supply. The need for blended finance arises where private investment cannot sustainably supply DFS but the public benefits from investment exceed private returns from investment. Additionally, social impact bonds structured around DFS-specific objectives can be effective in pooling philanthropic funds.

Risk management instruments are also effective in de-risking innovative activity. Guarantees are a useful instrument in deploying other sources

of finance into DFS supply. Broadly defined, guarantees are a type of insurance policy against the risk of non-payment as a result of a specified set of risks. Guarantees serve the useful purpose of de-risking investments to mobilize additional financing, and can cover a wide range of risks, including commercial or political risks.

3. Data Privacy and Cyber-Security

The collection of data improves access to DFS by providing historical data points that improve transparency by allowing an assessment of a given person's credit risk. Digital credit risk assessment algorithms are data intensive and rely on mobile money transaction history, social media data, purchase habits and geo-locational data. While this information improves efficiencies in offering DFS and other digital services, data collection frequently occurs without the consent of the individuals generating the data.

Data privacy legislation in the context of protecting individual data privacy is very nascent, and few countries globally have established and enforced comprehensive data privacy frameworks. In many countries consent is not required for collected digital data to be shared commercially, and neither are digital products required to seek permission to collect or share digital data. Given varying individual preferences for data privacy, each individual should have the ability to decide the personal tradeoff between the utility of privacy relative to the merits of sharing data. Empirical studies show that individuals place a high value on data privacy and are willing to pay a premium to maintain privacy. The value of privacy is high across all income segments, including those earning low incomes. Surveys run in Kenya and Bangladesh find that two-thirds of low-income individuals are willing to pay up to a 10 percent premium for financial services that offer data privacy relative to those that do not.[32]

Data privacy regulation is necessary for the following reasons: i) companies that collect data on individuals lack sufficient incentives to protect the privacy of users who have shared data, given that they can earn rents from selling data to third parties, or they can utilize the data to gain better insight on individual habits; and ii) companies do not internalize the utility that those generating data gain from data privacy. Thus, they do not suffer any disutility from sharing data and are more likely to over-share data for commercial purposes.

Inequalities in data privacy vary relative to levels of education and digital literacy. Individuals with lower education or digital literacy are less likely to use privacy settings to limit the data that is collected by third-party applications, for example by limiting cookies or changing privacy settings in their browsers or using privacy settings to limit the amount of data that is shared from their social media.

To promote data privacy, regulation must be developed to implement a comprehensive data governance framework that requires consent to be given by individuals to allow the collection or distribution of data. In addition, privacy tooling for DFS application developers must be enabled by establishing and making data privacy standards widely available, so that these standards can be incorporated into DFS products. In addition, legislation must be established and made mandatory to in-build data privacy controls into DFS products, and data privacy tools should be made widely available so that developers can easily access and use the tools in their applications, thus lowering the costs

32 FSD Kenya (2021), p. 14, Table 2.1.

of creating these tools and supporting a common level of standards.

Financial services involve collecting, storing, processing and exchanging consumer data by a variety of vendors, exposing consumers to the risk of unauthorized disclosure and use of personal data. Sharing of personal data exposes individuals to fraud, identity theft and other cybersecurity risks. Households with low education or digital literacy levels are at greater risk of becoming victims of digital security threats, as they are more likely to share personal information or submit to scams.

IV. Conclusion

Digital financial services are the cornerstone of the budding Kenyan digital economy. Although mobile money stands out as an example of the potential for DFS to disrupt financial infrastructure, it is only one aspect of the wider DFS ecosystem, which covers a broad array of channels and technologies upon which a wide and growing range of digital services are offered. The most disruptive innovations in the DFS ecosystem have originated from non-financial institutions such as MNOs and fintech companies, increasing the digital economy's size, productivity and supporting the efficient delivery of public services, including the distribution of social safety net transfers.

Kenya's policy on digital finance has been created with the vision of a bright economic future enabled by the widespread use of digital financial services which in turn spurs the growth of the digital economy. However, the reality is that data and devices remain unaffordable to large segments of the Kenyan population. As the digital economy grows, policies promoting equitable DFS access are critical. These policies include:

i) Implementing policies to promote universal access to data by lowering the costs of digital devices as well as the costs of access to data, given that Kenya ranks poorly amongst regional and structural peer countries as one of the countries with the highest costs per GB of data in nominal terms. This includes increasing competition by lowering barriers to entry for new data suppliers, enforcing antitrust legislation to counter uncompetitive practices, and subsidizing data costs for low-income and vulnerable households.

ii) Crowding in private finance to promote universal access by acknowledging the public benefits that access to DFS provides beyond private gain in underserved regions, through financing instruments such as blended finance, social impact bonds and risk management through guarantees. In addition, targeted universal access funds through user subsidies, subsidies to suppliers of DFS in underserved regions or across underserved groups, and taxation, are important to promote access to specific excluded groups.

iii) Lowering costs of mobile transaction fees and ensuring that pricing structures are non-regressive. As a percentage of transaction amounts, fees charged by MNOs for small-value transactions are disproportionately higher relative to fees charged for large-value transactions.

iv) Taxation policies should be reviewed to take into account the public good aspects of the mobile sector, which promotes financial inclusion and growth of the digital economy, and review tax legislation to lower digital exclusion, particularly of lower-income individuals.

v) Launching consistent and frequent education campaigns to increase levels of digital literacy amongst individuals, and to increase levels of trust in the use of DFS. Low digital literacy increases the likelihood of digital identity theft and fraud, disproportionately impacting lower-income households. Thus, education campaigns will improve the use of DFS while also safeguarding against financial crime.

vi) Tracking the evolution of DFS access across locations and marginalized and vulnerable populations by developing and monitoring a DFS Inclusion Index. The index would identify disparities in DFS access by demography and make local authorities aware of DFS access gaps, thus providing information to support policy implementation.

vii) Implementing a comprehensive regulatory framework to ensure data privacy and promote data security, thereby promoting consumer protection. Data privacy should be embedded in all DFS product offerings as a requirement through legislation, supported by establishing and enforcing uniform standards for data privacy and enabled by making data privacy APIs widely available and easily accessible to product developers.

viii) Limiting predatory lending practices by enforcing legislation to ensure that the total cost of credit, including all lending costs and fees, is clearly and transparently shared with all prospective borrowers. Additionally, the consequences of early and late repayment, including fees payable, should be shared transparently with borrowers. The regulations recently issued to regulate digital credit providers are timely and require close monitoring to ensure compliance of digital lending.

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