



LEVERAGING DIGITAL FINANCIAL SERVICES TO ADVANCE INCLUSIVE GREEN FINANCE POLICIES



SPECIAL REPORT

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on the basis of a decision
by the German Bundestag

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EXECUTIVE SUMMARY

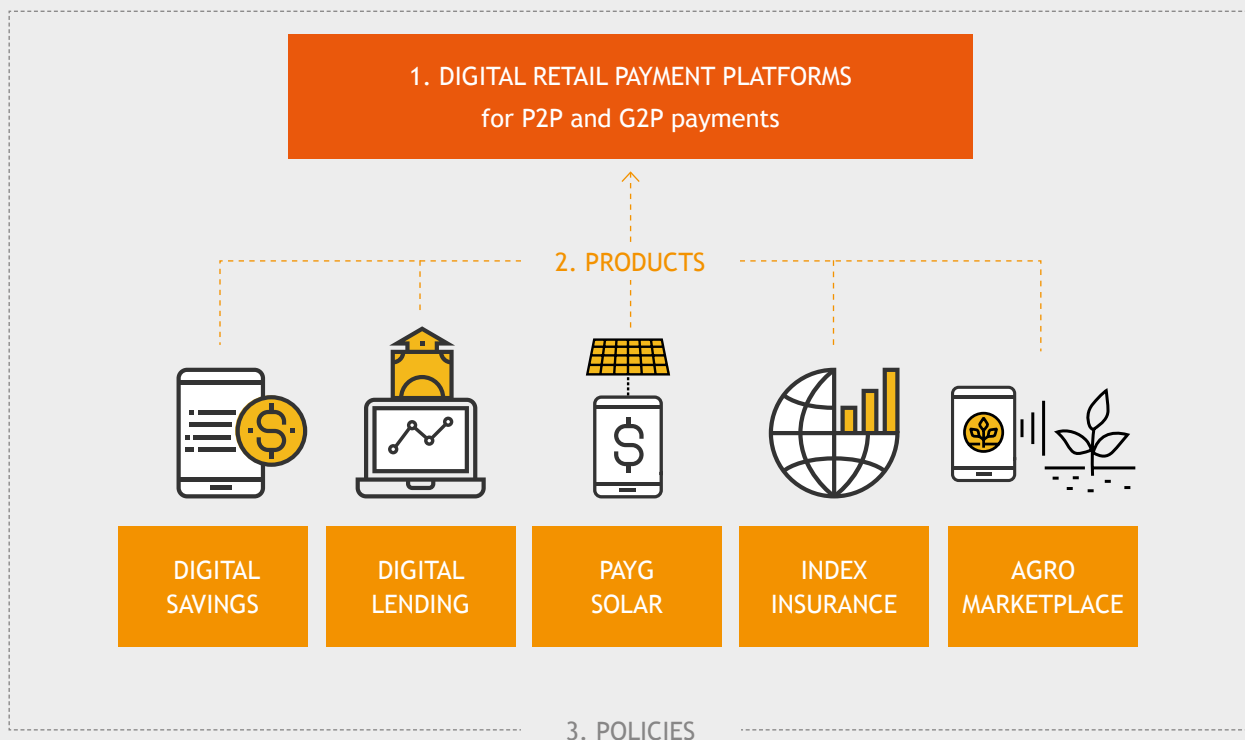
Climate change and environmental degradation threaten to derail sustainable development. Developing and emerging economies have to bear an increasing share of economic losses due to natural disasters, while low-income and rural households are especially exposed to environmental risk. Financially excluded populations have fewer mechanisms at their disposal to cope with such risks, and their exposure adds to existing vulnerabilities.

Financial inclusion can help vulnerable populations become more resilient to climate-related economic shocks. Digital financial services, in particular, open up new possibilities to bring about a just transition to a more resilient and environmentally sustainable economy.

AFI has formed working groups on inclusive green finance and digital financial services respectively, and this report is the result of a joint effort between these groups to highlight the synergies between the two issue areas.

This report shows how digital payment platforms, digital financial products, and enabling policies can make a difference in helping the most vulnerable populations adapt to and mitigate climate risk and environmental degradation. It brings together insights from interviews with regulators in digitally advanced jurisdictions, conversations with FinTech entrepreneurs in Asia, Sub-Saharan Africa and Latin America and the Caribbean, as well as academic literature from the field of development economics and a survey among AFI network members. This wealth of information is organized under three headings: platforms, products, and policies (Figure 1).

FIGURE 1: OUTLINE OF THIS REPORT



Digital retail payment platforms are the first line of defense against environmental risk for vulnerable populations in developing and emerging economies.

For the sake of clarity, “platform” in this report refers specifically to digital retail payment platforms, for example mobile money platforms, which utilize e-money. In many jurisdictions across the developing world, telecom operators or BigTech firms have rolled out mobile money platforms that have enhanced financial inclusion, weaving a network of financial access points that is significantly wider and denser than what is provided by the traditional financial sector. While regulators may think of mobile money merely as a payments service, it is used by low-income and rural households as an informal, yet essential risk management device against climate-related economic shocks. Person-to-person (P2P) remittances are used to pool and transfer risk among family and community members across distances in ways that are more affordable, trustworthy, and flexible than what most financial firms have to offer. Increasingly, governments add a layer to this digital financial safety net by channeling government to person (G2P) payments via mobile money to those in need, especially after natural disasters.

Several green digital financial products build on digital retail payment platforms to help households and micro, small and medium enterprises (MSME) adapt to and mitigate environmental risk. This report focuses on five such products, showing how digital savings and loans can help vulnerable parts of the economy become more resilient to shocks together with investments in green technologies that turn victims into agents in the fight against climate change. Also, pay-as-you-go solar as a green digital asset financing model deserves special attention because of its beneficial effects for financial inclusion and the environment in addition to the health and economic conditions of low-income families. The final two products focus on smallholder farmers, a population particularly exposed to environmental risk. Index agricultural insurance providers can leverage digital technology to improve product quality and service delivery for their clients. In recent years, entrepreneurs have developed digital agro marketplaces that combine access to the market and useful agronomic information with the financial services demanded by smallholder farmers, in an all-in-one cash-free package.

Policies are essential to enable and promote the healthy development of an inclusive green digital financial ecosystem. This section explores e-money issuance for non-banks, a risk-based approach to

regulation, agent banking, and consumer protection as basic regulatory enablers of inclusive digital finance. The report outlines the benefits of policy sequencing, where regulators take a test-and-learn approach to help the private digital financial ecosystem thrive first, and then subsequently tightening rules to address market failures. Openness to digital new (non-bank) digital finance providers is not common and requires particular attention by policymakers seeking to foster a green and inclusive digital financial system. The experience with targeted regulatory relief for mobile money during the COVID-19 pandemic carries important lessons for economic shocks from future environmental disasters. Finally, the section analyzes policies that promote the uptake of targeted customer groups, addressing inequalities in access to digital financial services.

SIX POLICY RECOMMENDATIONS CAN BE GATHERED FROM THE INSIGHTS IN THIS REPORT

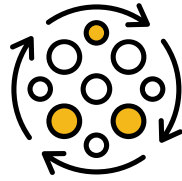
1. ALLOW NON-BANKS TO ESTABLISH DIGITAL RETAIL PAYMENT PLATFORMS

Polymakers should focus on retail payment platforms that can provide basic but essential services to climate-vulnerable populations.



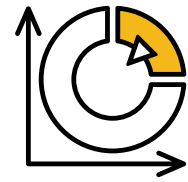
2. CONSIDER POLICY SEQUENCING

Test and learn, regulatory sandbox and other innovation facilitation approaches, including regulatory policies facilitate market entrance of digital new (non-bank) digital finance providers.



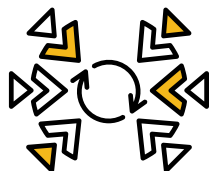
3. LOWER BARRIERS TO ENTRY BY ADOPTING A RISK-BASED APPROACH

Polymakers should establish tiered KYC and lower identity requirements in line with the results of risk assessment for customers to sign up for mobile money. Regulators should apply a more flexible licensing regime for companies.



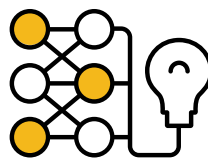
4. REMOVE OBSTACLES TO PRIVATE-SECTOR INVESTMENTS IN DIGITAL FINANCIAL INCLUSION FOR GREEN PURPOSES

Polymakers should provide an enabling environment and reduce barriers to market entry



5. FOCUS ON SUPERVISORY ENGAGEMENT AND OUTREACH, NOT INSTITUTIONAL FORM

Polymakers should keep an openness attitude to new (non-bank) digital finance providers and provide collaborations across ministerial and agency siloes.



6. ADDRESS GAPS IN ACCESS BY ENCOURAGING UPTAKE AMONG TARGETED CUSTOMER GROUPS

Polymakers should design capacity building programs and financial literacy campaigns to foster DFS uptake by women, smallholder farmers, low-income households and other vulnerable sectors.



INTRODUCTION

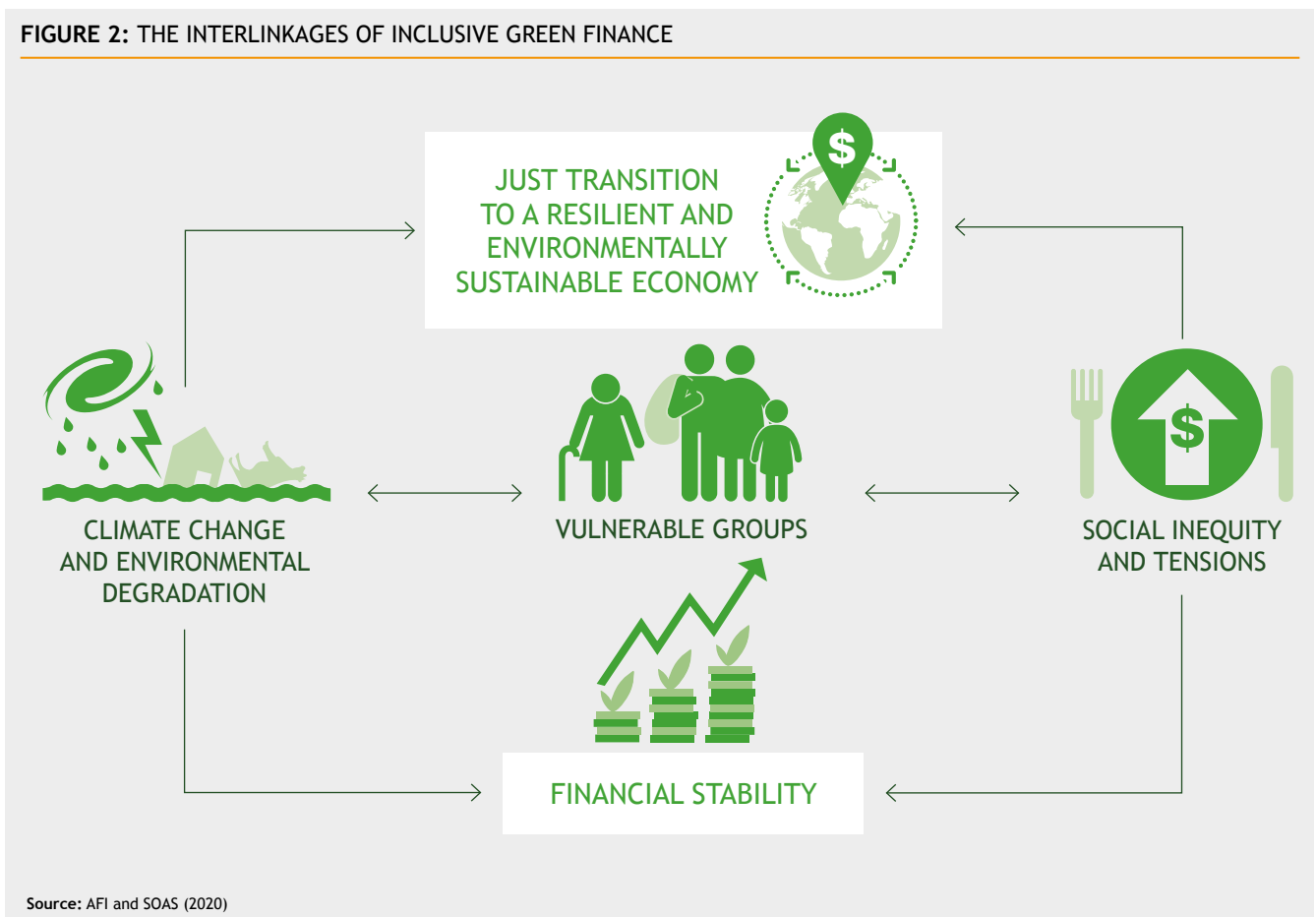
Climate change and environmental degradation pose the greatest threats to sustainable development today.

Economic losses from extreme weather events have been mounting since the 1980s around the world. Average annual losses currently are in the range of USD150-200 billion, with an increasing share of damages located in low and middle income countries (Tanner et al., 2015). This estimate does not account for the economic opportunities lost due to underinvestment in productive assets by risk-averse businesses with short time horizons in disaster-prone areas, nor the pain inflicted when loved ones are lost to climate catastrophes. Low-income households are particularly exposed: Living in less-favored agricultural areas, low-elevation coastal zones, and other climate-vulnerable locations, they are more likely to be hit by flooding, drought, natural disasters, or waterborne diseases that become more prevalent during extreme weather events (Barbier & Hochard, 2018; Hallegatte et al., 2015).

Moreover, they may be caught in a vicious cycle of land degradation and subsistence agriculture that drives a further depletion of the scarce natural resources at their disposal. Such unequal exposure to environmental risk threatens to add to other social and economic vulnerabilities, exacerbating existing inequalities (N. Islam & Winkel, 2017).

Financial inclusion can help vulnerable populations become more resilient to climate-related economic shocks. AFI established an Inclusive Green Finance Working Group to better understand how AFI members can help vulnerable populations address climate risk. The Working Group has published knowledge products on promotion, provision and protection policies, sharing emerging regulatory lessons within the network and with interested policymakers worldwide (AFI, 2021c, 2021a). A recent report spells out the linkages between climate risk, financial stability, social inequity and tensions, and how financial inclusion can help vulnerable groups in a just transition to a more resilient and environmentally sustainable economy (Volz et al., 2020). Financial inclusion can help rural and low-income households obtain the instruments they need to better manage and adapt to risk (Collins et al., 2009).

FIGURE 2: THE INTERLINKAGES OF INCLUSIVE GREEN FINANCE



Source: AFI and SOAS (2020)

It can also channel funding for MSMEs, whose access to capital is jeopardized by climate vulnerability (Kling et al., 2021). Moreover, financial inclusion can help turn victims, such as people and companies, into agents in the fight against of climate change. For example, replacing carbon-intensive methods of cooking, irrigation, and electricity generation with modern technologies can significantly reduce greenhouse gas (GHG) emissions, improving people's health, and saving money in the medium to longer-term. However, financial innovations such as pay-as-you-go solar are needed to help low-income groups finance the upfront investment. Finally, financial inclusion can make a life-saving difference after disaster strikes, channeling funds quickly and precisely to those in need. It can also have a catalytic function in helping underserved communities invest in more resilient and sustainable ways of living and doing business.

Academic and policy work on green, digital, and inclusive finance has advanced considerably over the last decade, though synergies between these issue areas have not yet received sufficient attention.

Central bankers and financial supervisors within the AFI network and the Network for Greening the Financial System (NGFS) have identified environmental risk as a material risk to financial stability (Bolton et al., 2020; NGFS, 2019). And while policymakers have developed a wide range of green finance instruments to adapt to and mitigate climate risk, most focus on firms and households that are already financially included (Castilla-Rubio et al., 2016). Similarly, studies on financial technology (FinTech) and its application to respond to climate change have often concentrated on services that help established firms and households in advanced economies, such as blockchain-enhanced green bonds or green robo-advice for institutional investors (Arner et al., 2020; Nassiry, 2018). Conversely, there is a large and growing body of literature on digital financial inclusion which discusses environmental risk only at the margins (Agarwal & Chua, 2020; J. E. Blumenstock et al., 2015; Ding et al., 2018; GPFI, 2016; GSMA, 2018; A. Islam et al., 2018). One of the reasons for the lack of attention to the synergies between digital, green, and inclusive finance may be the following two types of barriers to its policy implementation on the ground.

Inclusive green finance and digital financial services are priority areas in developing and emerging economies, but market developments and the underlying infrastructure remain at a nascent stage.

For example, digital carbon credit trading or blockchain applications for the issuance of smart contracts and

green bonds presuppose a financial market depth and complexity that is common only in advanced economies (FCA, 2019). In addition, many green finance instruments and policies focus on large carbon emitters and other established firms. While MSMEs in their entirety produce a sizeable share of GHG emissions (Meng et al., 2018), their small scale often does not allow them to take advantage of digital green finance opportunities (Butu et al., 2021). This is because only large firms can bear the transaction costs of green finance, such as green certification, verification and monitoring for green bonds (Ketterer et al., 2019).

Existing green finance methods are limited in scale, require high upfront investments, sometimes operate against market logic, or have unintended social consequences.

A plethora of community-based green finance pilot studies have shown promise but struggle to achieve scale or become commercially sustainable. For their part, top-down regulatory interventions such as lending quotas or interest rate caps for green loans can lead banks to skew their credit portfolio even more towards larger (agricultural) firms rather than smallholders. Partial credit guarantees can raise moral hazard concerns and risk creating dependencies when participants fail to graduate from these schemes (Ono, 2019). Worse, some green financial policies such as the elimination of fuel subsidies can be regressive when implemented without consideration for the most vulnerable. Policymakers in rich and poor countries alike have the opportunity to consider synergies between green and social policies that allow for a just transition to a more sustainable economic model (Barkawi & Zadek, 2021; White, 2021).

Digital financial inclusion can have a wide range of economic and social benefits, but few studies have explored specifically how it can help leverage finance for climate change adaptation and mitigation.

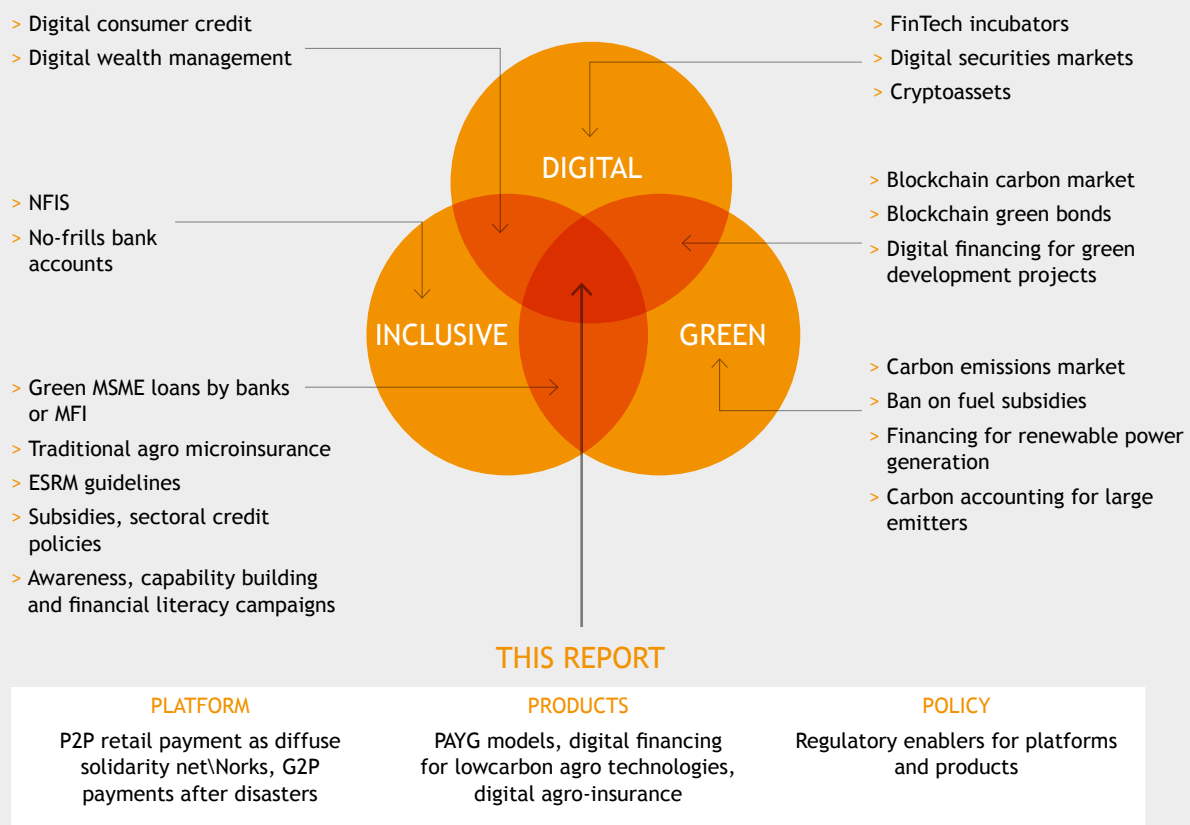
This report will focus on the overlap between green, inclusive and digital finance (see Figure 3 below), showcasing how innovative market developments in the leading jurisdictions (which are often developing and emerging economies rather than advanced economies) have enabled low-income and rural households as well as MSMEs to increase their resilience vis-à-vis environmental risk, adapt to and mitigate climate change.

This report focuses on platforms, products, and policies to show how digital financial services can be leveraged for inclusive green finance, with a chapter dedicated to each of these three thematic clusters.

The analytical journey starts with digital retail payment platforms - also known as mobile money - as enablers of green digital financial inclusion. It shows how mobile network operators or BigTech firms have rolled out mobile money platforms that have turbocharged financial inclusion, weaving a network of financial access points that is significantly wider and denser than those provided by the traditional financial sector. The chapter concentrates on the use of P2P remittances as the most affordable, trustworthy and flexible means of risk pooling and transfer, as well as G2P payments via mobile money as a public safety net. Chapter 3 focuses on five relevant products that are offered on or connected to mobile money platforms, highlighting how digital savings and loans can help vulnerable parts of the economy become more resilient to shocks and that investing in green technologies can turn victims into agents in the fight against of climate change. Pay-as-you-go solar, digital index agricultural insurance,

and digital agro marketplaces that bundle a number of services into one product also receive detailed attention. Chapter 4 of the report discusses the policies necessary to support the healthy development of an inclusive green digital financial ecosystem, turning to e-money issuance for non-banks, a risk-based approach to regulation, agent banking, and consumer protection as the basic regulatory enablers of inclusive digital finance. The report outlines the benefits of policy sequencing, where regulators take a modified test-and-learn approach to help the private digital financial ecosystem thrive at first, and then subsequently tightening the rules to address market failures. Special attention is given to openness to digital new (non-bank) digital finance providers and regulatory relief during crises, drawing from recent experiences with the economic downturn caused by the COVID-19 pandemic. The chapter also analyzes policies that foster the uptake of targeted customer groups, addressing inequalities in access to digital financial services. The final chapter distills lessons learned from jurisdictions around the world into a set of policy recommendations.

FIGURE 3: SCOPE OF THIS REPORT



PLATFORMS

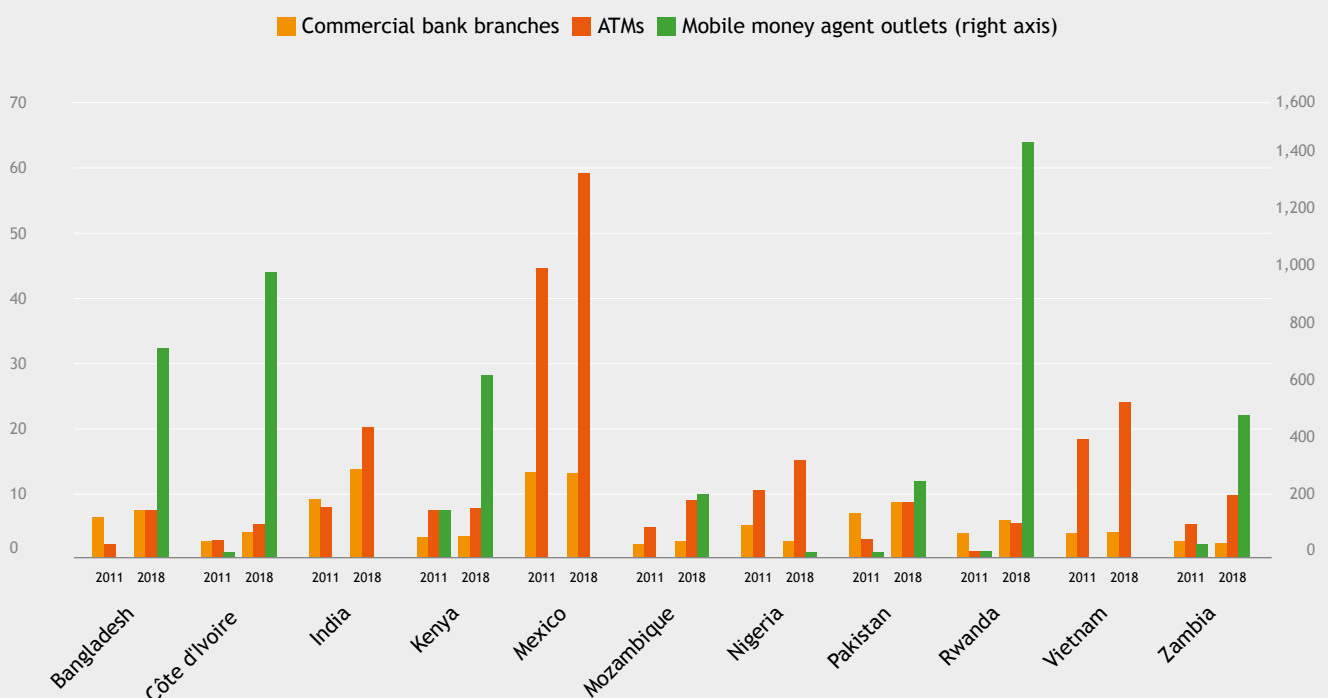
Digital retail payment platforms are both a base layer and a key tool for inclusive green finance in their own right.

For the sake of clarity, this report uses the term “platform” only in reference to digital retail payment platforms which make use of e-money, for example mobile money services. Such platforms allow users to send money domestically and abroad, cash in and cash out. All of the products discussed in Section 3 rely on this base layer of mobile payments. At the same time, digital retail payments themselves, both between individuals (P2P) and from government to people (G2P) play an important role in increasing the resilience of vulnerable populations to climate risk.

Digital retail payment platforms have enhanced financial inclusion. While traditional financial service providers have struggled to reach out to underserved populations profitably, digital retail payment platforms have found a way to make financial inclusion commercially sustainable. This is especially relevant for

low-income and rural populations which have very few financial tools readily available to face the economic impacts of climate change. By harnessing the power of digital automation, this new generation of financial service providers is able to operate at drastically lower fixed and variable costs (Osafo-Kwaako et al., 2018). High and rising mobile phone penetration helps overcome geographic access barriers (CTA, 2019). Moreover, agent banking allows digital new (non-bank) digital finance providers to expand their network of access points dramatically without jeopardizing profitability. In other words, digital automation represents a positive supply shock that makes financial inclusion a commercially sustainable endeavor. It is, therefore, not surprising that already by 2017, mobile money platforms had overtaken traditional providers as the main gateway to financial inclusion in ten African jurisdictions (WBG, 2017). In 2020, the number of monthly active mobile money accounts topped 300 million in 96 countries, having grown at an annual rate of 17 percent (GSMA, 2021). Figure 4 below illustrates how the traditional network of bank branches and ATMs (left axis) has advanced slowly in recent years, while digital retail payment (mobile money) companies (right axis) have created an access point network of a magnitude unfathomable to analog incumbents.

FIGURE 4: ACCESS POINTS PER 100,000 ADULTS, SELECTED JURISDICTIONS



Source: IMF Financial Access Survey

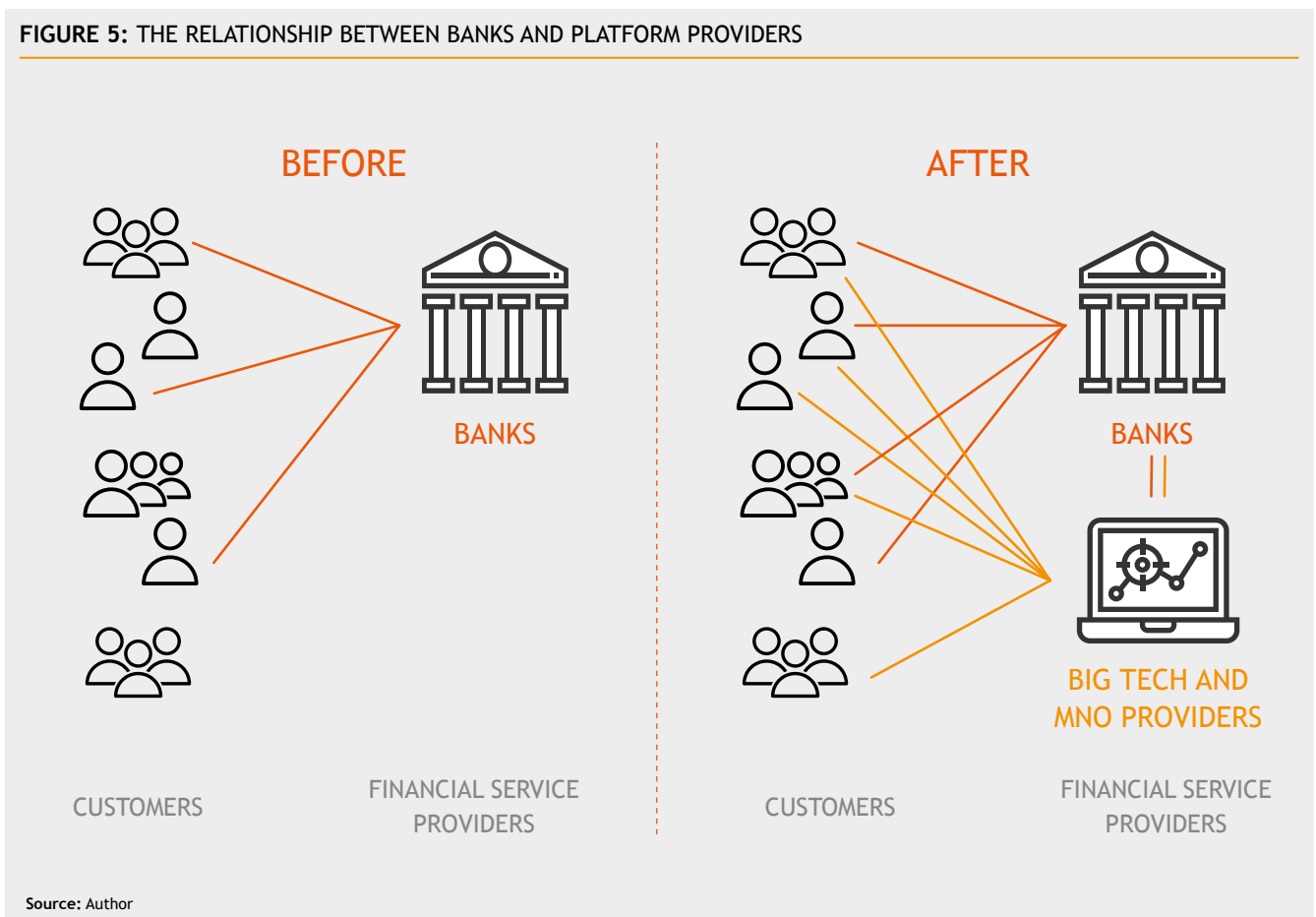
Gender differences in access to digital finance exist in many jurisdictions. In low and lower middle-income countries, women are 8 percent less likely than men to own a mobile phone and 20 percent less likely to access the internet (GSMA, 2020). They are also less likely to access digital financial services (Shin et al., 2021), but may need them more than others to increase their resilience against climate shocks. That said, the gender gap for digital financial services (DFS) is smaller than for traditional financial services. Furthermore, the gender divide in digital financial access is shrinking in many emerging and developing countries (WBG, 2017). Nevertheless, the need to foster uptake among women and other disadvantaged groups remains a policy priority, as Section 4 below discusses in greater detail.

Non-banks are key drivers of digital financial inclusion. The digital retail payment market varies by jurisdiction, but the last decade showed a tendency for mobile network operators (MNO) and BigTech firms to emerge as the dominant providers of such platforms. On one side Mobile money operators (predominantly in Africa) enable access to digital accounts to the unserved and underserved segments. On the other side, BigTechs (predominantly in East Asia and Southeast

Asia) enable usage of payments and other value-added financial services by integrating them into various (non-financial) services such as messaging, ride hailing, food delivery, etc. These models are being integrated and scaled at a global level given the tremendous success they witnessed at regional level.

The main reason why these two groups are able to push the frontier of financial inclusion is their ability to leverage big data, network externalities, and the cross-selling of activities. This so-called data-network-activities or “DNA” feedback loop (BIS, 2019; Frost et al., 2019) provides MNOs and BigTech companies with the following three advantages: Unlike traditional financial services providers or smaller FinTech startups, they can harness the (big) data gathered on customer behavior to fine-tune their products and increase customer loyalty. Second, MNOs and BigTech companies can also exploit network externalities, where the benefits of a given mobile money platform for customers rise as the network grows larger. Third, non-bank platform providers use platforms to cross-sell activities, binding customers in an increasingly multifaceted (and profitable) commercial environment.

FIGURE 5: THE RELATIONSHIP BETWEEN BANKS AND PLATFORM PROVIDERS



Source: Author

For example, M-Pesa in East Africa can be used to purchase cellphone airtime; GrabPay in Southeast Asia covers a range of services including ride hailing, food and package delivery and home services; while MercadoPago in several Latin American countries engages in e-commerce.

Digital new (non-bank) digital finance providers engage in a complex relationship with traditional providers to deliver inclusive green finance. MNOs and BigTech firms often partner with banks and other traditional financial services providers rather than replacing the incumbents. For example, mobile money providers work with banks and insurance firms to safeguard customer funds and offer prudentially regulated financial products such as savings, credit, and insurance for climate change adaptation and mitigation, as Section 3 will explain in greater detail. At the same time, they compete with the analog incumbents over customer data and loyalty.

While digital retail payment systems are often thought of as a platform for the delivery of financial products, they fulfil important functions in addressing climate risk on their own. Mobile money or digital retail payment platforms (the terms are used interchangeably here) can be understood as the first generation of a digital financial ecosystem, providing the foundation for the development and roll-out of next-generation products and services (Ndung'u, 2017, 2021). But the platforms themselves play a key role in helping underserved communities adapt to and mitigate climate risk. Person-to-person (P2P) and government-to-person (G2P) payments are two prominent functions relevant for inclusive green finance, as detailed in the following sections.

P2P DIGITAL PAYMENTS AS A SAFETY NET

P2P payments are an important safety net for underserved communities in developing and emerging economies. Research on the usage of Kenya's M-Pesa, a trailblazer in mobile money, has shown that the platform allows households to weave a wider net of informal insurance and risk sharing. This is of particular relevance for households seeking to increase their resilience vis-à-vis environmental shocks. Before the digital transformation, the unbanked or underbanked had to rely on expensive or risky methods of sending money to loved ones beyond their immediate vicinity, such as entrusting a bus driver or acquaintance that traveled to the target village or town with cash. Thanks to digital platforms, households in need can ask friends and family near and far for help and receive funds fast

and safely to address economic shocks due to climate change or other reasons (Bharadwaj et al., 2019; Jack et al., 2013; Jack & Suri, 2014; Suri & Jack, 2016).

Some financial supervisors and economists struggle to conceptualize P2P payment platforms in accordance with their actual usage. From a typical regulatory perspective, credit and insurance are two distinct financial services that are provided by prudentially supervised firms to customers, each subject to rules and regulations. But from a user perspective, mobile money provides access to insurance without a premium, or credit at a zero interest rate with state-contingent repayment terms. Other than the platform provider, no firm is involved in the provision of capital and services, and no profits are made in this informal P2P network. Mobile money can thus be understood as a financial network of diffuse solidarity, rather than a set of transactions between firms and customers. Some anthropologists in the tradition of Mauss (2002) may have a better grasp of P2P payments as a community-constituting web of mutual support, obligation, and group solidarity than regulators following textbook economics (Johnson, 2016).

P2P platform usage can enhance resilience to economic shocks and improve livelihoods. Empirical studies across the African continent have shown that mobile money helps households smooth their consumption in the face of unpredictable events, such as health or weather disasters. Mobile money users are less likely to resort to asset sales in the face of shocks (Jack & Suri, 2014), they are less likely to take children out of school or engage in risky behavior such as transactional sex (Jones & Gong, 2021) and they report higher rates of food security (Afawubo et al., 2020; Ky et al., 2018; Munyegera & Matsumoto, 2016; Murendo & Wollni, 2016; Sekabira & Qaim, 2016). Protected from the worst consequences of economic shocks, households are more likely to invest in resilience-enhancing tools, supplies and methods, and they can branch out into higher-risk but profitable sectors of the economy such as starting their own retail commerce business (Bharadwaj et al., 2019; Wakadha et al., 2013).

P2P platforms can be an essential tool for smallholder farmers in developing and emerging economies, a population particularly exposed to climate risk. In Togo, for example, mobile money use increases the resilience to environmental shocks such as drought and soil erosion, including among women and less educated users (Afawubo et al., 2020). In East Africa, mobile money has allowed farmers to improve food security, invest in better crops, and sell more high-

BOX 1: MAKING PAYMENTS DISASTER-PROOF - THE CASE OF THE BAHAMAS

An island nation in a hurricane-exposed part of the Caribbean, The Bahamas is facing a significant risk of recurring economic shocks due to environmental disasters.

Around 70% of the population lives on two main islands, while the other 28 inhabited islands of the country are sparsely populated and underserved by the financial system. Traditional banks find it unprofitable to establish financial access points there, and the Central Bank of the Bahamas estimates that about 20% of the population is unbanked. In addition, migrant workers from nearby islands flock to the country for work, but they are unable to provide the necessary documents to register for a bank account.

After the devastating impact of Hurricane Dorian in September 2019 and recognizing the limits of the traditional financial system in fostering financial inclusion, the central bank took innovative action, designing the first operational central-bank issued digital currency (CBDC) in the world, the Sand Dollar, to guarantee access to the payment system for everyone, even in remote places and in the wake of natural calamities, when internet service might be disrupted. Digitization of the currency frees the payment system from reliance on paper documents, and a sophisticated network of backup servers ensures operational continuity even after disaster strikes. Anyone with a data-enabled mobile phone can use the Sand Dollar. Mobile phone penetration is relatively high in The Bahamas, and network coverage includes even the more remote islands.

The central bank grants both banks and non-banks, such as payment services providers and money transmission businesses, access to the digital currency. In addition, anti-money laundering requirements are proportional to holding and transfer volumes, allowing Bahamians without full documentation and non-citizens to use the system without posing material risks to financial integrity.

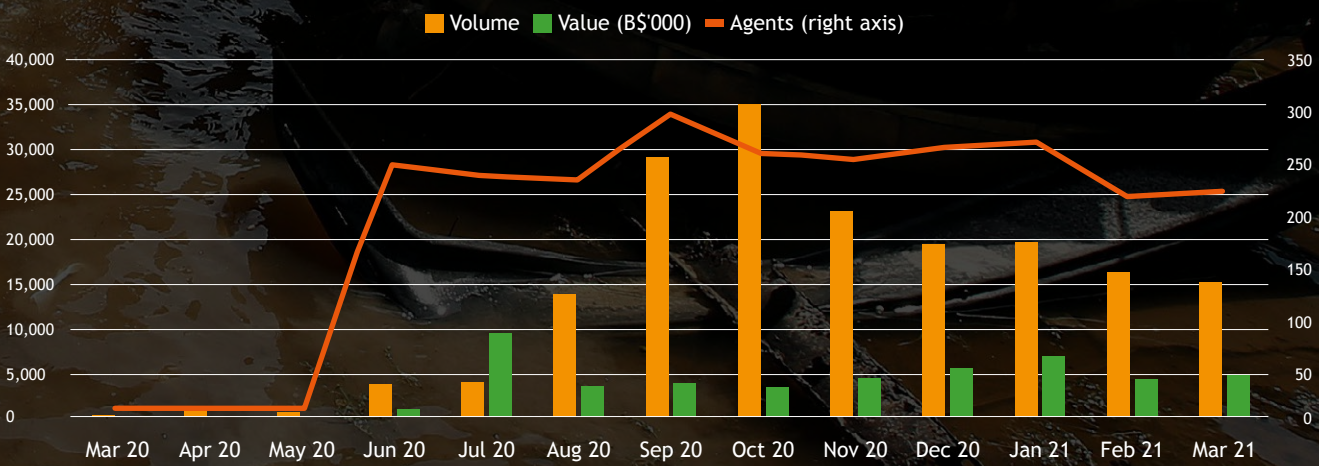
Supervisory authorities acknowledge that a digital retail payments platform (mobile money) would have accomplished most of the above goals. But The Bahamas is also an international financial hub, and a CBDC was deemed preferable because it allows the central bank to exert greater monetary control and signal a higher degree of confidence in safeguarding the financial system domestically and abroad together with making the traceability of transactions and due diligence (KYC) easier.

Nevertheless, the resilience of bank-end operations, cybersecurity, and detection of financial crime poses challenges for financial services providers and the supervisory authorities alike. In order to ensure the orderly adjustment of participants in the domestic payments space, the central bank announced a year-long suspension of license applications for non-bank payment service providers in 2019, and the moratorium was extended to September 2022. Regular meetings between financial supervisors and competition authorities in The Bahamas are essential in guiding the safe and orderly development of the ecosystem surrounding the CBDC (Central Bank of the Bahamas, 2019).

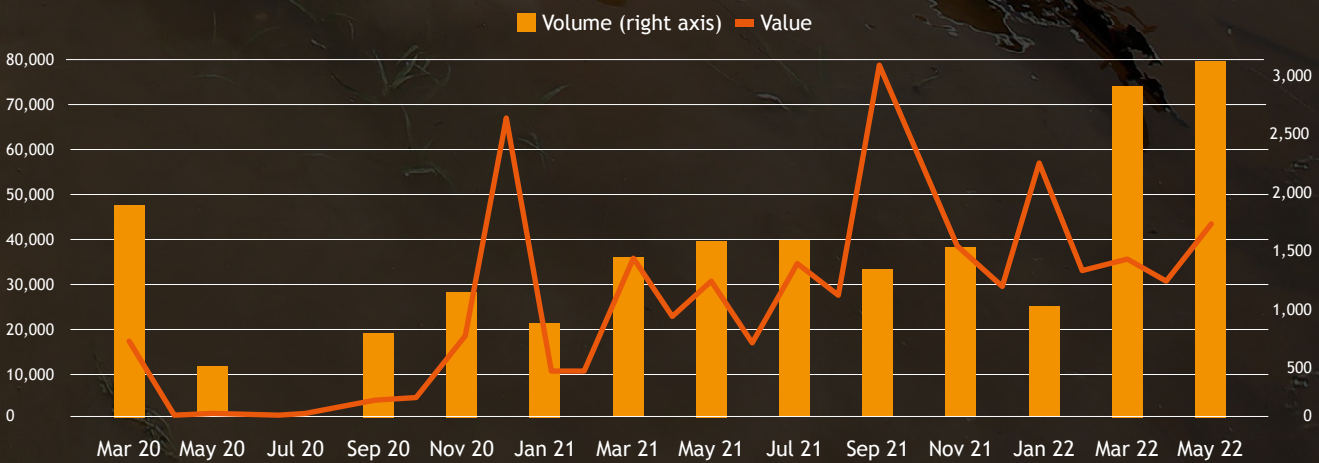
Source: Central Bank of The Bahamas



E-MONEY TRANSACTIONS



SAND DOLLAR TRANSACTIONS



value products (Murendo & Wollni, 2016; Sekabira & Qaim, 2016; Munyegera & Matsumoto, 2016; Hinson et al., 2019; Kikulwe et al., 2014; Kirui et al., 2013), while a natural experiment in Tanzania exposed the mechanics of risk sharing using mobile money. Usually, a rural household affected by a negative economic shock can ask nearby friends and neighbors for help. But this local network of solidarity fails to work when a weather shock, such as a flood or drought, affects everybody in the village. In such cases, researchers found that mobile money users were able to rely on friends and family beyond their village who were not affected by the disaster. Thanks to digital remittances from this wider support network, they were able to smooth consumption, while non-users of mobile money had no network to support them (Riley, 2018).

MSMEs can benefit from digital payments in a variety of ways. Empirical research from Afghanistan to Uganda shows that firms that adopt mobile money can save on transaction costs for sales, purchases, and salary payments. They are also able to invest in more climate-resilient technologies and expand their time horizon (J. E. Blumenstock et al., 2015; A. Islam et al., 2018). Moreover, by using digital payments, MSMEs create a data trail of cash flows, which can be essential to determining creditworthiness when applying for digital credit in jurisdictions that allow the use of alternative data for credit assessments.

G2P FOR SOCIAL PROTECTION

Governments are increasingly leveraging digital payment platforms to reach underserved communities. Almost 20 years ago, the Brazilian government pioneered the use of digitally supported conditional cash transfers. Delivering payments via debit cards allowed the government to cut administrative costs nearly seven-fold, from 14.7 percent to 2.6 percent of the grant value disbursed (Pickens et al., 2009). In India, replacing indirect or in-kind social transfers with payments to bank accounts and associated debit cards reduced leakage from imprecise beneficiary targeting and corruption, saving the government an estimated USD7 billion over two and a half years alone (Pazarbasioglu et al., 2020). What these first-generation services have in common is that they still rely on bank account ownership and access to the banking system's branch or ATM network.

Modern digital G2P payments delivered to mobile phones can help vulnerable populations before and after environmental disasters. Next-generation G2P networks have leveraged increasingly high mobile

phone penetration to directly reach underserved communities. For example, after typhoon Haiyan hit the Philippines in 2013, Mercy Corps partnered with a mobile bank and an MNO to send cash to individuals in the affected area through the MNOs agent network (T. Anderson & Chilczuk, 2015). When Tropical Cyclone Winston devastated parts of Fiji three years later, the government was able to provide recipients of existing social protection programs with rapid cash support using the M-PAiSA electronic payment platform, without the involvement of any traditional bank (Mansur et al., 2018; AFI, 2021a). Similarly, a pilot project for the Bahamas' Sand Dollar (see Box 1) involved G2P payments for recipients on a remote island that was hit especially hard by Hurricane Dorian (Dorst, 2021). An empirical study of a cash transfer program in Niger after a drought revealed that households who used mobile money spent less time in obtaining transfers and spent more resources on food for children than those who received cash by envelope. The digital channel also improved the bargaining power of women as recipients of the funds (Aker et al., 2016). Going one step further, the Novissi program in Togo used geospatial and demographic data to identify climate-vulnerable households using a predictive algorithm. The G2P program has spurred the creation of over 170,000 new mobile money accounts, fostering both financial inclusion and the expansion of Togo's social safety net (J. Blumenstock et al., 2021).

Innovative governments have leveraged digital G2P payments to help people in need during the global pandemic. In Bangladesh, for example, G2P payments were previously channeled only to bank account holders. But facing the economic crisis brought about by COVID-19, the Central Bank took innovative action and opened the electronic bank transfer network to mobile financial services providers, allowing government funds to be sent to 40 million recipients in marginalized sectors of the economy that would have been hard to reach otherwise (S. T. Islam & Divadkar, 2020, see Box 4 below). Across the world, the value of G2P payments via mobile money has quadrupled during the pandemic (GSMA, 2021). In all of the above cases, the rapid spread of digital technology requires greater efforts at improving financial literacy. Vulnerable populations might be hesitant to use new financial technologies, and policymakers need to take care of digital financial skill-building to ensure that nobody in the target group of G2P payments is excluded. Section four below expands further on this issue.

PRODUCTS

Digital retail payment platforms not only provide the foundation for informal insurance among households and a governmental social protection net - they also represent the base layer for an evolving ecosystem of financial products that can help vulnerable populations with climate risk adaptation and mitigation.

This section concentrates on five financial products that leverage digital payment platforms for inclusive green finance showing how digital savings, lending, pay-as-you-go solar financing, index insurance, and agricultural platforms can make a difference in helping low-income, rural households and smallholder farmers, in particular, by increasing their resilience vis-à-vis climate shocks and becoming agents in a just transition to a sustainable, low-carbon economy.

DIGITAL SAVINGS

Households and businesses alike can leverage digital payment platforms to increase their savings for emergencies. For example, a study in Burkina Faso showed that mobile money users have a higher propensity to save for health emergencies and other unpredictable events. Rural, female, and less educated individuals were particularly likely to use digital technology for emergency savings. One of the reasons for this might be that digital savings are less prone to theft and “taxes” by friends and relatives asking for assistance (Ky et al., 2018). Commitment savings devices - where users agree to subject themselves to higher fees for early withdrawal - can be a welcome method to safeguard funds until an urgent need arises. Digital savings for emergencies complement P2P payments from friends and family as two channels in which digital payment platforms allow vulnerable populations to increase their resilience and adapt to environmental risks.



Female farmer uses mobile technology to compare prices at various markets within Banfora Department, Burkina Faso. (Jake Lyell/Alamy Stock Photo)

DIGITAL LENDING

Low-income households and MSMEs can invest in climate change adaptation - but they need financing options. Digital lenders - companies that make automated credit assessments using a variety of data and deliver loans via mobile phones - can be essential in helping vulnerable populations increase their resilience to natural disasters and better cope in their aftermath (Dowla, 2018; AFI, 2020d). Information asymmetries, small loan amounts, and high operating costs often prevent traditional lenders from attending these populations. But digital automation represents a positive supply shock allowing digital new (non-bank) digital finance providers to undertake risk assessments, loan disbursements and recollections at a significantly lower cost thereby lending to underserved sectors of the economy without challenging their commercial sustainability.

Digital lending also allows vulnerable populations to become agents of climate change mitigation. For example, an estimated three billion people worldwide cook their food on open fires, using wood, animal dung, coal, and biomass as fuel. Such methods not only release significant amounts of methane and carbon dioxide into the atmosphere, they also pose health hazards by worsening ambient air quality. Using clean cookstove technology helps households reduce GHG emissions, avoids premature deaths, and can also be more cost-effective than traditional methods. Digital lending can play a key role in helping low-income households finance the upfront investment necessary for this technological change (Bailis et al., 2015; Lacey et al., 2017; Mitchell et al., 2019).

Smallholder farmers can leverage digital loans to climate-proof their livelihoods. Drought-resistant crops, more resilient seeds, green farming methods, and solar-powered irrigation systems, for example, can make a significant difference in climate change adaptation and mitigation. But the financing gap facing smallholder farmers is huge: their share of private financing in developing countries remains in the single digits, according to World Bank estimates (World Bank, 2021b). Again, digital lenders can address this demand because they are nimbler than traditional incumbents and better able to overcome geographic barriers to financial inclusion.

Automated digital credit assessment can help underserved communities that are exposed to climate risk. The few empirical studies available to date indicate that digital assessment models based on cash flow, mobile data, or other data trails work with decent accuracy for “unscorable” customers, those who have no recorded financial history or collateral such as smallholder farmers (Bartlett et al., 2021; Berg et al., 2020; FinRegLab, 2019; Hau et al., 2018; Jagtiani & Lemieux, 2018b, 2018a). However, such preliminary results should be taken with caution as digital credit scoring has yet to show its imperviousness to algorithmic discrimination, as well as its predictive quality after the economic downturn caused by COVID-19. Also, digital delivery does not change existing policy concerns over responsible financial access and over-indebtedness (Bharadwaj et al., 2019; Gwer et al., 2019; Izaguirre, 2018; Kaffenberger et al., 2018; AFI, 2020a). Thus, as Section 4 on policy will show in greater detail, supervisory authorities need to take consumer protection and education very seriously.

PAY AS YOU GO SOLAR

Climate-vulnerable populations in low-income countries are often unbanked and energy-poor. They lack reliable access to an energy grid and usually have no choice but to resort to costly and polluting fuels such as kerosene for candles, disposable lead-acid batteries, and diesel to run generators. An estimated 600 million people lack access to reliable electricity in Africa alone and this number is set to increase due to the adverse economic effects of the COVID-19 pandemic, according to the International Energy Agency (Kazeem, 2020). In contrast, access to energy generated by solar panels (at a variable cost approaching zero) promises to improve both the health and financial situation of their owners while reducing pollution and GHGs (IRENA, 2020; Sharma, 2019). However, low-income families and MSMEs often lack the funds to invest in such higher-value assets.

Pay-as-you-go (PAYG) solar providers leverage digital retail payment platforms to lease solar panels at affordable and flexible rates. While the business model is less than ten years old, it has been shown to be sustainable both from a financial and environmental perspective. The PAYG provider installs a solar panel in a house and the customer pays for the price of the panel plus installation via mobile money over a stipulated period, e.g. one or two years. The provider can use its machine-to-machine (M2M) network to switch-off the panel remotely if the customer misses payments - and back on again once payments resume.

**BOX 2: USING REGULATORY SPACE TO DELIVER
GREEN FINANCIAL INCLUSION: M-KOPA**

Founded in 2011 in Kenya as an asset financing company, M-KOPA was a firstcomer in what is now an industry with over 10 million customers. The PAYG solar provider is neither a leasing company nor a lender and thus not subject to financial prudential supervision.

In an interview with GSMA, the mobile network association, a company representative noted that this amount of regulatory space was a boon: “Had we been a microfinance company that had rules, regulations, and inertia built around a certain type of product, it would have been a lot harder to end up where we are now. We’ve been able to do it a different way because we didn’t have any rules” (GSMA, 2013).

In its first eight years of operations M-KOPA installed PAYG solar systems in over 750,000 African homes, allowing low-income and off-grid families to benefit from sustainable and reliable energy (Moore, 2019). The company currently operates in three African countries: Kenya, Uganda, and Nigeria and decided to exit a fourth country due to tough macroeconomic factors (customers had low disposable incomes) and other external complexities such as high labor costs and taxes on solar equipment that eroded the business case in that jurisdiction. This highlights the power of policymakers to throttle or boost the expansion of innovative digital services for inclusive green finance.

Over the last few years, M-KOPA’s business model has pivoted to refinancing assets for customers with good repayment performance, offering them for example, credit for upgrades or cashback to digital wallets. The business has also moved into financing other assets beyond solar equipment, notably TVs and smartphones, product offerings that have taken the total customer base to over one million.



The same M2M technology is also used to record usage and for maintenance. The relatively low cost of mobile money transactions makes micropayments over an extended period of time commercially sustainable, and the remote switch reduces financial risk for the PAYG provider while granting flexibility to customers whose income streams might be fluctuating or unpredictable (Marke et al., 2019).

This solar leasing model can have a secondary effect in fostering digital financial inclusion. PAYG solar providers have an incentive to sign up prospective customers to join mobile money platforms because their business depends on it. Research estimates that in the early 2010s, up to half of new PAYG customers outside of Kenya were new to mobile money, and opened a mobile wallet in order to access the solar service (Winiiecki & Kumar, 2014). Moreover, customers generate data streams on repayment flows and energy usage that PAYG solar providers can use to assess creditworthiness, using predictive analytics and machine learning. In many jurisdictions, strict regulatory frameworks prevent firms from expanding beyond the asset financing business. But smart entrepreneurial innovation has led firms to offer product upgrades and access to re-financing for other livelihood-improving devices and services to deserving customers. In Uganda, for example, PAYG solar customers can use re-financing lines to help pay for school fees (Mattern & Garcia, 2021). With some flexibility and support from financial supervisors - while taking into account the risk of over-indebtedness - PAYG providers could leverage data and their digital know-how to provide an even wider range of financial services.

INDEX INSURANCE

The insurance industry can do more to help smallholder farmers who are increasingly exposed to climate risk. The Food and Agriculture Organization (FAO) of the United Nations reports that developing countries lost USD96 billion in the form of damaged or lost crops and livestock from 2005 to 2015 alone (UN News, 2018). Research using financial diaries of farmers in Mozambique, Pakistan, and Tanzania shows that at least half of farmers in these countries see their crops destroyed by adverse weather events at least once every five years (J. Anderson & Ahmed, 2016). Making matters worse, pastoralists often hoard their livestock at the onset of a drought and resort to fire sales later at deeply discounted prices, exacerbating the economic fallout from climate risk.

Yet less than 20 percent of smallholder farmers globally have adopted any insurance to cover themselves against risk, and insurance coverage is as low as 3 percent in Sub-Saharan Africa (Raithatha & Priebe, 2020). Community-based forms of informal insurance are common, but they struggle to address so-called covariate risk, namely when adverse weather events affect the majority of people in the same region at the same time.

Index-based insurance can help lower operating costs and thus expand the commercially sustainable range of customers. Index insurance models pay out once a pre-defined threshold on an area yield or weather index (e.g. rainfall) is crossed, allowing the provider to indemnify policy holders for losses without the need for a case-by-case inspection or a formal claims process (Chamberlain, 2017). Each sub-product has its own drawbacks and advantages. Area yield insurance has relatively low setup costs and covers non-weather events such as pests, but its claim settlement speed is relatively slow because losses in comparison to average yields for a certain area need to be calculated. Weather index insurance in turn requires long-term meteorological data for actuarial precision but can disburse payouts rapidly (Raithatha & Priebe, 2020).

Digital technology can address some supply and demand-side barriers to insurance uptake. The provision of traditional rural financial services is constrained by the geographic isolation, small scale, and high risk facing farming in the developing world (Benami & Carter, 2021). Many index insurance providers still rely on traditional channels such as bank branches or rural credit cooperatives for service delivery and payments, and many have struggled to become profitable in reaching smallholder farmers at an affordable price. Government subsidies are common. But innovative insurance companies can leverage digital retail payment platforms for the collection of premiums and payouts, significantly reducing operating costs while improving customer convenience. Next-generation providers use smartphone technology to allow farmers to send pictures of their crops and receive targeted agronomic advice in good times and rapid indemnity payouts in bad times (Hinson et al., 2019).

Low take-up of agricultural insurance can be attributed to low-quality services that have tarnished the industry's reputation in some jurisdictions, rather than a lack of financial literacy. Research shows that the greatest benefit of index insurance, namely the availability of payouts independent of on-the-ground verification, is also its greatest weakness.



BOX 3: DELIVERING INDEX INSURANCE VIA MOBILE - THE EXPERIENCE OF OKO

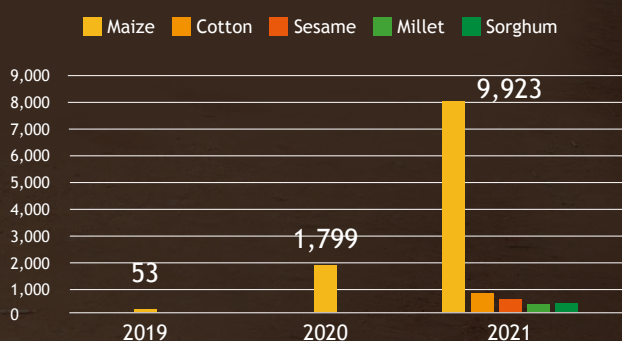
OKO is a what is known in the industry as a technical service provider (TSP). The company delivers the service and undertakes many of the insurer’s responsibilities in the value chain, with the exception of ensuring regulatory compliance and underwriting.

TSPs typically lack the insurance licences required to perform these functions. The founder of OKO notes that the regulatory environment was forbiddingly complicated, as national insurance regulators often lack a financial inclusion mandate and impose capital and risk management requirements that start-up companies cannot meet. In Mali, OKO started partnering with a local insurer and asked the supervisor for a no-objection letter to run a pilot in a geographically limited area, which it obtained in 2018. After a successful pilot run, the company obtained a license as an insurance agent in 2019, which gives it the rights of a TSP and allows OKO to engage individual end customers nationwide.

Source: OKO

OKO was fortunate to count on the support of Orange Money in Mali. The MNO decided to include OKO as an insurance service in its mobile money menu, providing it with the necessary ease of access and visibility to scale up. In return, Orange Money charges a 3% fee for any cash-out operation. OKO’s customer base rose from a few dozen in 2019 to almost 10,000 in 2021, not least thanks to excessively high rainfalls in 2020 that led to a high payout rate. Word of mouth among satisfied farmers helps, as does a trust-building network of agents on the ground and a responsive customer service department that can be reached by voice, text messages, and WhatsApp in French and Bambara, a local language.

POLICIES SOLD PER YEAR AND PER CROP



Farmers face so-called basis risk when they receive no payouts after incurring losses and vice versa. A World Bank review of index-based crop insurance in India indicates that insurance failure rates reached and exceeded 50 percent in some cases, making index insurance no more helpful than a lottery ticket (Clarke et al., 2012). Financial supervisors and financial inclusion advocates need to provide more transparency of basis risk inherent in specific index-based technologies to distinguish high-quality insurance services from the ones risk-averse farmers should avoid (Morsink et al., 2016).

Mobile network operators can help improve the quality and reach of index insurance. The commercial microwave link network they rely on for telecommunications can also be used to monitor rainfall, constituting a de-facto network of weather sensors. Customers can be located using call detail records from the telco base station or triangulation from several towers. Additionally, mobile network operators can incorporate an index insurance offering in the proprietary menu they provide on feature phones to help insurance providers reach scale. Finally, the collection of premiums and payouts can be faster and more convenient using mobile money than the network of bank branches and rural finance institutions traditional players still rely on (Raithatha & Priebe, 2020). At the same time, customers need appropriate protection from privacy abuses by companies.

AGRO MARKETPLACES

Traditional and even digital financial service providers struggle with last-mile delivery in rural areas. In sparsely populated areas, financial service providers find it difficult to generate enough transactions (and hence revenue) to make a network of agents or physical infrastructure, such as point-of-service terminals, commercially sustainable. Many providers thus choose to bundle and cross-sell a variety of products of relevance to rural customers. Traditionally, they worked with local agro-dealers or seed companies, but digitalization may offer a more cost-effective and encompassing way to address the last-mile problem (Hernandez et al., 2020).

Digital agro marketplaces can provide a range of financial and non-financial services to smallholder farmers. They are developed either as a standalone application or in partnership with an existing MNO platform, and build on the foundation of a digital retail payment (mobile money) platform. Farmers can use agro marketplaces throughout the agricultural cycle.

They can buy seeds and fertilizer, apply for credit to finance these inputs, buy crop insurance, sell their harvest and repay their loans - all through the same application. High-quality marketplaces allow their customers to select from a variety of suppliers for inputs and services, as well as access to a digitally enabled and, therefore, wider and more competitive market for their goods.

Timeliness, data-driven relevant advice and services, as well as cashless payments are benefits of digital agro marketplaces. Climate change makes rainfall more unpredictable and as a result, farmers in many developing and emerging economies often only have a small window of time to plant crops. Traditional firms, such as banks and microfinance institutions, struggle to process credit applications at the necessary speed, but digital credit assessments can be instantaneous. Another value added of digital marketplaces is that they can provide tailored advice on what, when, and how to grow produce. This is useful not only because farmers can lack access to high-quality meteorological data, modern techniques, and market information, but also because climate change requires them to adapt their agricultural practices. Farmers can use e-money for all financial transactions in the marketplace and can, therefore, save on time usually spent to cash in/out.

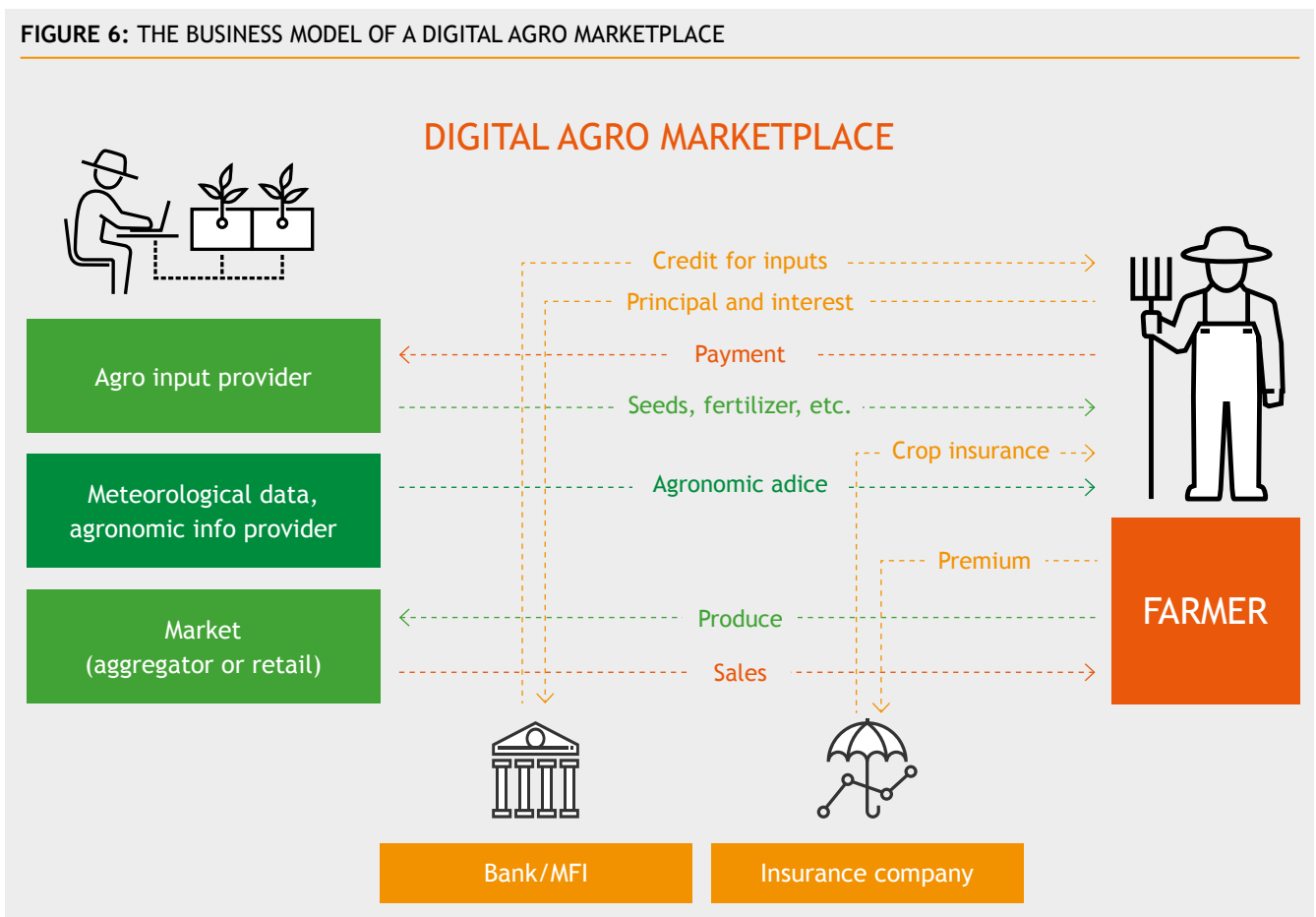
By leveraging the DNA feedback loop (see above), digital agro marketplaces can be commercially sustainable, at least in principle. The revenue stream of this business model includes a margin on the sale of inputs, interest rate spread on the loans extended, a commission for insurance, and a margin on trade transactions in the marketplace (Miller-Wise, 2019). The sector has boomed in Sub-Saharan Africa in recent years, and of the 390 firms surveyed in 2019, a quarter is breaking even and 15 applications have begun to reach notable scale (CTA, 2019). Half of the firms surveyed are headquartered in East Africa, and notable examples include DigiFarm, DigiGrow, and Tulaa. Based on self-reported data, customers see significant yield and income improvements due to better inputs, better growing techniques, and better market access (Miriri, 2020; Omulo & Kumeh, 2020; Strydom, 2017; World Bank, 2020). Independent research has yet to corroborate those results. A recent pilot study in Colombia revealed that farmers appreciate the digital application they used, but the advice provided did not change their technology, sales, nor did it translate into significant short-term welfare improvements (Camacho & Conover, 2019).

As the sector matures - and if regulators create a competitive environment for market actors - marketplaces that provide better value can be expected to replace the ones that are ill-designed to the needs of smallholder farmers.

Digital marketplaces for small-scale fisheries are developing with similar business models. Smallholder farmers and small-scale fishermen face the same problems of financial exclusion: they are ineligible for credit from formal lenders due to a lack of collateral, traditional banks are far away, and financial products are too expensive or ill-designed for their needs. Fishermen rely on informal financial providers, such as merchants and boat owners, but their services can be excessively priced and of little help to mitigate the daily risks of the trade, such as no catch, adverse weather, or damage to the boat and gear (Pomeroy et al., 2020). Overfishing, habitat loss, pollution, and climate change pose additional challenges of increasing severity.

Digital fisheries platforms, such as Abalobi (2022) in South Africa and Aruna (Shu, 2021) in Indonesia, address a number of interconnected issues: By shortening the supply chain and tracing the trajectory of each fish “from hook to cook”, they can check and certify sustainable fishing practices. Small-scale fishermen, in turn, obtain better market access, while digital cash flow data can help them obtain collateral-free financing for productivity-enhancing inputs. Using a traceability app called Trafiz, Indonesian NGOs help women fish sellers, in particular, obtain financial access and thus a path to economic empowerment (Langhorne, 2020).

FIGURE 6: THE BUSINESS MODEL OF A DIGITAL AGRO MARKETPLACE



POLICIES

The right institutional, fiscal, and regulatory environment is key. Policymakers in financial supervisory agencies, central banks, and line ministries have a wide range of tools at their disposal to advance the right institutional environment to let digital financial services for climate-vulnerable populations thrive. This section outlines regulatory approaches and policy lessons for an inclusive green digital financial services ecosystem.

BASIC REGULATORY ENABLERS

Policymakers need to remove obstacles to private-sector investment in digital financial inclusion for green purposes. Digital new (non-bank) digital finance providers are able to include underserved populations and remain commercially sustainable on their own if regulators and supervisors proactively work towards removing obstacles to market entry and operations. The private sector is willing to make substantial investments in creating digital retail payment platforms if the right incentives are in place. Leveraging a digital financial ecosystem for green purposes might, therefore, require a fundamental shift in the perspective of regulators, financial inclusion advocates, and other relevant policymakers. A decade of experience in developing and emerging economies shows that the existence of four basic regulatory enablers differentiate the jurisdictions where an inclusive digital financial ecosystem has failed to take off from those where it has thrived (Staschen & Meagher, 2018). These enablers, namely e-money issuance for non-banks, use of agents, a risk-based approach to regulation, as well as consumer protection, are discussed in greater detail in the remainder of this section. While they are relevant for digital financial services in general, all four enablers are also needed to leverage digital finance to improve climate change adaptation and mitigation.

Non-bank financial institutions are key drivers of mobile money expansion. Regulators in some jurisdictions have tied e-money issuance to the traditional banking system, either by new (non-bank) digital finance providers requiring non-bank providers to partner with banks or by restricting access to real-time payment systems to banks. Evidence suggests that financial authorities in jurisdictions which have enabled

non-banks, such as MNOs and BigTech companies, license to issue e-money and access to the payment and settlement system (Ehrentraud et al., 2021), have been able to facilitate more inclusive digital finance ecosystems. For example, the experience of Cote d'Ivoire and Ghana shows that mobile money adoption only took off after regulatory changes enabled non-banks from requirements to partner with banks in e-money issuance (Jenik & Mattern, 2019; Mattern & McKay, 2018). As a result, a greater share of the climate-vulnerable population in these countries is able to leverage mobile money platforms for climate change adaptation and mitigation.

Agent banking creates wide and dense networks of access. Cash-in/cash-out services at low cost and in close proximity are necessary for the rapid delivery of G2P payments and remittances in the wake of climate shocks. The disparity in the number of financial access points between jurisdictions that allow agent banking and those that rely on bank branches, ATMs, and microfinance institutions alone is stunning (see Figure 4 above). Turning telecom airtime vendors, small shops and kiosks into e-money agents is an essential method to bring financial services to climate-vulnerable populations in rural areas and elsewhere while retaining commercial sustainability. Agents will likely retain their importance for years to come, not only as a trusted human interface to the digital financial world, but also because experience in more digitally advanced developing and emerging economies shows that the near future will not be cashless (Bech et al., 2018).

A risk-based approach to customer onboarding allows for inclusive green finance without sacrificing financial stability and integrity. In some jurisdictions implementation of anti-money laundering and counter terrorist-financing rules (AML-CTF) without sufficient regard for proportionate application can inhibit climate-vulnerable populations from accessing the financial system. Low-income and rural households, for example, may lack the required identification documents to satisfy know-your-customer (KYC) requirements for digital financial services. A recent special report by AFI notes that several member jurisdictions “specify KYC requirements in terms of information that must be obtained and documents that must be acquired rather than in terms of the risk being mitigated” (AFI, 2019, p. 62). For instance, the global standard setter FATF does not include proof of address in its AML-CFT guidance, but some jurisdictions require it for onboarding, thus potentially excluding vulnerable populations. The AFI report also notes that a risk-based approach for tiered KYC where users can register easily

or small-scale mobile money transactions and where identification requirements increase proportionally to transaction volumes is a smart way to reduce access barriers while safeguarding financial integrity. In jurisdictions where digital ID systems are in place, electronic know-your-customer (e-KYC) registries that are shared by public and private stakeholders can make a significant difference in onboarding the unbanked in fast, safe, and efficient ways (AFI, 2018).

Consumer protection is essential, including for climate-vulnerable populations. Unbanked and under-banked individuals and families that are exposed to climate shocks have good reasons to be risk-averse: when incomes are low and vulnerable to economic shocks, misleading marketing, predatory lending, unfair small print in insurance contracts and other fraudulent practices by financial firms can send household finances into turmoil. Policymakers often cite financial literacy as a demand-side barrier to access, but direct and indirect knowledge of malicious practices can be understood as a rational disincentive to financial inclusion. For example, farmers with an index insurance policy that fails to pay out when they need assistance the most have no reason to trust the

insurance industry going forward. Trust is even more important in the digital financial ecosystem, which exposes consumers to new kinds of (cyber)risk, and which cannot rely on a long track record. Current legal practices that rely on “informed user consent” in accepting terms and conditions are insufficient to hold predatory firms accountable (Medine & Murthy, 2020). In Kenya, as an example, irresponsible digital lending practices are responsible for 90 percent of new entries to the blacklist of credit bureaus, threatening financial exclusion of vulnerable communities (Johnen et al., 2021). Ensuring that grievance redress mechanisms are widely accessible and that public authorities defend customers against firms in cases of cyber-fraud are essential to building trust in the digital financial ecosystem, especially among climate-vulnerable populations. AFI has published a policy model on consumer protection for DFS (AFI, 2020h) and a guideline on data privacy (AFI, 2021b) that incorporates these and other relevant concerns.



Women participate in a Village Savings and Loan meeting in Namasalima village, Mulanje District, Malawi. (Jake Lyell Alamy Stock Photo)

OPENNESS TO DIGITAL NEW (NON-BANK) DIGITAL FINANCE PROVIDERS

Regulators can adopt a test-and-learn approach to licensing. The experience of jurisdictions that are successful in fostering digital financial inclusion indicates that a test-and-learn approach in the early stages of digital transformation can be beneficial. Kenya’s M-Pesa, for example, was launched on the basis of a no-objection letter from the central bank (Ndung’u, 2021). In China, regulators spent close to a decade monitoring the development of digital retail finance before issuing rules to govern it (Woetzel et al., 2017). Singapore’s regulator offers three different licenses for payment service providers, each with particular activity limits and commensurate regulatory requirements (Ehrentraud et al., 2021). In Malaysia, BigTech e-money operators, such as Grab, are supervised under a moneylender license while having

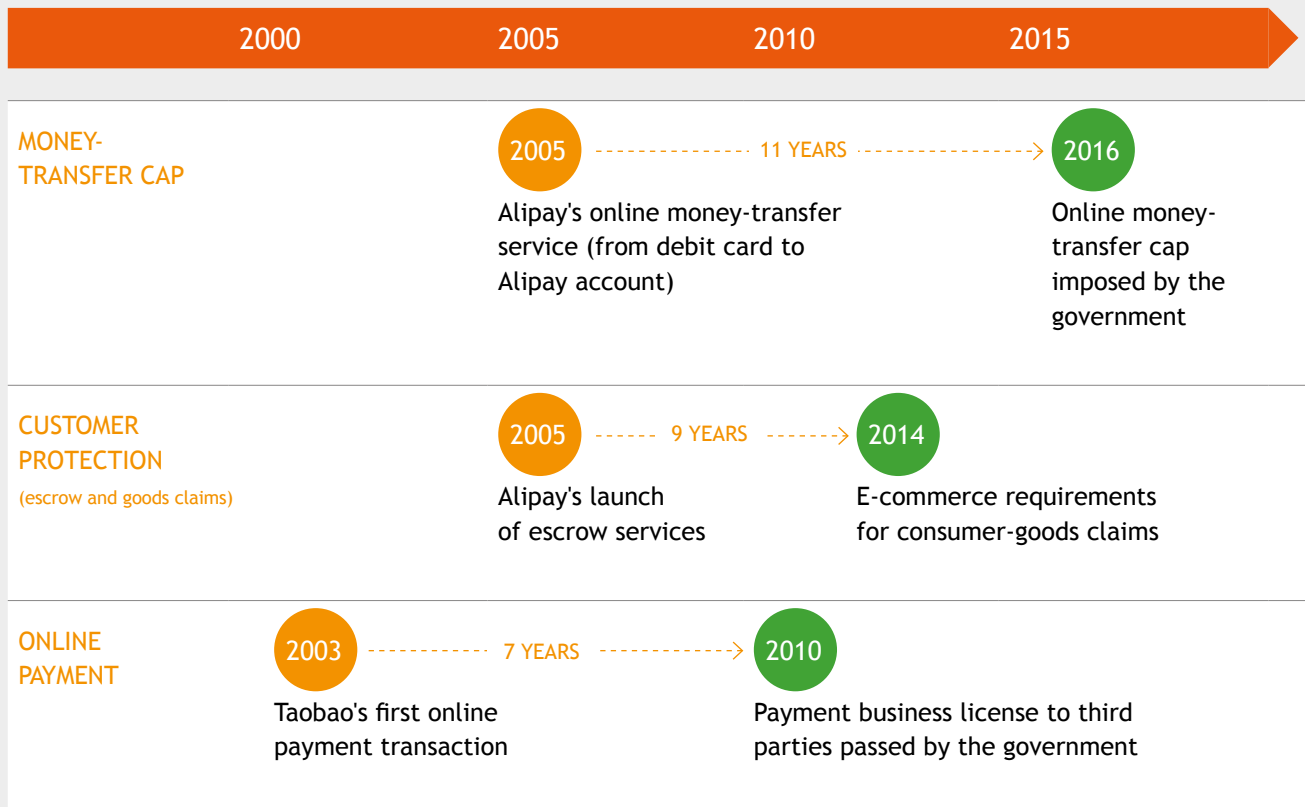
access to the real-time electronic payment system RPP (Choo, 2020). Conversely, an analysis of payment bank licenses in Mexico (Instituciones especializadas en emisión de dinero y pagos) and India (payment banks) shows that regulatory requirements may not be proportional to permitted activities. Digital new (non-bank) digital finance providers that offer green products and services may receive more favorable attention by regulators. A test-and-learn approach under controlled conditions, like regulatory sandboxes, innovation hubs and other innovation facilitators, to licensing also entails policy sequencing over time. Once a digital financial provider has reached scale, regulators in conjunction with competition, data governance, and cybersecurity authorities can issue rules to safeguard the public interest (Baur-Yazbeck et al., 2019). Here, the ongoing policy adjustments in Kenya and China are instructive.

FIGURE 7: REGULATORY SPACE IN THE EARLY STAGE OF CHINA’S DIGITAL FINANCE TRANSFORMATION

In mobile payments, government policies left space for innovators to experiment

Selected examples

● Commercial move ● Regulatory event



Source: Woetzel et al (2017)

Onerous regulatory requirements are a barrier to market entry for digital new (non-bank) digital finance providers with green financial service offerings. Evidence across developing and emerging economies shows that it is digital non-banks, such as telco operators and BigTech firms, that move the needle in climate-relevant digital financial inclusion. While the traditional financial system can benefit by providing prudentially supervised services and products (including trust accounts for mobile money) via digital platforms, it has not been able to harness digital automation to reach unbanked sectors of the economy by itself (Petralia et al., 2019). But regulatory requirements, such as high minimum capital requirements, mandatory joint-ventures, and tight restrictions on the scope of permitted financial services, disincentivize investment by digital new (non-bank) digital finance providers. As a result, relevant green financial services might not become available to climate-vulnerable populations at accessible prices.

Regulatory outreach and engagement matter more than institutional form. In particular, proactive engagement with industry participants and regulatory peers (such as competition and telecoms authorities) are essential for financial regulators who want to foster a green digital financial ecosystem (AFI, 2020b). The initiative by the UK Financial Conduct Authority (FCA) to create a regulatory sandbox has been imitated by regulators in many developing and emerging economies, aided by policy guides from different institutions (AFI, 2020f; Jenik & Duff, 2021). Experience from many jurisdictions show that focusing on providing regulatory clarity, regular outreach and engagement with stakeholders is effective in fostering green digital financial ecosystem and this could be through various approaches such as test-and-learn, regulatory sandboxes, innovation hubs, etc. depending on the context and relevance to respective jurisdictions.

REGULATORY RELIEF IN TIMES OF CRISIS

Regulators in several developing and emerging economies understood the utility of digital retail payment platforms as an informal safety net and took appropriate action during the COVID-19 crisis. Financial supervisors in Kenya and at least 13 other developing and emerging economies ordered mobile money firms to waive fees for low-value transactions and increase the limit of e-wallets in early 2020 (Njogore, 2020; AFI, 2022). Due to this regulatory relief and the pandemic itself, the number of active mobile money accounts and transaction values in 2020 grew by 17 percent and 22 percent, respectively (GSMA, 2021).

AFI (2020g) has encouraged its network members to consider fee waivers as a first step in a seven-pillar policy framework to leverage DFS to respond to global emergencies. Moreover, in India and Bangladesh for example, the government leveraged no-frills accounts and mobile money to provide emergency support to sectors of the population particularly affected by COVID-19 lockdown measures (Kapur et al., 2020; Kejriwal, 2020). While these regulatory activities respond to a catastrophe unrelated to climate change, they provide valuable lessons for regulatory interventions in the event of a future environmental crisis. Financial supervisors in the Philippines have already devised a framework for the provision of regulatory relief measures in the wake of natural disasters, for example (AFI, 2021a). Importantly, such relief measures should be temporary in nature and decided after industry consultation in order to not compromise the viability and commercial sustainability of the digital financial ecosystem.

FISCAL AND MONETARY POLICY SUPPORT

Fiscal authorities can create tax incentives for the uptake of (green) DFS. Affordability is one of the main reasons for financial exclusion (WBG, 2017). While access to digital retail payment platforms may be easier than traditional services, the unbanked and underbanked have to consider the cost of phone subscriptions and data plans, which can be prohibitively high. Recent digital affordability reports (GSMA, 2020; World Bank, 2021a) show that the cost of a 1GB data plan can vary between 11 percent and 30 percent of disposable income. Broadband internet access was found to be affordable in only 26 out of 42 Sub-Saharan African countries for which 2019 data was available (Ndulu et al., 2021). Fiscal authorities in some jurisdictions seek to ease budgetary constraints by levying taxes on digital infrastructure assets such as transmission and networking equipment, handsets, instant messaging and mobile money usage. But research shows that such tax regimes can discriminate against digital access and thus undermine climate-relevant digital financial inclusion (Ndung'u, 2019). This is especially concerning because access to the internet exhibits a higher price elasticity of demand than other goods and services, and potential consumers are easily discouraged by small price increases (Goel et al., 2006; Goolsbee, 2000). In more forward-looking jurisdictions, digital financial transactions are value-added tax-exempt, and businesses can qualify for tax exemptions if they invest enough in research and development for green financial technology (Cheng & Tang, 2021).

BOX 4: REGULATORY RELIEF, MONETARY AND FISCAL SUPPORT IN BANGLADESH

Bangladesh Bank, the country’s central bank and chief financial supervisor, has devised a number of policies to leverage digital financial inclusion to foster climate change adaptation and mitigation.

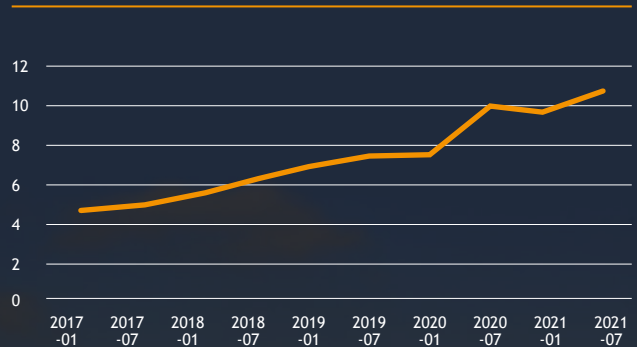
The central bank supports NGOs that offer pay-as-you-go financing for solar energy and low-carbon cooking methods by discounting the refinancing rate for the banks and financial institutions that offer loans to organizations. Financial intermediaries have also received a lower refinancing rate on loans for solar irrigation systems while farmers are able to pay for the use of such facilities in small instalments on a monthly basis, using mobile financial services (MFS).

Most green finance policies issued by Bangladesh Bank apply to the financial system as a whole. The authority published a green banking policy guideline in 2011, ordered banks and financial institutions to dedicate at least 5% of their loan portfolio to green purposes in 2014, issued a “sustainable finance taxonomy” in 2017 and doubled its revolving green refinancing scheme in 2020 after 11 years of operations (Bangladesh Bank, 2020b, 2020a; Iqbal, 2018). The authorities are aware that greenwashing remains a concern as a growing number of sectors seek to obtain access to financing under favorable terms (Barkawi & Monnin, 2015). Still, SMEs and

other underbanked parts of the economy can benefit from the central bank’s green policy to finance climate change adaptation and mitigation measures. Bangladesh Bank also instructed banks in partnership with microfinance institutions to provide credit in the wake of natural disasters at better rates and with lower documentation requirements than in normal times, providing regulatory relief in times of crisis.

Meanwhile, the country has experienced a continued uptake in MFS (see graph below). While loan issuance is still under the exclusive purview of banks and microfinance institutions, they cooperate with mobile financial service providers in the areas of credit assessment, loan disbursement, and repayment. Moreover, the central bank opened its electronic bank transfer clearinghouse to MFS providers, allowing the government to channel subsidies or social protection payments directly to mobile money accounts.

NUMBER OF DAILY AVERAGE TRANSACTION USING MFS (MILLIONS)



Solar irrigation pumps, Bangladesh. (Mahfuzul Bhuiyan/iStock)

Monetary authorities can incentivize green digital investment. Green loans offered through digital platforms can allow climate-vulnerable populations to invest in technologies that enhance their resilience and even mitigate climate change (see Section 3). But because low-carbon technology often entails high upfront costs and longer-term price savings, the price of green loans matters a great deal. A study covering 35 advanced and emerging market economies since 2000 shows that green investments decline by about 10 percent when the real interest rate increases by one percentage point (Eyraud et al., 2011). Central banks can, therefore, incentivize green investments by offering refinancing at favorable rates to green loans issued by the financial sector, regardless whether or not they are delivered via digital platforms. The above is only a selection of a wider toolkit at the disposal of monetary authorities (Volz et al., 2020; AFI, 2020d).

FOSTERING TARGETED CONSUMER UPTAKE

Tailored incentives and education programs can address gaps in access to digital finance. Governments can channel G2P payments through digital channels to foster uptake among vulnerable populations that do not have access to the traditional financial sector. MSMEs in many jurisdictions may be reluctant to embrace digital technology because they fear that fiscal authorities will use digital receipts to raise taxes. In Bangladesh, the central bank created a special merchant account that channels incentives and subsidies to small vendors while promising not to use cash flow data for taxation purposes.

A gender-specific approach to digital financial inclusion makes a difference. As mentioned at the outset of this study, women are less likely to own a mobile phone and access the internet or digital financial services. A study on digital agro marketplaces in rural Kenya found that while women farmers are more than twice as likely to experience emergencies as the national average, they manage to save at the same rates as Kenyans overall. The design of agro marketplaces and other digital financial products must take into account their particular needs to be successful (Varangis et al., 2021). The human interface with the digital worlds also matters. An IFC-sponsored study in Bangladesh showed that women prefer female mobile money agents because they are believed to behave better and provide superior services. At the time though, fewer than one percent of mobile money agents were female.

The authorities developed a Women Agent Acquisition Toolkit to address this disparity and foster uptake among women (Barooah et al., 2018). AFI has also compiled Lessons on Enhancing Women's Financial Inclusion Using Digital Financial Services from its member network (AFI, 2020e).

CONCLUSION: POLICY RECOMMENDATIONS

The development of digital finance platforms is driven chiefly by telecom companies in Sub-Saharan Africa and BigTech firms in Asia, with important exceptions. Country-specific gaps in infrastructure and the financial market shape the demand for services and the potential for technological leap-frogging.

For example, PAYG solar solutions may be less attractive in middle-income countries where access to the national electrical grid is more reliable. Rather than prescribing green digital financial solutions as noted above, policymakers are encouraged to remove obstacles to a thriving market in which private actors have incentives for risk-taking and innovation to meet the real needs of climate-vulnerable populations.

The insights gathered from the experiences of AFI members and expert interviews suggests the following six high-level recommendations:

- 1. Allow non-banks to establish digital retail payment platforms.** Non-banks such as mobile network operators and BigTech firms are able to leverage data, network externalities, and cross-selling (the DNA feedback loop) in ways that make the establishment of a retail payment platform worth the investment even if it is not immediately profitable on its own., policymakers concerned with inclusive green finance should focus on retail payment platforms that can provide basic but essential services to climate-vulnerable populations, especially in low-income and rural zones.
- 2. Consider policy sequencing, test-and-learn.** Complex and onerous requirements regarding licensing, risk management, data governance, and interoperability are often made to guarantee financial safety, stability, and competition. But they may encumber the market entrance of digital new (non-bank) digital finance providers and reduce business incentives to invest in a digital payment platform. Taxes on green imports and the digital economy, likewise, represent an obstacle to green digital financial inclusion. Policymakers should facilitate market entrance of digital new (non-bank) digital finance providers to innovate under controlled conditions, like test and learn,

regulatory sandboxes, innovative hubs and other innovation facilitators, and once a basic digital ecosystem is established, regulators can issue the rules to avoid market failures.

- 3. Lower barriers to entry by adopting a risk-based approach.** For customers, this means tiered KYC and a reconsideration of identity requirements to register for mobile money. For firms, this means a more flexible licensing regime. A risk-based approach to market entry in the digital finance sector can entail “light licensing” for small-scale firms or the removal of cooperation obligations with incumbent financial firms. For MSMEs, a special mobile money account category that allays fears of subsequent taxation can boost adoption of digital payment platforms. In all cases, transactions at greater frequencies and higher values should be subject to greater regulatory scrutiny.
- 4. Remove obstacles to private-sector investment in digital financial inclusion for green purposes.** Innovative green DFS products are developed by entrepreneurs who meet real demand by customers. In the process, they may take market share away from traditional incumbents who failed to innovate and address the needs of underserved populations. Policymakers can contribute to this process of creative destruction by providing an enabling environment and reducing barriers to market entry that protect established firms.

- 5. Focus on engagement and outreach, not institutional form.** Openness to digital new (non-bank) digital finance providers and particularly green digital service providers, recurring engagement with industry stakeholders (including non-bank financial intermediaries), collaborations across ministerial and agency siloes are all key qualities of an enabling regulatory environment. Irrespective of the regulatory approach (regulatory sandbox, test-and-learn, etc.), it is the attitude and openness of the regulators that contributes to a thriving green DFS ecosystem.
- 6. Address access gaps by fostering uptake among targeted customer groups.** Climate-vulnerable populations such as smallholder farmers and low-income households need particular attention from policymakers in the design of capacity building programs and financial literacy campaigns. In addition, a gender-sensitive approach to encourage DFS uptake by women is essential. Because trust is a key precondition for the adoption of DFS, consumer protection laws and regulations should protect the interests of retail customers vis-à-vis financial firms and provide easily accessible grievance redress mechanisms. Subsidies, regulatory relief, and the channeling of G2P payments via digital channels to climate-vulnerable populations are additional methods to address current access gaps.

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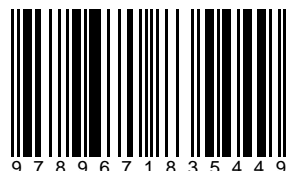
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