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Innovation in Payments: Opportunities and Challenges for EMDEs

Fintech and the Future of Finance Flagship Technical Note

WORLD BANK GROUP

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1818 H Street NW,
Washington DC 20433
Telephone: 202-473-1000;
Internet: www.worldbank.org

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Authors and Contributors

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This note is a product of the Financial Inclusion, Infrastructure, and Access unit of the World Bank Group’s Finance, Competitiveness, and Innovation Global Practice. It was prepared by Dorothee Delort and Jose Antonio Garcia Luna, under the direction of Harish Natarajan (all World Bank Group).

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Acronyms

ACH	Automated Clearing House
AISP	Account Initiation Service Providers
AML	Anti-Money Laundering
API	Application Programming Interface
ATM	Automated Teller Machine
B2B	Business-to-Business
BIS	Bank for International Settlements
CBB	Central Bank of The Bahamas
CBDC	Central Bank Digital Currency
CBU	Central Bank of Uruguay
CDD	Customer Due Diligence
CFT	Combating the Financing of Terrorism
CPMI	Committee on Payments and Market Infrastructures
DCEP	Digital Currency Electronic Payment
DLT	Distributed Ledger Technology
EBPP	Electronic Bill Present and Payment
EFT	Electronic Funds Transfer
EMDE	Emerging Markets and Developing Economies
FMI	Financial Market Infrastructure
FPS	Fast Payments System
FSB	Financial Stability Board
FX	Foreign Exchange
G2P	Government-to-Person
GPSS	Global Payment System Survey
ICT	Information and Communication Technologies
IFC	International Finance Corporation
IMF	International Monetary Fund
IoT	Internet of Things
KYC	Know-Your-Customer
KPI	Key Performance Indicator

MDR	Merchant Discount Rate
MNO	Mobile Network Operator
NPCI	National Payments Corporation of India
NPS	National payment system
P2B	Person-to-Business
P2P	Person-to-Person
PAFI	Payment Aspects of Financial Inclusion
PBC	People's Bank of China
PIN	Personal Identification Number
PISP	Payments Initiation Service Providers
POS	Point-of-Sale
PSP	Payment Service Provider
RSP	Remittance Service Provider
RTGS	Real Time Gross Settlement
RTP	Request to Pay
SCA	Strong Customer Authentication
SEPA	Single Euro Payments Area
SIPS	Systemically Important Payment Systems
SME	Small And Medium Enterprises
SSB	Small Subsistence Business
TPAPS	Third-Party App Providers
TPP	Third-Party Payment Provider
WBG	World Bank Group
UPI	Unified Payments Interface
USD	United States Dollar

Executive Summary

The global economy is undergoing a rapid digital transformation that is changing many conventional notions about our behavior and preferences. This includes the way in which we—as consumers, as businesses, or in interactions with government—seek out goods and services and pay for them or how we receive money from others or transfer it to family or friends. As the payments industry undergoes radical changes due to digital transformation, users, providers of payment services, and regulators are adapting to the new dynamics at varying paces.

This note discusses the most significant innovations in payments and their key impacts and implications on users, banks and other payment service providers, regulators, and the overall structure of the payments market. The note places special emphasis on how emerging markets and developing economies (EMDEs) can reap the benefits of payment innovations in terms of costs, convenience, accessibility, and inclusion for individuals and firms, and allow them to leapfrog development of their payments markets and effectively support economic activity.

Payments are probably the financial activity most affected by innovation, undergoing radical changes from various perspectives. This transformation has been prompted by the adoption of new technologies and business models, by the emergence of new market players, and by changes in the structure of the market. This is having a profound impact beyond the realm of payments and is also affecting the real economy. Changes are significant.

- Payments have become a standalone product, no longer just a supporting function typically offered only by banks as part of a bundle of services and with comfortable profit margins. In other words, payments have become a separate, identifiable service offered by a growing number of providers, including non-banks, exercising downward pressure on fees and margins and upward demand for quality.
- The consumer experience has been transformed as long-standing barriers or deterrents to the use of digital payments are gradually being overcome, helping meet new demands from payers and payees for increased speed and convenience and lower prices.
- In some cases, as with ride-hailing or meal-ordering apps or “one-click” online ordering, the purchase experience has been totally transformed by making the actual payment process “invisible” from the customer’s perspective.
- Payments are increasingly becoming a source and provider of data that is critical for differentiation against competitors and for the provision of other products and services, including—but not limited to—those offered by financial sector entities.
- Innovation in payments has enabled and shaped major developments in the real economy, like the surge of e-commerce—including transactional online services offered by governments—and, in turn, new platform models that have placed additional demands on payment services.

Competition in payments has increased and is only intensifying, but may paradoxically lead to renewed concentration and an oligopolistic equilibrium. In essence, payments may evolve once again into a concentrated market served by a relatively limited number of providers. Unlike in the past, these providers could be technology giants and/or large telecommunication firms, rather than banking institutions. The consequences and challenges of this potential outcome are not fully understood.

While innovation in the area of retail payments has been prolific, it has not fully transmitted to specific payment streams like international remittances and other forms of cross-border payments, some types of government payments, and business-to-business (B2B) payments.[1] For example, the Committee on Payments and Market Infrastructures (CPMI) reports that cross-border payments lag behind domestic payments in terms of cost, speed, access, and transparency.[2] In the area of government payments, many EMDEs have a long way to go in digitizing their payments and collections effectively, largely due to coordination challenges and other elements that slow down the general use of payment innovations. Here, however, the COVID crisis has accelerated digitalization efforts, for example to facilitate transfer of relief funds while trying to ensure social distancing. Regarding B2B payments, this market segment has certain unique requirements like linkage to invoicing processes and taxation, and payments tend to be for larger amounts. To date, these unique requirements have not been fully met.

Innovations in payments and their consequences on service providers and the overall payments market are also proving to be a unique challenge for central banks in their various statutory roles in payments.[3] The regulatory and oversight roles of central banks are already being challenged by the changes in the structure of the payments market resulting from innovations. Furthermore, innovations may even disrupt the traditional divide between central bank money and commercial bank money, and therefore impact all aspects of the central bank's mission, beyond its mandate on payments, including monetary policy and financial stability. Central banks have no choice but to introduce changes in their own work processes and procedures, build new capacities and, more generally, rethink their approach to money. Their role is not diminished by innovation in payments; it is, on the contrary, made even more critical.

EMDEs can greatly benefit from many of these innovations but will need to carefully consider their multiple facets and implications and develop policies and institutional capacities accordingly. EMDEs should continue to create an enabling environment for innovation in their financial sector, fostering new products and providers while managing risks and protecting consumers. At the same time, they should not write off proven strategies and methods to accomplish important objectives like financial inclusion and stability. In any case, central banks and other regulators should be duly equipped and prepared to support their country's public and private sector actors so that they can maximize gains from the new reality.

1. There have been also some relevant developments in large-value payments, which have been less visible for non-payments specialists and the general population. These include the adoption of ISO 20022 message standards, cloud-based hosting of the solutions and expanding access to large-value payment systems to participants other than banks.
2. CPMI (2020).
3. These include being operators of payment systems, supervisors of payment services providers, catalysts for change, and overseers of the National Payments System (NPS), which encompasses payment systems, payment services, and payment instruments.

Innovation in payments can be characterized on three levels, how it materializes, its structural impact, and how the central bank, as payments authority, needs to adapt. *The main pillars of innovation in payments include: i) changes to the way payment services are linked to an account; ii) changes to the systems that process payment transactions; and, iii) changes in the way consumers interact with payments and the business model of payment service providers. Thanks to innovations like mobile wallets or super apps—combined with fast payments, APIs, and other technologies—customers now find it more convenient and less costly to make and receive digital payments, while enjoying a smoother user experience. At the same time, innovations are also redefining business models for payments, which in turn are having far-reaching consequences for the very structure of the payments market.*

The most conspicuous effects of innovation on the structure of the market have been its impact on competition by opening up the payments market to non-banks, by putting downward pressure on payment service fees, and by making real-time payments the new normal. *While new entrants challenge incumbents, innovation could end up having a paradoxical, centralizing effect and a tendency to increase concentration, with the major transformation being the shift of dominant market positions from incumbents to big tech companies. In addition to banks, other payments ecosystem players are deeply impacted by the ongoing changes, and it is especially the case for international and domestic payment card networks and ACH service providers. Government agencies are also significantly affected by the wave of innovation in payments: for interactions with citizens through the provision of government services and programs that involve making payments.*

Innovation in payments challenges central banks in their typical roles vis-à-vis payments; that is, as operators, overseers, regulators, and catalysts for change. They also need to move beyond their typical mandates on payments as innovations continue to redefine money. *The combination of traditional and new risks and causes for potential market failures calls for centrals banks to reassess and renew, not just policies, but also their internal organization, activities and tools, and heighten their level of collaboration and cooperation with authorities and stakeholders.*

Introduction: Changes in the Way We Pay Are Transforming Our Everyday Life, the Financial Landscape and the Economy

This technical note is intended primarily for central banks and other financial sector policy makers and regulators. It aims to increase awareness on the sometimes hermetic world of payment systems and payment services, if only due to the pervasiveness of payments and their interrelations with multiple sectors, stakeholders, and policy aspects. Another key objective is to discuss how EMDEs can reap the benefits of payment innovations in terms of costs, convenience, accessibility and inclusion for individuals and firms.

The technical note builds on the experience of the World Band Group (WBG) in supporting National Payment System (NPS) reforms and contributing to the work of international standards-setting bodies.[4] For over two decades, the WBG has been supporting developing countries in various areas of the NPS, including financial market infrastructures (FMIs), retail payment systems, payment instruments, payment services, and remittances. It has also collaborated with the CPMI and the Financial Stability Board (FSB) on these same topics as well as on innovations, financial inclusion, and digital financial services.

Section 1 describes the major pillars of innovation in payments, while section 2 analyzes their impact on all features and strata of the market, providers as well as users, including governments as major users of payment services, with COVID-19 accentuating the urgency of this transformation. Section 3 focuses on how innovation is forcing central banks to reexamine their operational, regulatory, and oversight action with regards to payments and, more globally, money. Section 4 proposes a set of considerations for a strategic approach to responsibly harness innovation in payments, followed by concluding remarks.

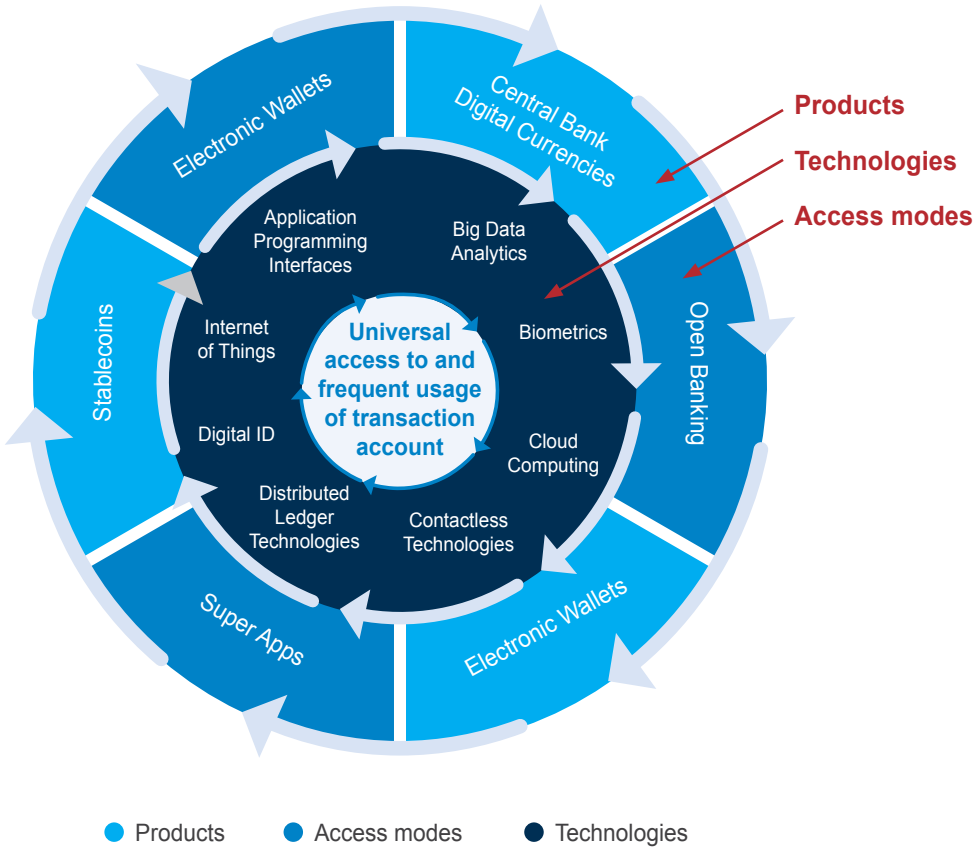
This document draws extensively from the report “Payment aspects of financial inclusion in the Fintech era” (hereinafter the “PAFI Fintech report”) issued by the Committee on Payments and Market Infrastructures (CPMI) and the World Bank Payment Aspects of Financial Inclusion (PAFI) task force in April 2020.[5] Other key information sources include the World Bank Group’s Global Payment Systems Survey (WBG GPSS) 2018, other WBG publications in the field of payments and remittances,[6] and various publications by the Bank for International Settlements (BIS) and the CPMI.

4. Please see the Authors and Contributors section for details.
5. CPMI-WBG (2020), available at https://www.bis.org/cpmi/publ/d191.pdf.
6. See https://www.worldbank.org/en/topic/paymentsystemsremittances.

1. Innovation in Payments, a Largescale Disruption at an Unprecedented Speed[7]

Technological innovation is at the heart of innovations in financial services, especially in payments. New technologies have enabled the development of new products and services, entry of new providers, and new access modes. Figure 1 provides a stylized illustration of this linkage, designed in the context of the CPMI-World Bank Group work on payment aspects of financial inclusion (that is, so-called "PAFI").

Figure 1. The Payments Fintech Wheel in the Context of PAFI

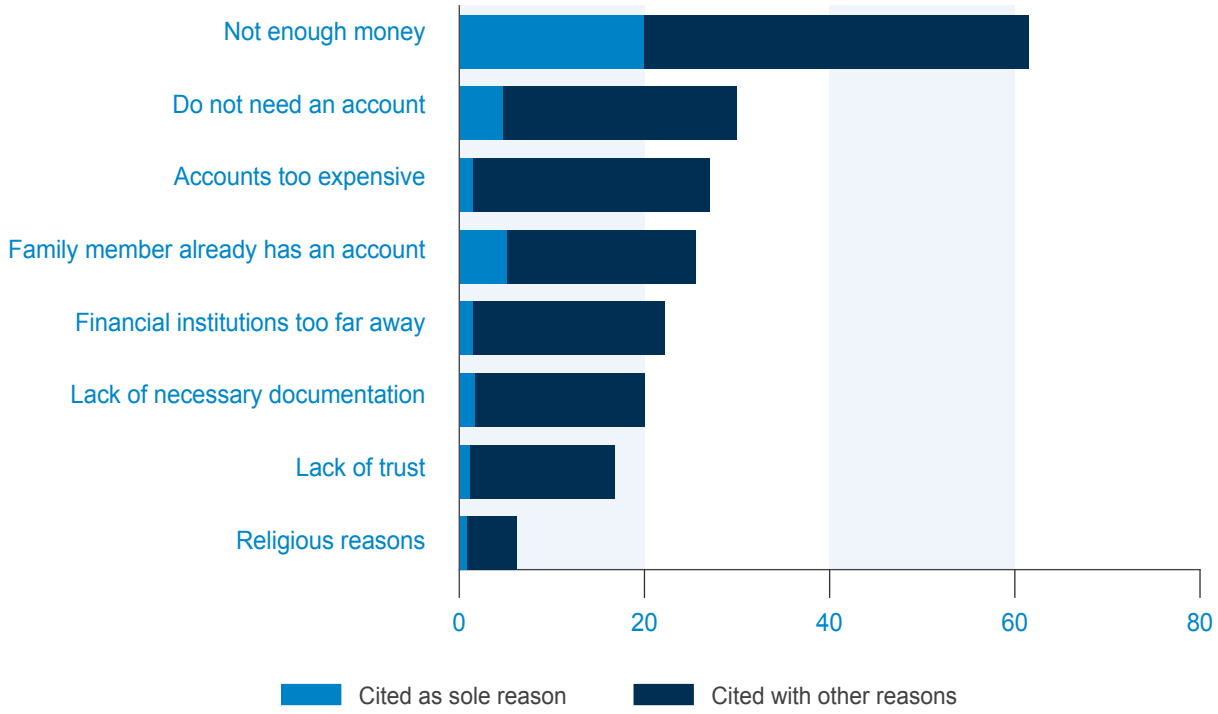


Source: PAFI Fintech report.

7. For definitions of the various innovations discussed in this section, readers are referred to the PAFI Fintech report.

In practice, innovations in payments are making it possible to address many of the long-standing frictions that impaired payer and payee user experiences, or deterred consumers from having accounts altogether. The main frictions, as per Global Findex 2017 data, are shown in figure 2, and can be roughly classified into two main categories: inconvenience and high cost.[8] Safety and speed of payments, as well as proximity of access points for payment services are examples of convenience. Regarding cost, users had to deal with direct costs (for example, high transaction[9] and account maintenance fees) and also indirect costs such as transportation costs or time spent accessing the closest access point. High costs affect both payers and payees, when they accept digital payments, which can be a major deterrent, particularly for small businesses.

Figure 2. Frictions in Access to and Usage of a Transaction Account[10]



Source: Global Findex database.

From an analytical standpoint, innovations in payments can be categorized into three main pillars: i) changes to the way payment services are linked to an account; ii) changes to the systems that process payment transactions; and iii) changes in the way consumers interact with payments and the business model of payment service providers. This is represented in figure 3. Thanks to these developments, many customers (payers and payees) around the world now find it more convenient and less costly to make and receive digital payments, while at the same time enjoying a smoother user experience. In parallel, innovations in all these areas are also redefining business models for payments, which in turn are having far-reaching consequences for the very structure of the payments market.

8. There are other frictions that are not directly related to the payment experience, but still negatively affect usage of electronic payments, such as informality and lack of documentation, limited literacy, and lack of trust in financial services.
9. High per-transaction fees have a proportionately larger impact on small-value payments, which are the ones that low-income end users typically make.
10. Adults without a financial institution account reporting one or more barriers as a reason for not having one (percentage), 2017.

Figure 3. The Three Pillars of Innovation in Payments

I. Changes to links between payments and accounts: the four waves

- Digital access to bank accounts
- The "prepaid" concept and entry of non-banks
- De-linking of initiation of payment from maintenance of account
- De-linking of account from payment.

II. Changes in payment processing

- Faster payments
- Distributed ledger technologies (DLT)
- QR codes
- Integration with ID.

III. Changes in user engagement and business model

- Integration with day-to-day interactions
- Invisible payments
- Big Data and analytics.

Source: Global Findex database.

For a long time, access to payment services (other than cash) was directly determined by access to a bank account. One needed a bank account to have a checkbook, a payment card, to make credit transfers, or authorize direct debits. Till the late 1980s, and even in the early 1990s, most transactions were initiated in person, and/or through paper means, and in a few cases via telephone. The digitalization of customers' access to their bank accounts was a significant breakthrough, allowing accountholders to mobilize their funds electronically, first through a linked debit card, then through Internet banking and via mobile banking in the first decade of the new century.

Operating a bank account became more convenient, but having one was not within the reach of many individuals and small businesses, especially in EMDEs. A bank account typically required an income commensurate with the cost of maintaining and operating the account; moreover, proximity to a branch to open an account and for other interactions was still needed. The creation of the prepaid concept, whereby monetary value can be stored in special purpose accounts (that is, e-money accounts)[11] and accessed and transacted through digital devices and channels, broke that exclusive link between non-cash payment instruments and bank accounts.

E-money was revolutionary and has had a transformative impact; it led to the creation of a new payment instrument that could better meet the needs of certain customer segments. More importantly, it opened the market of payment services to non-banks and different business models. Indeed, while e-money had been around for some time, the rise of non-banks, in particular operators of mobile telephony (or mobile network operators—MNOs), was the real game changer (see box 1). The other important underpinnings for the success of e-money include: (i) leveraging of third-party agent networks; (ii) regulatory simplification of know-your-customer (KYC) requirements for the opening of e-money

11. E-money is not considered an innovation in the payments fintech community because the prepaid concept had been there before the fintech term itself came into mainstream usage.

accounts; and, (iii) alternative pricing models.[12] The use of agents addressed the proximity challenge of traditional payment mechanisms and enabled the provider to use a variable cost model to distribution rather than the fixed cost of a branch and ATM-based distribution model. The simplification of KYC requirements enabled more individuals with access to only basic identification to open e-money accounts. The use of alternative pricing models was better suited for low-income individuals, who could not afford the fees associated with opening and maintaining a bank account.[13] In particular, most e-money services use a "per transaction-based" fee model, in which accountholders only pay for the payment service they actually use.

Box 1. Non-Banks as Providers of E-Money Services

In the mid-2000s, MNOs—usually through subsidiaries or other corporate structures—leveraged their core business to offer an innovative way to transfer money: via a mobile phone to other individuals who also had mobile phones; this was generally referred to as "mobile money". MNOs also opened basic transaction accounts for their customers so that they could store funds to transfer money or make payments.

While this last function could also be performed by banks, MNOs very often offered a more convenient and accessible option by leveraging their distribution network (that is, agents) to service these accounts. The most visible example was M-Pesa, in Kenya.

According to GSMA, by end-2018 there were 272 live mobile money deployments in 90 countries. In recent years, many traditional e-money providers have evolved and now provide mobile money services through mobile wallets.

Source: Authors' elaboration and GSMA.

The competitive pressure exerted on banks by MNOs and other entities providing e-money accounts and related services has also been transformative, yielding positive results for consumers. Indeed, many banks have adapted and, as a result, have improved their product features, lowered minimum account opening and/or balance requirements,[14] and enhanced accessibility to their accounts and payment services.

Competition pressure by e-money and non-banks also led to a rapid evolution in payment methods: from MNOs offering basic person-to-person money transfers using feature phones, the generalized offering of electronic wallets,[15] to "super apps" that have adopted a platform business model. A significant part of the success of these new payment mechanisms is due to the de-linking of the initiation of payments from the management of accounts. This has allowed third parties to provide payment initiation services to customers that hold their accounts with any given payment service provider (PSP), often embedding payments into other apps and services, providing convenience to customers.[16] This has been made possible by initiatives like open banking via application programming interfaces (APIs) and tokenization (see box 2).

12. As with any other product or innovation, e-money offerings by non-bank PSPs are not exempt from risks (for example, the possibility that the entities managing accounts where customer funds are held go bankrupt without a safety net) and other limitations.
13. Banks traditionally have used a pricing model and cost structure based on a periodical (for example, monthly) fixed service fee, which allows accountholders to use various services. This model proved not appropriate for many poor individuals for several reasons, including due to their uncertain incomes and having to pay for services that they do not really need or use.
14. In some cases, these developments have been the result of regulatory action.
15. According to the PAFI Fintech report, e-wallets are payment arrangements that enable end-users to securely access, manage, and use a variety of payment instruments issued by one or more PSPs via an application or a website. The e-wallet may reside on a device owned by the holder (for example, a smartphone), or remotely hosted on a server, but is anyway under the control of the holder.
16. For example, through in-app payments, customers can benefit from fast and largely automated checkout systems. In some countries, some e-wallet providers use APIs to interface with the bank or non-bank PSP that holds the account of the customer. This is the case of Google Pay in India, among many others. Box 5 in this report provides details on some of these issues.

Box 2. APIs, Open Banking, and Tokenization

An API defines how software components communicate with one another. An open API enables external application (app) developers to establish communication between their own apps and the apps and information systems of the entity providing the API.[17] In an open banking context, APIs allow third-party providers to gain access to account information of the banks' clients—typically to offer value-added services—provided the clients have given consent. For example, when a customer places a payment order through a mobile app developed by a fintech, the customer's bank grants the fintech access to the client's account data for the payment to be made. Many FMIs publish API specifications to enable direct connections between their clients' back-office systems and the FMIs' own IT systems, leading to greater transaction processing efficiency. Super apps make extensive use of APIs, though not necessarily open APIs.

Tokenization is the process of protecting sensitive data by replacing them with an algorithmically generated number—called a "token". In credit card tokenization, the customer's primary account number is replaced with a token. Therefore, tokens become the payment credentials and, based on encryption and cryptography, they provide a much more secure way to make payments. As a payment is processed, the token is passed through the Internet or various wireless networks used to process the payment, without actual bank details being exposed. The actual payment credential is held safe in a secure token vault. Tokenization is also behind the development of payment capabilities in the Internet of Things—like a refrigerator being able to "order" grocery. Tokenization is used by wallet services like Apple Pay and Google Pay.

Source: Authors' elaboration.

E-wallets and super apps are especially useful in dealing with a major limitation of traditional e-money products: their very limited use for person-to-merchant payments. E-wallets have gained traction worldwide, especially as their deployment on mobile phones with Internet access increases—hence they are often referred to as "mobile wallets" (see box 3). Well-known examples include ApplePay, Google Pay, PayPal, and Samsung Pay. Super apps, on the other hand, provide end users with a one-stop shop for a large variety of products and services and are widely used for e-commerce payments, although super apps have also made inroads in payments at physical merchants. By greatly expanding the number of use cases—including daily life matters like ride hailing—and also by integrating as many digital payment instruments as possible, super apps are becoming a major driver of usage of transaction accounts. In China, for example, based on 2019 data from the People's Bank of China (PBC), the number of payments per capita made with the apps of non-bank PSPs like Alipay and WeChatPay was 514, compared to only 27 five years before. Further, super apps adopt a platform business model, serving as a gateway for users of various financial services offered by other institutions but accessed and managed through the payment app.[18]

17. While open banking initiatives typically target traditional bank accounts, some mobile money providers are also establishing payment platforms with access via APIs. For example, Safaricom M-Pesa in Kenya or MTN in Uganda offer API portals for businesses and/or third-party developers to enable mobile money to be integrated into service offerings.
18. This business model has also been followed though to a lesser degree in EMDEs where smartphone penetration is limited, notably in Sub-Saharan Africa.

Box 3. Digitalization of Fare Payments in Public Transit Systems

E-wallets are starting to play a role in a specific use case that can become a game changer for the low usage of transaction accounts around the world: fare payments in mass/public transit systems. These systems are used frequently (for example, daily or almost daily) by a significant share of the population and, with a few exceptions, they rely heavily on cash or sub-optimal non-cash payment solutions like single-purpose and closed-loop solutions that require users to set aside funds to pay transit fares.

In some cities, mobile wallets enabled by contactless payment technologies like NFC or QR codes are now being used to pay public transit fares. For instance, London's TfL system has adopted an open-loop transit payment scheme accepting contactless cards and mobile wallets. Also, the Shanghai Metro recently adopted QR codes, enabling users to pay with their mobile phones via Alipay or UnionPay. In both cases, mobile wallet payments run in parallel to previous payment methods.

Source: Authors' elaboration.

Tokenization and APIs preserve the role of incumbents while facilitating new entrants; however, other innovations like crypto-assets and stablecoins seek to introduce a more radical disruption. These innovations could enable individuals and businesses to transact directly with each other without the need for a trusted third party (for example, a bank) to maintain the underlying account. In other words, these innovations could delink accounts altogether from payments, meaning that users can make digital payments/transfers without having an account with a bank or other PSP.[19] Distributed ledger technologies (DLT) are the key enabler of these innovations.[20]

Nevertheless, actual usage of crypto-assets for payments (for example, cryptocurrencies) is still very limited and requires some new types of intermediaries. Crypto-assets such as Bitcoin are "value-based instruments" (that is, they are not a financial claim on an issuer), which makes them highly volatile and therefore not widely accepted. End users are therefore subject to high "cashing out" costs, among other risks. In this context, stablecoins are a class of crypto-asset designed to minimize price volatility, for example by "backing" their value with fiat currencies or assets or attempting to match demand and supply. Currently there are several stablecoins in operation, though none enjoy mainstream usage.[21] Further, new intermediaries like wallet providers and crypto-exchanges have evolved, which make the interface with the underlying technology infrastructure of crypto-assets and stablecoins simpler and user-friendly. Incidentally, many super-apps and existing e-money providers like Paypal are beginning to offer similar services to their customers.

Central bank digital currencies (CBDCs) are another innovation that has the potential to disrupt the prevailing tiered structure in which banks and other authorized PSPs provide access to transaction accounts. Retail CBDC could reinforce the central role of central bank money in a context where e-money and commercial bank money are gaining prominence and reposition a digital, state-issued form of legal tender at the center of transactions. Where appropriate, CBDC could be seen as a way to promote competition and innovation in the National Payments System (see also section 3). Its coexistence with private-sector money would require a level playing field aimed at ensuring that competition is open and fair, and interoperability would be essential for an environment that needs to be open to innovation.

19. Users might still need to rely on the entity that provides the user interface to help interact with the crypto-asset or stablecoin—referred to as wallet providers, and most likely will also need an account to fund a purchase and for cashing out the proceeds of a sale.
20. Crypto-assets use DLT—as opposed to centralized systems—for the execution, clearing, and settlement of payments. DLT is discussed in more detail below as part of the discussion on innovations and changes in payment processing.
21. The entry of Diem (previously called Libra) could change this. Further, the field of crypto-assets is very dynamic and many current challenges in their usability and volatility could be addressed in due course.

While CBDC should not be seen as a panacea for financial inclusion challenges, some argue that CBDC, especially a retail CBDC, could be especially useful to advance financial inclusion, because users would be attracted to the cash-like safety and convenience for peer-to-peer payments. In at least one operating model, CBDCs could enable individuals to hold balances and make digital payments without them holding an account with a bank or other PSP, but rather by linking those balances and payments to accounts at the central bank, available to all, and at the same time widely accepted and highly trusted. On one hand, the central bank could, as a public sector entity, subsidize access to and operation of these accounts at a fiscal cost. One of the risks would then be that keeping consumer prices subsidized in the long run could crowd out private sector digital payments initiatives that could have introduced new features, technologies, and/or efficiencies over time. Avoiding the potential disintermediation of banks and other PSPs is therefore high on the agenda of many central banks researching CBDCs. On the other hand, a CBDC could put competitive pressure on existing payment offerings, thereby fostering cost reductions and improved user experiences by private sector players.

Introducing a CBDC represents a paradigm shift in the central bank's imprint in the economy, in addition to the risks and operational costs. Central banks worldwide are investigating the many possible options and design features and assessing the potential impact on the financial sector of issuing a CBDC.[22] In any case, the existing guidance from the Committee on Payments and Market Infrastructures and World Bank Group on Payment Aspects of Financial Inclusion continues to be relevant and has proven to be effective in advancing financial inclusion across a range of countries.[23]

The four innovations in the link between accounts and payments described above[24] have been accompanied by deep changes in the way payments are processed and in-service delivery. The latter changes, which constitute a second pillar of innovations in payments (see figure 3), have followed the demand for increasing levels of convenience in terms of speed, end-user control, ease of access, and ubiquity. Key innovations in processing include: i) The development of fast payment systems (FPS) and services; ii) DLTs; iii) Usage of QR codes for payment acceptance; and, iv) Usage of IDs in connection with payment initiation.

Fast payments, already adopted in many jurisdictions worldwide,[25] are becoming a game changer for business-related payments, both in the form of person-to-person (P2P) and person-to-business (P2B) use cases. Fast payments provide new opportunities for merchants to accept payments from customers, possibly without having to rely on merchant acquirers like in the payment card model. With fast payments, a merchant could, for example, sell goods via a website, email exchange, or social media, and receive direct and immediate payment into her account without requiring integration of that website into a payments gateway or having to absorb a merchant discount rate (MDR).

Fast payments are also driving change in the payments ecosystem because other value-added services can be built on top of them, like Request to Pay (RTP) schemes.[26] Through RTP schemes, a merchant or other payee sends a payment request to the payer, but the latter still controls payment initiation and, with it, the payer also controls several key security aspects. RTP messages generally include all necessary information for a payment to be processed in a fully automated way, only awaiting acceptance from the payer for initiation. Furthermore, RTPs running on fast payment systems are processed as "push payments" or payer-initiated transactions (meaning that cost elements like repudiation-related

22. Appendix 1 provides information on existing CBDC initiatives and a detailed discussion on broader financial sector implications of CBDCs can be found in various reports of the Bank for International Settlements (BIS) and CPMI and in a new WB publication: "Central Bank Digital Currency:– a payments perspective" of November 2021.
23. Many countries have made rapid progress in financial inclusion with a combination of (i) fostering public and private-sector commitment to financial inclusion; (ii) adopting legal and regulatory reforms to allow entry of non-bank players in the provision of e-money-based payment services; (iii) introducing agent-based models and simplified customer due-diligence requirements and increasing coverage of digital identities; (iv) improving interoperability of payment services; and (v) shifting large-scale recurrent payment streams like government-to-person payments and domestic and international remittances from cash to direct credit to accounts.
24. These are: i) Digital access to bank accounts; ii) The "prepaid" concept and entry of non-banks; iii) De-linking of initiation of payment from maintenance of account; and, iv) De-linking of account from payment altogether. See figure 3.
25. According to GPSS 2018, by end-2017 a total of 45 jurisdictions had already adopted fast payments. Many others were already in the implementation process. Appendix 2 provides additional details on fast payment variants, use cases and country examples.
26. Further, open banking/open APIs coupled with real-time payments can significantly help drive innovation and develop new use cases. See appendix 2 for additional details.

chargebacks would not be applicable)[27] and credited to the merchant in real time. For all these reasons, RTP can become a serious challenger to the dominance of payment card schemes in P2B payments and to automated clearing house-based electronic funds transfer (EFT) services.

In the case of DLT, its main transformative impact is that it cancels the need for a central system or central authority/trusted third party for digital payments to be made between two parties. In the context of payment, clearing and settlement, DLT enables entities or individuals, through the use of established procedures and protocols, to carry out transactions without necessarily relying on a central authority to maintain a single "golden copy" of the ledger (that is, a central system).[28] DLTs have therefore been instrumental in the development of crypto-assets and stablecoins, as mentioned earlier.[29]

QR code technology is proving an effective alternative to expand the digital payment acceptance network, mainly across medium and small merchants. Generalized and frequent use of digital payments for a wide variety of use cases requires the extensive deployment of acceptance points, which has been hampered by long-standing frictions like high cost or difficulty to deploy in isolated locations. QR codes can leverage the mobile phone, both as a payment initiation device (that is, as a mobile wallet) and as a transaction-accepting device,[30] thereby lowering hardware requirements on the payee and deployment costs for acquirers. Furthermore, as even those payees without smartphones can still accept payments by simply displaying a printout of the QR code for the payer to scan. QR codes appear to be a viable solution even for subsistence small businesses. In practice, widespread popularization of QR codes has been instrumental to the success of digital payments in EMDEs like China, India, and Thailand.

Currently the main challenge for QR codes widespread dissemination and to lowering acceptance costs is the lack of interoperability of most QR code solutions. Lack of interoperability in this area means that a merchant may need to have two or more QR code solutions to be able to accept payment instruments from various providers, or a payer not being able to use her/his mobile wallet to pay at all intended merchant locations displaying QR codes. In several countries, authorities are taking an active role to achieve interoperability in this area. Appendix 3 discusses the benefits of adoption of standardized QR codes, using Thailand's experience as an example.

Use of Digital IDs in connection with payments is the fourth major innovation in payment processing, as it reduces frictions for account onboarding, allows for stronger authentication and supports fraud prevention. Difficulties in managing and using PINs and passwords are common among individuals that use financial services very sporadically (for example, once every two months), like beneficiaries of social assistance programs. Use of biometrics as a means for authentication is helping overcome some of these challenges (see box 4).[31] By allowing digital identification, authentication, and granting of consent, digital IDs also facilitate onboarding of customers, agents and merchants and make onboarding more efficient.[32] Furthermore, biometrics are also useful in preventing and/or detecting fraud.[33] Lastly, digital IDs can become a key enabler for the development of a general purpose consent mechanism, critical for widespread usage of API-based third-party access to customer's accounts.

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27. In "push payments" the payers initiate and/or approve the payment before their account is debited. In contrast, payments with cards and most payments with mobile wallets are "pull payments". Here, the payment is initiated by a request of the payee, for which reason the payer generally has a right to repudiate charges made to her/his account.
28. From a more technical standpoint, DLT refers to the processes and related technologies that enable nodes in a network to securely propose, validate, and record status changes (or updates) to a synchronized ledger that is distributed across the network's nodes. See CPMI (2017).
29. Other potential use cases for DLT include introducing "programmability of payments", through smart contracts.
30. To some extent, USSD and SMS technologies also made this possible. In fact, M-Pesa in Kenya is still largely USSD-based. These technologies are nevertheless being replaced with QR codes because of security and other considerations.
31. Other services like FIDO Alliance and GSMA's mobile connect that use some native capabilities of smartphones to provide a general-purpose authentication capability fulfil a similar function.
32. Digital ID can support eKYC processes (for example, remote onboarding of customers, including first-time ones), thereby lowering costs for PSPs through the near elimination of paperwork and the burden of keeping paper records.
33. Importantly, using Digital ID in connection with payments requires availability of technologies like Internet availability, mobile phones, and other electronic devices. If such tools are not universally or quasi-universally available, the Digital ID mechanism could not be used in all communities. Physical IDs (for example, paper-based, plastic cards) would need to remain in place.

Box 4. Digitalization ID and Payments

Digital ID refers to a set of electronically captured and stored attributes and credentials that can uniquely identify an individual or legal person and can be used for electronic transactions. Attributes may include biographic data for example, name, age, gender, address), biometric data in the case of an individual (for example, fingerprints, iris scans and/or other physiological and behavioral attributes that are unique to that individual), and others.

Effective use of biometric data for Digital IDs has been made possible through innovative technology that allows verification of biometrics against a verifiable independent and official source of ID, as well as modern ICT technologies that enable the cost-efficient storage, management, and retrieval of this data. Importantly, while Digital IDs can contain biometric data, as mentioned earlier, this is not a requirement for an ID becoming digital and for it to be used in a fully digital environment.

Various entities are developing software to digitally verify and authenticate one's personal identity through facial, voice, image, document, or fingerprint recognition using artificial intelligence and machine learning algorithms.

Source: Authors' elaboration.

Finally, a third pillar of innovations in payments has to do with changes in customer engagement and to the business model of banks and other PSPs for what concerns the provision of payment services. These changes include a growing accumulation of customer data and new tools to use this data effectively to analyze behaviors and preferences. All these changes are significantly altering the market for payments. For this reason, although they were introduced in figure 3 of this section, these issues are discussed in more detail in section 2, which focuses on the impact of innovation in market structure.

Key Takeaway 1. About Innovation in Payments

The main pillars of innovation in payments include: i) changes to the way payment services are linked to an account; ii) changes to the systems that process payment transactions; and, iii) changes in the way consumers interact with payments and the business model of payment service providers.

Thanks to innovations like mobile wallets or super apps—combined with fast payments, APIs, and other technologies—customers now find it more convenient and less costly to make and receive digital payments, while at the same time enjoying a smoother user experience.

At the same time, innovations are also redefining business models for payments, which in turn is having far-reaching consequences for the very structure of the payments market.

2. Impact of Innovation on the Payments Market

2.1 Changes in the Structure of the Payments Market

Innovations and changes in the payment process have prompted major changes in the structure of the market and of the overall financial sector. These changes can be observed from a micro or institution perspective, with alterations in customer engagement and business models and from a macro perspective, through the evolution in the dynamics of the payment market (for example, the balance of powers between incumbent and emerging providers, with an impact on prices, access channels, and products design).

Payments are increasingly being integrated within the day-to-day interactions of users, rendering them "invisible" and "contextual. This is already changing some industries and other economic activities, like ride hailing (see box 5).

Box 5. New Ways to Make Payments for New Customer Experiences

"Invisible" or frictionless payments are transforming customers' purchase experience by making the actual payment process "disappear". These payments are based on apps that enable users to make product purchases without having to ask for the bill or to manually pay. For example, ride-hailing customers can securely store their payment information in the app and their cards are automatically charged once the destination has been reached, completely taking out the friction of paying and tipping.

Invisible payments also allow businesses to integrate buying opportunities for customers within their current environment or context. For example, super apps like Alipay and WeChatPay let consumers see detailed product information (for example, price, description additional photos) the moment they show intent and buy through a "Shop Now" button without ever leaving the platform. Often referred to as "contextual commerce", this business strategy aims at meeting consumers where and when they have the most interest and intent to purchase, with the easiest checkout experience as possible, minimizing transaction abandonment opportunities.

Source: Authors' adaptation from other WBG internal reports.

But the most conspicuous effect of innovation on the structure of the market has been the boost in competition, with the opening of the payments market to non-banks, a downward pressure on payment service fees and real-time payments becoming the new normal. The payments market used to be dominated by banks: payments represented a good portion of banks' earnings and banks would set the customer fees for payment services and the processing times for transactions. The rise of e-money and the entry of non-bank PSPs changed this, spurring competition and driving

costs and processing times down.[34] Non-bank PSPs had the advantage of starting without the burden of brick-and-mortar distribution networks, legacy IT systems, and the usual corporate rigidities of banking institutions. They also had the advantage of being able to focus on the specific mission of providing payment services and making profits out of it, with a vision and hence a business strategy that banks generally did not have at that time. While disruptors have been innovating on customer experience and product offerings, incumbents have benefited from a competitive edge on consumer trust.[35] Eventually, many banks also developed strategies focusing on payments in response to competitive pressures.

The trend toward market transformation is apparent in the change in the traditional sources of growth and revenue of banks. According to McKinsey Global Payments Report 2019, global payments revenues totaled $1.9 trillion in 2018, but major sources of revenues from payments are eroding and evolving, with a blurring of lines between payments types and bold entry moves by non-bank players leveraging non-traditional business models. Payments remain among the best-performing financial-services product segments, but this doesn't benefit banks, historically the main providers of payments services. The revenues that banks extract from payments have substantially declined, because of increasing pressure on margins, growing international standardization and emergence of technologies enabling new entrants and competition, and growing regulatory pressure toward open banking. Banks are reacting by innovating or partnering with innovators. This is also leading to divergent choices and ensuing specialization, with some banks making the strategic decision to put payments at the forefront of their offering, while others choose not to invest heavily in payment services, relying instead on their partnership (for example, with fintech firms). These dynamics are very visible in the payment card space, which is also seeing some regulatory interventions on pricing (see figure 4).

Figure 4. Changes in the Traditional Sources of Growth and Revenue from Retail Payments

Major revenue sources	From...	To...

 **Interchage fees**	• **Interchange fees** creating issuer revenues
	• **Reward programs** as key incentive for card usage
		• **Interchange fees** caps creating:
		  • Challenges in funding reward programs
		  • Need to increase transaction volumes by becoming a "top of wallet" card (especially in digital channels)

 **Credit**	• **Credit revenues** fueled mainly by revolving credit card balances • **0% introductory APR** as common customer incentive	• **Customers looking for cheaper and sustainable credit options** - e.g. POS lending

34. For example, the World Bank Remittances Prices Worldwide database indicates that the share of remittance corridors with an average cost of less than 5% increased from 17% in the first quarter of 2009 to 34% in the third quarter of 2020. Moreover, banks, e-money networks and money transfer operators have all reported a general decline in their total average costs.
35. Some national surveys show that this advantage may be eroding. For example, according to McKinsey's U.S. Digital Payments Survey 2019, consumers have become more comfortable entrusting their financial transactions to some non-bank PSPs.

Figure 4 continued

Major revenue sources	From...	To...
 **Cross-border/FX payments**	• **High margins** on cross-border payments	• **Cross-border volumes increasing,** driven by e-commerce • **However, margins are declining** as customers are offered competitive rates and transparent fees

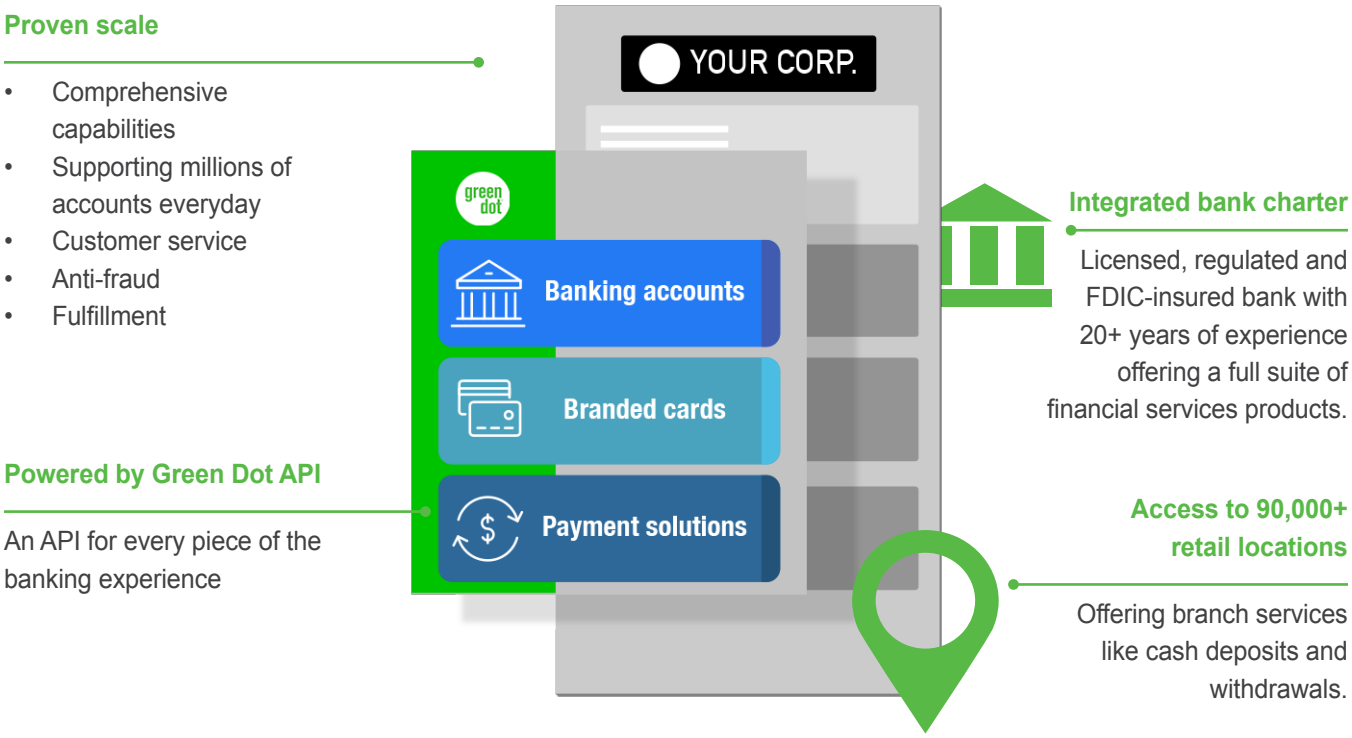
 **Additional fees** (Late fees, penalties)	• **Late payments penalty fees** deliver meaningful revenues for issuers	• **Decline in penalties/late fee revenues** due to:
		  • Increased regulatory scrutiny
		  • Increased customer awareness of simple tracking tools

Source: McKinsey Global Payments Report 2019.

Market dynamics, coupled in some cases with regulatory interventions, are pushing for payment services to be offered at zero or very low cost. Payments are increasingly seen as a commodity, and this is forcing incumbents to seek profits from additional services with higher margins.[36] Standalone PSPs will necessarily have to look for these other revenue streams. Banks, on the other hand, in order to maintain profit margins, can adjust their business models and orient it more towards providing tailored modern services (for example, creating apps and mobile payment services for clients that support real-time payments, including in partnership with fintech firms) and increasing their focus on the cross-selling of products, among others.[37] Some banks are also seeing an opportunity in offering services to fintech firms and pursuing a B2B strategy—being called "banking-as-a-service" (see for example the case of Green Dot in figure 5) and others like Clear Bank in the United Kingdom and Union Bank in Philippines. Furthermore, banks' business models are likely to migrate from being transaction-led to data-led, as data analytics are bringing new ways to monetize the payments services.

36. Since strong competition on a (typically standardized) commodity erodes margins, suppliers tend to diversify by attaching higher value-added services.
37. For example, JP Morgan Chase has been offering hosted payment services for Airbnb. Citibank is offering checking accounts through Google Pay.

Figure 5. Banking As-A-Service, the Case of Green Dot



Source: Greendot.com.

The other dominant strategy resulting from payments being offered at zero or near-zero cost appears to be the "super app" model, led by large technology companies or big techs. Big tech companies have established products, services, and business models in their original fields of expertise, but are making big moves in payments and other financial services for a variety of reasons, for example accessing new revenue streams and protecting core products (Apple Pay), improving margins of existing revenue streams (Amazon credit cards), acquiring new customers, or obtaining value-adds to their core businesses. Importantly, big tech companies are creating large ecosystems across their vast user base (Alibaba, Amazon, Apple), which increases consumer stickiness and therefore is highly likely to lead to a new form of market concentration and translate the market dominance they enjoy in other sectors to the payments space (see below). There has nevertheless been space for standalone PSPs to emerge. For example, Stripe changed the way payments are integrated into websites and apps, while Square focused on transforming mobile phones into POS devices.[38]

In contrast to fintech firms that are new market participants with highly uncertain business potential, big tech companies have entered the payments market with competitive advantages, such as well-known and trusted brands, large user bases, and strong financial positions. These advantages allow them to scale up their activities quickly. The expansion of big techs into payments and banking has been faster and more pervasive in developing countries where other means of digital payments are limited and mobile phone penetration is high.[39] Some analysis even points out to a barbell outcome, composed of a few large providers, and many niche players.[40] Big techs can use data on consumer behavior and preferences to bolster their other product and service lines. Indeed, accumulation of customer data from digital payments and the availability of tools (for example, Big Data, machine learning) to use this data effectively to

38. Some new standalone PSPs have however gradually expanded into other services. For example, Square began extending credit to its small business customers.
39. OMFIF (2020).
40. Fintech and the Digital Transformation of Financial Services: Implications for Market Structure and Public Policy (Market Structure note) by Erik Feyen, Jon Frost, Leonardo Gambacorta, Harish Natarajan, and Matthew Saal.

analyze behaviors and preferences is enabling pricing models in which payments can be offered at zero or near-zero cost to users.[41] This seems to be the strategy being deployed by various super apps of big techs.

The rise of big techs as major providers of payment services brings new challenges to the authorities. A widespread use of big tech solutions in payments could lead to rapid and large-scale movements of clients' funds, which could have consequences on banks' profits and stability of funding, and, hence, potentially also on broader financial stability. When they offer services directly to end-users, big techs could qualify as systemic providers of payment services if they reach a dominant position or very high volumes. Even if they do not offer services directly to end-users, but to other user-facing institutions, they could still become critical third-party providers. In both cases, their failure could cause widespread disruption to the NPS and the economy. So, in summary, authorities, and especially central banks, responsible for the oversight of the NPS, might need to adapt their oversight concepts and procedures to ensure that they are appropriate for the distinctive nature of big techs.

Furthermore, while open banking has been envisioned as a tool to promote diversity and allow consumers access to a broader variety of payment services, they can also be leveraged by big techs to increase consumer loyalty and stickiness. With open banking initiatives, big techs can get access to their users' bank data and initiate payments on their behalf, de-facto re-bundling payment services with other services big techs offer to their active users. So instead of contributing to diversity and competition, open banking could strengthen the hold of big techs on financial services and help them achieve a dominant position. The Financial Stability Board has noted that the new structure of the financial industry could be one in which a small number of big tech firms dominate, rather than diversify, the provision of certain financial services, especially payment services.

The resulting models, in particular the super app model, raise the paradox of the payments market eventually evolving from being concentrated in a few big banks in each country, to concentration in a few big techs (and probably some banks able to adapt). The super-app model became dominant in China in only a few years: online payments represent more than 80 percent of total digital payments and are concentrated in only two providers, Alipay and Tencent/WeChat. The shift in the balance of power apparent in the payments market with the growing role of big techs may have far-reaching consequences. For example, these players having non-financial origins may end up becoming systemically important components of the payments market and of the broader financial system, and therefore requiring increased attention from financial sector regulators more broadly than just as payment service providers.

In this context, regulators may need to explore certain interventions to preserve contestability and a level playing field, but also to regulate and oversee these new actors on an ongoing basis.[42] The National Payments Corporation of India (NPCI), operator of the United Payments Interface (UPI), in order to mitigate risk from third-party app providers (TPAPs), via its instructions dated November 5, 2020[43] (effective from January 1, 2021) to its participants instructed that PSPs and TPAPs shall ensure that the total volume of transactions initiated through the TPAP to not exceed 30 percent of the overall volume of transactions processed in UPI during the preceding three months (on a rolling basis). The TPAPs operating on date of issue of the instructions have been given a period of two years to comply with the instructions in a phased manner. NPCI has also issued a detailed standard operating procedure for this.[44]

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41. Revenues and profits are obtained from sources like the selling of information derived from customer data analytics to other businesses, fees for driving customer traffic to merchant offerings, cross-selling of other financial services, etc.
42. For example, in China, the PBOC and other authorities have developed a number of regulatory interventions in recent years. These include mandating that all the float stemming from "in transit" payments be deposited at the central bank and mandatory clearing of online transactions through a specialized payments infrastructure created ex profeso. As another example, the National Payments Corporation of India, in response to concentration of UPI (a fast payment service that also allows third-party initiated payments) in a few companies—Google, Phone Pe (subsidiary of Flipkart, owned by Walmart), and PayTM—recently announced a cap of 30 percent market share by any one third-party app in UPI transactions. This change was announced as part of allowing the launch of WhatsApp's UPI payment service (Source. https://www.bloombergquint.com/business/npci-imposes-cap-on-share-of-upi-transactions).
43. https://www.npci.org.in/PDF/npci/upi/circular/2020/OC-97-Guidelines-for-TPAPs-in-UPI.pdf
44. https://www.npci.org.in/PDF/npci/upi/circular/2021/standard-operating-procedure-sop%E2%80%93market-share-cap-for-third-party-application-providers-tpap.pdf

It is also worth noting that some innovations drive decentralization while others push toward more centralization, for providers as well as for infrastructures. Innovation initially led to unbundling of services, but a trend towards re-bundling is emerging. Banks initially perceived fintech firms solely as competition, especially in the wake of open banking reforms, since banks could risk being disintermediated from customers when banking, payments, and other financial services can be provided by third parties. Fintech firms have however in many cases evolved into partners for banks, and the unbundling of vertically integrated financial services can allow banks to leverage complementary value-added services from them. Competitive unbundling of services has pushed customer prices down and enabled the offering of new product features, but has also created frictions for consumers, as using many different services and apps can be cumbersome. In this context, an opposite, centripetal force, to re-bundle and simplify is especially apparent in the incursion of big techs in payment services.

The issue of centralization versus decentralization is also observable in payment clearing and settlement. FMIs provide these services in a centralized manner, which leads to efficient processing but also concentrates risks and therefore requires extensive risk-management features and significant transaction volumes to guarantee cost recovery and make the FMI financially viable. In contrast, blockchain and DLT enable payment and securities clearing and settlement without a trusted party, for which they have a centrifuge or decentralizing effect.[45]

B2B payments is one market segment where the payment innovations have not made much inroads and banks have an advantage in this segment. B2B payments are typically for larger amounts, integrated with the invoicing processes, and have to factor in applicable taxes like value added tax as part of the payments processes. Further, these payments often also involve "multiple eye" approval processes within the payer institution and, potentially, the payee institutions. All these require significant enhancements to payment services meant for individuals. Moreover, e-money as a product comes with limits imposed by regulations on total balance, value, and volume of payments, which makes them unsuitable for B2B payments. Further, standard payment systems and services do not carry all the information required to accompany B2B payments. For all these reasons, banks have significant competitive advantages in this space. But even in that segment, payment processing changes like RTP, Fast payments, and DLT can be transformative, and so can stablecoins and crypto-assets. RTP lends itself very well for integration into invoice payments and automation of accounts receivables and accounts payable processes. Further, the usage of new messaging formats like ISO2002 in FPS makes it feasible to carry more information. Lastly, even with stablecoins and crypto-assets, businesses would likely prefer to use more industrial-grade custodial services and banks might have an opportunity to develop services for B2B payments.

In addition to banks, other payments ecosystem players are deeply impacted by the ongoing changes, and it is especially the case for international and domestic payment card networks and ACH service providers. The development of RTP and FPS often create a parallel network, different from the payment card and ACH rails, though in some jurisdictions, the existing payment card and ACH rails have been adapted to support RTP and fast payment services. As a consequence, the business strategy of payment card networks and ACHs is evolving as they attempt to reinvent themselves and their business model along several key paths. Firstly, they try to themselves become operators of fast payment services.[46] Second, they evolve into gateways and hubs for open banking and API-based services.[47] Third, they position themselves as payment systems underpinning CBDCs, stablecoins and crypto-assets. Fourth, they introduce services for B2B payments, like Direct Corporate Access in ACHs and by adding additional services on top of existing card rails to carry the additional B2B information. Lastly, international card networks, in particular, are becoming white-label service providers for some cross-border payment services like remittances.[48]

45. As earlier discussed, blockchain and DLT also support other types of innovations with a centralization impact, such as CBDCs.
46. This is most clearly exemplified in the acquisition of Vocalink by Mastercard
47. This is exemplified by the attempted acquisition of Plaid by Visa and many domestic payment card networks also being open banking hubs, like the NPCI in India, KFTC in Korea, and SIBS in Portugal.
48. See for example tie-up between Visa and Western Union - https://usa.visa.com/about-visa/newsroom/press-releases.releaseId.16396.html

2.2 Changes for the Biggest User of Payment Services, the Government

Innovations in payments are having a significant impact not only on private sector stakeholders, but also on governments and other public sector entities, like central banks. Governments are usually an economy's largest user of payment services, both in their role as payees and payers. Therefore, they benefit substantially if they are able to reap the benefits of digitalization, which include reduction in transaction costs, reduced fraud and leakages, and a more effective fight against corruption.

Innovations and the way in which they are changing the world around us are prompting governments in their role as payees to re-think how they can leverage digital payment services to better serve their citizens. Many governments—national and local—are aiming to improve the "customer" experience by minimizing the need for physical presence and/or submission of paper documents. Just like many private sector entities are going fully digital, governments are accelerating their engagement in e-government projects that provide an end-to-end digital experience (that is, including a payments component, where applicable).[49]

Some of the innovations discussed in this report can help address some of the key frictions for governments to migrate their collections more fully to digital, notably cost, speed, and reconciliation. Thus far the only payment mechanism available for online e-government payments were cards and, to some extent, ACH-based EFTs. In the case of payment cards, the application of a merchant discount rate (MDR) like on a typical merchant transaction was widely seen as a challenge. Both in the case of payment cards and ACH transfers, the delay between payment and settlement and the limited data accompanying the payment message also posed some challenges. Given recent innovations, governments can leverage additional payment mechanisms, like EFTs or RTPs running on fast payment systems and some mobile wallets that use e-money. Perhaps more importantly, with APIs, invisible payments and other developments, governments can now create frictionless or *quasi* frictionless experiences for paying taxes and government services, just like it is already the case in several private sector industries, improving both speed and reconciliation.

On the other hand, innovative payment instruments and business models have also been giving governments more and better opportunities to digitalize the payments they make. Indeed, payments from government to businesses ("G2B payments") and between government agencies ("G2G payments") have already seen significant progress in digitization in many countries. This is also the case for some types of payments from the government to persons ("G2P payments") like payrolls and, to a lesser extent, payment of benefits like retirement pensions. In contrast, the payment of grants associated with social assistance/aid programs targeting vulnerable individuals have proved difficult to digitalize.[50]

Digitization of government payments, in particular of social assistance/aid programs, is highly supportive of financial inclusion objectives, as observed in numerous countries. Digitization of these payments essentially involves channeling corresponding funds to a basic bank account or an e-money account.[51] Both types of accounts are proven, widely used technologies that any government should be able to exploit. More recent technologies like Digital IDs can be used to remotely onboard beneficiaries, making the process swifter, and reducing transaction costs. From the perspective of the beneficiaries of social assistance programs, innovations like e-wallets and QR code usage in payments, among others, are crucial to make these accounts truly useful to them, for example, by developing more use cases for daily live matters.

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49. Many government agencies have developed or are currrently developing eGovernment projects, but a large majority of these projects are limited to websites and portals providing information. In other words, these efforts very often lack the transactional element which, in turn, needs to be accompanied by a payment component. This limitation is especially true in EMDEs.
50. These include the characteristics of recipients of social grants (for example, often poor and financially excluded), of the communities where they reside (for example, often isolated and lacking or having limited ICT infrastructure and PSP presence), and the multiplicity of government agencies carrying out these programs ,which frequently has led to isolated efforts and duplications.
51. It usually involves other considerations, more of a regulatory or contractual nature, like the providers charging zero or limited fees on transactions made via those accounts.

The COVID-19 pandemic is giving a new push to the digitization of the payment delivery mechanisms of social assistance programs. As mentioned earlier, much of what is needed for achieving this digitization in terms of technology and products is already available, but technology and innovations by themselves are not a sufficient condition for governments to obtain significant results in this area. The COVID-19 crisis has re-emphasized the importance of efficient digital payment mechanisms, associated with digital identification systems, to support government interventions to mitigate the impact of the pandemic. Therefore, COVID-19 appears to be creating new momentum in many EMDEs to address the other necessary elements to successfully digitalize social assistance payment programs, which include coordination challenges across government agencies—supplemented by political economy complications. In this regard, several countries are already discussing and designing high-level initiatives to stitch together the different G2P payment digitization projects currently being implemented in silos by various government agencies.[52] The broader effects of the COVID-19 pandemic on payment digitization are discussed in box 6.

Box 6. The COVID-19 Pandemic as an Accelerator for Change in Payments

COVID-19 has undoubtedly changed society in ways that we are still not able to fully understand, including payment habits of individuals and firms.

In retail payment services, the main impacts of COVID-19 have included alterations to the availability, smooth provision, and customer demand of cash. For example, several ATMs and bank branches have been closed in many countries, and agents that support transaction accounts or remittances, but whose primary business is classified as "non-essential," have also been closed.

Consequently, and also a result of health concerns, a change in the demand for digital payment services is being observed. Amplified use is already being observed, with substantial growth in remote payments related to e-commerce, but, also, more people paying bills from their homes or via their mobile phones. Digital payments are also accelerating their growth for in-person use cases (for example, purchases in physical shops or markets) as people shift to payment instruments other than cash to avoid or at least reduce physical contact.[53]

The pandemic has also resulted in new government support programs, especially emergency payments to vulnerable individuals and to certain businesses. Reaching the intended beneficiaries quickly and safely has proven anything but easy in many EMDEs with underdeveloped payments ecosystems. In fact, in many cases, the only realistic option has been to deliver these emergency payments in cash. The lessons learned, however, are expected to spur further adoption of digital payment delivery mechanisms for social assistance programs, including an increased attention to underlying payments infrastructure.[54]

Source: Authors' adaptation from other WBG internal reports.

52. Economies of scale arise if most or all government social assistance programs are viewed together for payment digitalization purposes. This brings more actors and funds to the table to push for change, including long-term changes like installing essential payments infrastructure in rural and underserved areas.
53. This trend is nonetheless not universal. The payment habits of financially excluded or underserved groups and most senior citizens remain largely unchanged and, for the most part, still heavily reliant on cash.
54. In this last regard, according to the Mc Kinsey Global Institute (See "COVID-19: Making the case for robust digital financial infrastructure," January 2021, https://www.mckinsey.com/industries/financial-services/our-insights/covid-19-making-the-case-for-robust-digital-financial-infrastructure), the potential economic gain from building robust digital financial infrastructure is about 20 percent greater now than it was before the pandemic, and digital financial infrastructure can improve country-level resilience in crises and on an ongoing basis.

Yet another potentially significant effect is that by achieving an effective migration of their payments and collections to digital, governments can create more use cases for digital payments throughout the whole economy. Most individuals and businesses will use government services at one point (and pay for them, where applicable), and these large baseline volumes, if channeled digitally, can improve economy-wide payments economics and encourage individuals and businesses to adopt digital instruments that they will then also use for other use cases. Furthermore, governments can also use their e-government platforms to introduce direct incentives for people to use digital payments and help accelerate behavioral change.

Key Takeaway 2. About Innovation and the Market of Payment Services

The most conspicuous effect of innovation on the structure of the market has been the boost to competition, with the opening of the payments market to non-banks, a downward pressure on payment service fees and real-time payments becoming the new normal.

In addition to banks, other payments ecosystem players are deeply impacted by the ongoing changes, especially international and domestic payment card networks and ACH service providers.

Government agencies can be expected to be significantly affected by the wave of innovation in payments, especially for what concerns their interactions with citizens through the provision of government services and programs that involve making payments.

3. Impact of Payment Innovations on Central Banks

Innovations in payments are having a profound impact on the central bank as the authority in charge of regulating payments, as overseer of the NPS, supervisor of payment services providers, and operator of payment systems. Payment systems are critical for financial stability, monetary policy transmission, and trust in the national currency; central banks have traditionally been entrusted with the mission to guarantee the safety and efficiency of systemically important payment systems or SIPS (that is, systems supporting systemically important interbank payments, monetary policy operations, and money markets). For these systems, central banks have to ensure that new technologies do not introduce new risks which would compromise functioning and resilience. Beyond the impact of innovation on financial stability, innovation also impacts other mandates of the central bank, especially for those that have a specific mandate over retail payments.[55]

At the same time, central banks should regard innovation and fintech as critically important for the development of their financial sectors. Fintech introduces creativity, innovative solutions, and is in sync with rapidly-evolving markets and consumer needs. Regardless of how they are integrated into the financial sector—via cooperation or direct competition with incumbents—fintech firms make the industry more dynamic. The role of central banks and supervisors is then to reconcile confidence and innovation, to encourage the latter while ensuring that the people are protected from risks and their trust safeguarded. Central banks can no longer limit their involvement in the NPS as issuers of the sovereign currency and operator of the wholesale payment system (that is, the RTGS system); many of them are already deeply involved in the retail payments market, and as such must act to promote standardization and interoperability, to guarantee safe, efficient, and inclusive payment services and enable innovation, thus boosting competition.[56]

Innovation in payments challenge central banks in their typical roles vis-à-vis payments, that is as operators, overseers, regulators, and catalysts for change, but also beyond their typical mandate on payments, as innovations are redefining money. Central banks have a critical role in payment systems, and the waves of innovation call for a continuous involvement of central banks to guarantee the safety and efficiency of payments. As pointed out by Agustín Carstens, General Manager for the Bank for International Settlement, money and payment systems are founded on trust in the currency and this trust is a "central bank public good", that only the central bank can provide, and that represent the solid foundation on which innovative payment solutions can be built. Central banks need to evolve to support their country in reaping the benefits of innovation in payments. As earlier discussed, innovations in payments are disrupting the traditional divide between central bank money and commercial bank money. In some parts of the world, people are using less cash, and therefore less central bank money. The rise of crypto-assets and stablecoins could potentially lead to a replacement of central bank and commercial bank money, which would challenge the very framework on which the financial system and traditional central banks tools are now constructed.

Furthermore, most NPS ecosystems are increasingly reliant on global foreign providers, such as global card schemes and/or big techs. Some central banks have expressed concerns on the risk of losing sovereignty over their NPS

55. Many central banks have gradually widened the scope of their oversight on payments to encompass retail payments.
56. The following subsections of this section elaborate on the various roles of central banks in payments.

as parts of it are being managed outside their jurisdiction. For example, these considerations have been part of the rationale of the central bank of Sweden, Sveriges Riksbank, to consider a two-pronged strategy of regulating private payments and launching a CBDC, the e-krona. By issuing a public form of digital money, this central bank expects to maintain a direct presence in the payments system and facilitate the effectiveness of its regulatory framework for private payments.[57]

A related concern that might lead a central bank to consider going beyond its traditional role in the National Payments System and issuing a CBDC is the risk of citizens losing their privacy to big firms. Unlike cash, transactions using digital payments enable payment services providers to capture consumers' personal data. Digitalization of payments can then infringe upon consumers' right to privacy. In addition, this capture of consumers' data can contribute to the formation of a monopoly.[58] A provider with early access to information, such as consumers' behavioral patterns, can lower its pricing of payment services to access even more data; it will, in the process, expand its market share, possibly to the extent of becoming a monopoly. The rise of monopolistic players in the payments market has therefore led some central banks to ponder whether they should provide a digital alternative to cash. The risk to privacy however doesn't disappear with CBDCs, as they would leave traceable digital footprints, holding none of the anonymity of cash, thus making users identifiable and, in some country contexts, potentially allowing governments to track payments. While some design options could limit the privacy risk by allowing for anonymous capabilities, they would increase the Money Laundering and Terrorism Financing (ML/TF) risks, thus bringing forth a difficult tradeoff between privacy, anonymity, and financial integrity.

There are important policy tradeoffs between anonymity, privacy, and financial integrity and the design of CBDCs to reflect and be consistent with public policy objectives, legal framework, and broader societal expectations. Appropriate design and legal safeguards can ensure privacy even when the transactions are not anonymous. This is the case in many jurisdictions that have strong privacy laws. The use of CBDCs would in any case require data and privacy protection. Mitigating risks associated with breaches of privacy necessitates legal and regulatory provisions that, among other things, clarify the rights of users, define data types, give control to users over their personal data, and set out the legal obligations of data controllers and processors when interacting with data users and with each other.[59]

3.1 The Central Bank as Operator of Payment Systems

Many central banks are currently confronted with the strategic urgency to support the implementation of FPS in their country. Some central banks provide operators of FPS with accounts in the RTGS system and act as settlement agents. Some central banks are adopting more frequent settlement cycles to support FPSs that use deferred net settlement. Some central banks have decided to directly operate a FPS as part of their mandate to provide clearing and settlement services to their domestic financial institutions, while other central banks only ensure that their policy objectives are being upheld in FPSs, such as promoting usage of digital payments, access neutrality and level playing field, fostering innovation, enabling interoperability, and limiting market fragmentation, without direct operational involvement.

Supporting fast payments capability, directly or indirectly, has operational implications for the central bank. The impact on the RTGS system can differ depending on the choice of settlement model, but there is often a need to adjust the RTGS system's operating hours. In some cases, the RTGS system may need to operate 24/7 to support processing of payments from FPS that use a real-time settlement model between system participants. Similarly, in many cases, central bank RTGS systems as well as privately-operated payment systems have to re-examine their access criteria to consider granting access to non-bank PSPs (direct or indirect) to ensure the effectiveness of competition and positive network effects. The WBG GPSS shows that, in most countries, commercial banks are still the only entities with direct access to

57. Armelius et al. 2020.
58. IMF Working Paper, A Survey of Research on Retail Central Bank Digital Currency, June 2020.
59. WBG CBDC: a Payments Perspective, July 2021.

RTGS systems and other key payment infrastructures.[60] Furthermore, beyond access issues, central banks operating RTGS systems will have to consider extending access to the system's liquidity facilities to non-bank PSPs, especially if they become important participants in the NPS.

The launch of CBDCs, under consideration in several countries, would also have major operational implications for a central bank. Issuing a CBDC will undoubtedly come with operational and legal risks, in addition to potential implications for the broader financial system. For example, some CBDC models require central banks to interface with customers and build front-end wallets, which implies selecting and maintaining the appropriate technology and having to monitor transactions, including for AML/CFT purposes. Failure to satisfy any of these functions, due to technological glitches, cyber-attacks, data loss or leakage, human error, or third-party dependency would certainly undermine the central bank's reputation. The issuance of a CBDC also requires clarification of legal and oversight consequences, such as whether the central bank legal framework allows the issuance of a CBDC, will it be legal tender in the country, etc. On oversight, it would need to be defined whether CBDCs should be overseen as a retail payment instrument or system or as a system of systemic importance.

Innovation may also result in unbundling, or re-bundling, of central bank activities in payments. For example, some CBDC implementation models could enable the central banks to step away from the responsibilities of operating the underlying payment infrastructure, leaving it to the private sector. In other CBDC implementation models, central banks could still control the underlying payment infrastructure to support funds transfers using CBDCs and make access to the system more widely available to non-banks, and perhaps even to individuals.

3.2 The Central Bank as Regulator of the Payments Market

In a rapidly evolving payments environment, central banks find themselves in a double-bind of having to proactively encourage innovative solutions while minimizing associated risks through appropriate regulation. In regulating the NPS, central banks have to reconcile the sometimes conflicting objectives of stability and inclusion, manage traditional risks and new risks, and pay special attention to topics such as competition, interoperability and consumer protection. Central banks have an especially important catalyst role to play in setting the roadmap and supporting the implementation of decisive innovations, like open banking and FPS.[61]

To foster innovation in payments and enabling a robust fintech industry, central banks have to venture into less-familiar territories. Central banks worldwide are trying to achieve the right balance between enabling innovation in payments, foster an enabling environment for fintech firms offering innovative payment services, and preserving the safety of the NPS. The IMF-WBG Global Fintech Survey indicates that about 73 percent of the surveyed jurisdictions are reviewing and amending their policy framework to enable fintech investment, innovation, and adoption.[62] Implementing the appropriate approach to fintech is a new challenge for central banks. It requires understanding and assessing the fintech landscape in the country and fintech developments worldwide. It also requires an analysis of regulatory and supervisory implications, in a context where many central banks' resources are already stretched. When deciding which approach or sequence of approaches to adopt in order to inform subsequent policy responses, central banks will need to define the

60. The WBG GPSS shows that, in many countries, commercial banks are still the only entities with direct access to the RTGS system and other key payment infrastructures Access for non-banks (for example, e-money issuers, post offices—when not licensed as banks—, national treasuries, MNOs, and MTOs, etc.) is slowly rising, but is still low.
61. For example, for FPS to be successful, the central bank must promote that a critical mass of PSPs and accounts are reachable, and support industry-level agreements on a wide range of issues such as governance, funding, compliance, and fraud mitigation processes. For example, as earlier discussed, the central bank and FPS participants will have to work out liquidity arrangements, particularly where settlement at the level of end-users is expected to occur in real time on a 24/7 basis and the RTGS system is not open 24/7.
62. IMF-WB Bali Fintech Agenda: The Experience Thus Far (https://www.elibrary.imf.org/view/journals/007/2019/024/007.2019.issue-024-en.xml).

objectives they are trying to achieve, how fintech plays into the overarching payments, financial inclusion and financial sector development strategies for the country, considerations of the critical success factors, and importantly, specific country circumstances. Creating an enabling policy framework comes at a cost for regulation and supervision, the regulatory and supervisory implications of having to devote resources and treading new waters in the specific country/institutional context need to be taken into consideration when defining the overarching policy on fintech.

Competition in payment services is also becoming a pressing topic for central banks. Many national central banks already deal with competition issues as part of their payment system oversight duties. This has been the case in, for example, the U.S., the European Union, and Australia.[63] BIS has published several reports on retail payment issues,[64] where the role of central banks in facilitating competition and efficiency has been ascertained. Central banks as payment authorities have had to encourage greater competition by opening up the payments market to non-bank PSPs, which they also have to regulate and supervise. Recent regulations such as the EU's revised Payment Service Directive, the United Kingdom's Open Banking initiative or Mexico's fintech law issued in 2018 promote the concept of "payments as a service" by allowing third-party fintech firms greater access to banking data via open APIs and open source technology.

With new payment media emerging, including the creation of stablecoins and CBDCs, regulators have been increasingly interested in achieving interoperability and standardization of clearing and settlement rules and infrastructures. These features would allow users of different technologies or systems to interact with one another, improving their effectiveness and efficiency. This interoperability must be possible, not only in terms of technology, but also in terms of costs to avoid high charges derived from the interaction and transactions between systems. Regulators can help to ensure a more seamless payments infrastructure and support interoperability, for example by requiring market participants to develop end-user payment services based on open data-entry solutions to avoid creation of closed payment solutions and fragmentation of the market. Governance of payments increasingly requires governments and regulators to be more proactive in understanding and setting standards for new technologies and business models and operating procedures and rules.

To advance open banking, the experience in countries such as India, Mexico, or the United Kingdom[65] shows that authorities´ intervention and steering is often required. Digitalization is increasing the importance of accessing data and information, since many products and services are now data-based, and new processing capabilities and analytical tools allow for a more sophisticated and intensive use of data. Authorities are intervening to mitigate the adverse effects of inadequate competition and are requiring banks to develop open APIs and open banking standards, allowing access for Third-party Payment Providers (TPPs) to retail and SME customer accounts. This intervention can be direct or indirect. In the latter case, this can occur by designating/supporting the creation of an entity in charge of developing and maintaining standards, providing directory services[66] for authentication and authorization of ecosystem participants, monitoring, and supporting functions (for example, onboarding and helpdesk support, dispute management system for customer redress), and, more generally, to manage the open-banking community.

Innovation is also introducing heightened concerns for central banks over consumer protection to prevent unfair, deceptive, and fraudulent business practices or hidden costs. A sound and dynamic NPS requires public trust, which in turn requires that consumers perceive the innovative payment services to be reliable and that their rights are sufficiently protected. Central banks have to ensure that consumers are adequately informed about new payment services and their rights, as well as recourse mechanisms should they be abused. Innovation in payments also calls for adjustment to data privacy regulations. New technologies make greater use of personal (payments-related) data, and central banks must strike a balance between achieving greater efficiency and preserving privacy. Regulators should also ensure that

63. In the cards market, for example, certain fees and practices have been deemed to be inefficient, uncompetitive or unfair.
64. BIS 1999, 2001, 2002, 2012 (Innovations in retail payments), 2014 (Non-banks in retail payments), 2016 (Fast payments - Enhancing the speed and availability of retail payments).
65. UK Finance (2020), *Open Banking Future State Report,* June.
66. As well as a "white-listing" service.

innovative payment services and related networks and platforms adopt quality-of-service standards and liability rules for losses suffered by consumers.

Rapid developments in technology and increased reliance on third parties have created new challenges for the regulatory function, but also operational and cyber threats that central banks need to address proactively. Central banks have a role to play in leading and coordinating the efforts to improve the cyber resilience of the financial sector, including for payment systems, payment instruments, and payment services. They should make sure that smaller, newer institutions are informed about best practices in a concrete and detailed manner. A central bank's role is particularly important in all cyber resilience activities requiring coordination, such as information sharing, testing, education, and awareness. Central banks can guide payment system operators and PSPs in conducting threat intelligence-based testing as well as market-wide cyber crisis communication exercises, and foster strategic engagements between authorities and the industry, facilitating trust and collaboration among providers, and encouraging joint initiatives.

Many central banks have developed—or are in the process of drafting—revised legislation and licensing frameworks to address and regulate new and traditional payment businesses. Payments regulation must be updated to be principles-based, and apply the policy of "same activity, same regulation". New payment regulations must also be adaptable, so that they can be gradually customized to capture emerging innovation and new risks. The challenges for regulators will nevertheless often go beyond what has been explicitly captured in domestic laws or regulations.[67]

3.3 The Central Bank as Overseer and Catalyst for Payment Systems, Instruments, and Services

The complexity of fulfilling the central bank oversight mandate over payment systems and instruments has increased dramatically and is deeply affected by technological change. Central banks are confronted with a dual evolution compounding the challenge: i) the broadening of the scope of their oversight over payments; and, ii) the parallel increase in activity outside of their traditional regulatory and oversight perimeter. In the last 20 years, many central banks have included retail payments in their oversight scope, especially in EMDEs where several central banks also have a mandate to promote financial inclusion. Central banks have therefore to assess whether innovation in payment systems, as well as new payment instruments and PSPs, could endanger the overarching objectives of safety and efficiency.

Innovation, with new PSPs, new services, and fintech firms challenge the applicability of some current oversight concepts and methodologies. Central banks are used to overseeing payment instruments and services offered by banks, or the payment systems where only banks are participants, and they can base their oversight on data and information collected through their supervision function. But central banks now have to oversee payment instruments and services offered by non-banks, whose risk profiles may be quite different from those of banks (see figure 6 on entities subjects to central bank oversight worldwide), and for which they don't have a solid supervision background.[68] Central banks have to decide on the participation of non-banks in payment systems and have to craft new supervision and oversight models, covering payment activities and technical infrastructure, but also business models (viability, outsourcing arrangements), market conduct (transparency, pricing, consumer protection) and corporate activities (governance, risk management). In order to achieve this, central banks will also need to collaborate with other sectoral regulators, such as telecom or ICT regulators and competition authorities, while until now most central banks mainly cooperated with banking supervision

67. For example, some processes of handling payment services can involve data flows across national borders, which raise questions of data sovereignty in the financial industry.
68. Regulation and Supervision of Fintech: Considerations for EMDE Policymakers (Regulation note) by Tatiana Alonso Gispert, Pierre-Laurent Chatain, Karl Driessen, Danilo Palermo and Ariadne Plaitakis with contributions from Ana M. Carjaval and Matei Dohotaru

authorities and securities regulators to discharge their payment systems and payment services oversight duties. Many in the central bank community already identified and tackled this oversight challenge prior to the rise of fintech. Even if some countries have not fully overcome it yet, awareness is already there. Still, fintech is adding another layer of challenge to oversight concepts, including by decentralizing once centralized functions with an identifiable governance body the overseer could address. The rise of means of exchange that are not necessarily denominated in a fiat currency might be another new challenge due to increasing outsourcing of critical functions, where the contractor has far more control and negotiating power (for example, big techs) than the institutions contracting them.

Figure 6. Scope of the Payment Oversight Function

	Global	High income	Upper middle income	Lower middle income	Low income	Europe & Central Asia	Latin America & Caribbean	Sub-Saharan Africa	High income OECD	East Asia & Pacific	Middle East & North Africa	South Asia
All systemically important payment systems	93% 99/106	97% 38/39	88% 29/33	96% 26/27	86% 6/7	100% 17/17	74% 14/19	100% 16/16	100% 31/31	100% 11/11	100% 8/8	50% 2/4
Retail payment systems	87% 90/104	84% 32/38	85% 28/33	92% 24/26	86% 6/7	94% 16/17	74% 14/19	94% 15/16	83% 25/30	100% 10/10	88% 7/8	75% 3/4
Payment instruments	81% 81/100	71% 27/38	77% 23/30	100% 25/25	86% 6/7	75% 12/16	72% 13/18	100% 16/16	70% 21/30	89% 8/9	100% 8/8	100% 3/3
All relevant payment systems and services in the country even if the operator is a non-bank	81% 75/93	70% 26/37	85% 23/27	91% 20/22	86% 6/7	93% 13/14	56% 9/16	100% 15/15	69% 20/29	100% 9/9	100% 8/8	50% 1/2
Payment services	78% 81/104	63% 24/38	82% 27/33	92% 24/26	86% 6/7	69% 11/16	70% 14/20	100% 16/16	63% 19/30	100% 10/10	88% 7/8	100% 4/4
Non-Bank Payment Systems Operators (PSOs)	69% 66/95	46% 17/37	85% 23/27	83% 20/24	86% 6/7	79% 11/14	56% 9/16	94% 15/16	46% 13/28	100% 9/9	75% 6/8	75% 3/4
Non-Bank Payment Service Providers (PSPs)	66% 63/95	41% 15/37	81% 22/27	83% 20/24	86% 6/7	67% 10/15	50% 8/16	94% 15/16	36% 10/28	100% 9/9	100% 7/7	100% 4/4
Payment nerworks (e.g. SWIFT, VPN)	54% 51/95	57% 21/37	46% 13/28	52% 12/23	71% 5/7	47% 7/15	22% 4/18	73% 11/15	57% 16/28	67% 6/9	63% 5/8	100% 2/2
International remittance services	51% 49/97	24% 9/37	66% 12/29	63% 15/24	86% 6/7	69% 11/16	35% 6/17	81% 13/16	21% 6/28	78% 7/9	50% 4/8	67% 2/3
All relevant payment systems in the country as long as such systems are operated by commercial banks	46% 41/89	26% 9/35	58% 15/26	62% 13/21	57% 4/7	54% 7/13	47% 8/17	64% 9/14	19% 5/26	67% 6/9	50% 4/8	100% 2/2
Non-Bank Fintech	41% 37/90	28% 10/36	44% 11/25	52% 12/23	67% 4/6	23% 11/16	33% 5/15	67% 10/15	21% 6/28	80% 8/10	57% 4/7	50% 1/2
Central Bank-operated systems only	33% 31/95	14% 5/37	38% 11/29	50% 11/22	57% 4/7	25% 4/16	53% 9/17	53% 8/15	14% 4/29	33% 3/9	29% 2/7	50% 1/2

Each box shows the percentage of answers among the jurisdictions in a group.
Thank number of corresponding jurisdictions may differ across options.
A jurisdiction may have chosen multiple options.

0% 20% 40% 60% 80% 100%

Source: WBG GPSS survey, 2018.

The combination of traditional and new risks and causes for potential market failures calls for centrals banks to reassess and renew not only their policies, but also their internal organization, activities, and tools. Cyber-risk management and the protection of consumer data stand out as key concerns for regulators and overseers due to emerging payment technologies. The pace of technological change is set to remain high over the coming years, so central banks need to improve their ability to react quickly to the new realities of payments, to attract talent and build the capabilities necessary to assess the opportunities and threats posed by new technologies. An increasing number of central banks and other financial supervisors have or are in the process of implementing “regtech for authorities” or

"suptech" solutions to serve their missions;[69] for example, for collecting data (automated reporting, real-time monitoring, data management, including data validation and consolidation) and analyzing data (for market surveillance, misconduct analysis for AML/CFT purposes, and fraud detection).[70] Automated oversight solutions can help address the challenge of monitoring increasing volumes of payments transactions processed by an increasing number and types of providers. These tools require high computational capacity and IT expertise, for which central banks will need to rely on external partners or will need to develop ever stronger in-house IT expertise.

All of these developments call for a heightened level of collaboration and cooperation, between authorities and with all stakeholders. As the financial sector moves on from bilateral to networked business models, so must international institutions and domestic authorities enhance mechanisms through which to co-innovate, share experiences, and coordinate efforts to promote an orderly adoption and integration of innovation. The healthy development of such an ecosystem will result in mutually beneficial cooperation among stakeholders and eventually help financial services to be delivered at lower cost, higher speed, and at better quality to more consumers.

Key Takeaway 3. Innovation in Payments; Challenge and Opportunity for Central Banks

Innovation in payments challenge central banks in their typical roles vis-à-vis payments, that is, as operators, overseers, regulators, and catalysts for change, but also beyond their typical mandate on payments as innovations are redefining money. In addition to banks, other payments ecosystem players are deeply impacted by the ongoing changes, and it is especially the case for international and domestic payment card networks and ACH service providers.

The combination of traditional and new risks and causes for potential market failures calls for central banks to reassess and renew not only their policies, but also their internal organization, activities, and tools, and for a heightened level of collaboration and cooperation between authorities and all stakeholders.

69. Regulatory technology (regtech) focuses on the use of fintech innovations to solve regulatory, oversight and compliance requirements more effectively and efficiently, including but not limited to the challenges introduced by fintech developments. An increasing number of authorities have or are in the process of developing explicit strategies to leverage regtech for their purposes (often referred to as "regtech for authorities" or "suptech").
70. A recent analysis by the Financial Stability Institute among 39 financial authorities from 31 jurisdictions found that about half of them have or are working on a specific suptech roadmap and/or digital transformation programs (Ehrentraud et al. 2020, Di Castri et al. 2019).

4. Considerations to Inform a Strategy on Innovation in Payments

To benefit from the unrelenting waves of innovation in payments, authorities at the national level need to agree on a framework or set of considerations to inform their approach to innovation in payments.[71] They will need a common understanding on the institutional way to address the modernization of their NPS ecosystem. As earlier discussed, innovations in payments may have a centralizing or decentralizing effect on the market, but there is one entity, the central bank, whose role is undoubtedly made even more crucial by the successive waves on innovation. Ultimately, the central bank is mandated with the fundamental mission to ensure trust in money and provide the ultimate safe asset to settle both wholesale and retail transactions.

4.1 More Coordination between the Central Bank and Other Authorities, and with Stakeholders

The central bank is the top authority for money and payments and, as such, has a statutory obligation to play a catalyst role in the transformation of the financial sector while preserving financial stability, supporting the economy of the country, and protecting its people. Even if some innovations pretend to eliminate the need for a trusted third party, the overall new environment brought about by innovation in payments reasserts the critical role of the central bank. The central bank has to rise to the challenge and adapt its skills and tools not to be placed in a position where it ends up on the receiving side of decisions made elsewhere, by other national authorities, by private entities, domestic or foreign, and by supervisory colleges of central banks of other countries. Adapting their frameworks entail revising concepts like geographical location, currency denomination, and including new activities within the concept of payment services. The central bank should also work in close coordination with the government and other relevant authorities to align their strategic actions. It is especially critical that all the various relevant and related national strategies (for example, financial sector development, financial inclusion, NPS modernization, e-government agenda) are coordinated or at least mutually consistent.

Innovations in payments call for increased coordination: international, cross-sectoral between authorities, and between authorities and industry/stakeholders/market. Developing a sound and dynamic NPS ecosystem entails cooperation at multiple levels, between the NPS overseer and other relevant authorities and between the overseer and NPS stakeholders. Such cooperation should facilitate effective communication, consultation, or coordination, as appropriate, during periods of market stress, crisis situations, and the potential recovery, wind-down, or resolution of payment systems or PSPs. Critical decisions include: i) How cooperation should be organized in a context of growing numbers and varieties of stakeholders; and, ii) How should competition policy, consumer and data protection be handled—in particular, what should be the role of the central bank in that respect and the sharing of responsibilities with other relevant agencies. Cooperation is also important at the regional and international level.

71. That is, how to organize themselves and how to come up with a strategic approach.

4.2 Review and Revise Core Concepts, Standards, and Procedures

Innovations in payments challenge the applicability of some current oversight concepts, standards, and procedures, and at the same time payments oversight is now more important than ever. This is forcing central banks to reconsider their methodologies, internal organization, skill sets, and possibly examine the standards they use for critical payment infrastructures in light of the emergence of new types of critical players. Strong oversight remains key for building up a sound and dynamic NPS. Oversight seeks to ensure that payments provision is safe, efficient, and inclusive; robust and resilient to risks; constantly available; and evolving based on changing needs of the economy. The overseer should be given enough authority and resources to conduct effective oversight and to use all instruments necessary to this end. The overseer of the NPS may play several roles: it adopts rules, standards, and policy guidelines for the good conduct of PSPs, and monitors and ensures PSP compliance with such rules, standards, and guidelines; it acts as regulator and supervisor of payment services; it makes sure that PSPs, as well as all entities operating in the NPS, carefully manage the risks that arise from their payments activity and that such risk do not become systemic. The overseer, also, encourages cooperation from NPS stakeholders and coordinates their action, when this is necessary, to increase the efficiency and safety of payment infrastructures.

4.3 Safe and Efficient Payment Systems Continue to be Key

Safe and efficient payment systems are one of the key enablers for innovation in payments. Payment systems can enable innovation by providing interoperability and ubiquity, that is, by allowing new entrants to access to other participants, which facilitate new use cases and business models.[72] Payment systems also concentrate risks, including cyber-risk. It is therefore important to ensure that payment systems are compliant with international standards and best practices, but also that they evolve to align with newer technical standards (ISO 20022) and functionalities (for example, fast payments) and that they be included in critical nationwide initiatives, like financial sector cyber-resilience strategies. National authorities committed to enabling innovation in payments should take a strategic approach to payment infrastructure upgrading and work closely with the private sector to this end.

4.4 Principles-Based Regulatory Framework that Caters to New Concepts

Payment innovations elicit the question of whether technology should be considered in the design and drafting of regulations. At present, it is generally accepted that regulation should be technology-neutral in order not to favor or deter the use of a given technology (as long as it satisfies safety and consumer protection requirements). On the other hand, however, some technologies and new players may require ad-hoc regulation. There is no doubt that technology is fundamentally changing some key paradigms, but principles-based regulatory frameworks remain, at least until now, the best way to deal with it.[73] This does not mean that current concepts and frameworks should not evolve. On the contrary, new concepts and frameworks may need to be created, always with a good understanding of the prospects and the risks they entail in order to anticipate and shape potential outcomes. For example, central banks may need to adapt their oversight concepts and procedures to the distinctive nature of big techs involved in payments (see box 7 for an example of

72. For example, as earlier discussed, FPSs are the rails used by many payment fintech firms to offer new services or serve new segments of the population (such as small merchants).
73. For example, typical principles include developing proportionate and risk-based prudential regulations that ensure that PSPs are sound and resilient to shocks, while not imposing excessive compliance costs on them. Different entities providing the same type of service should be subject to the same set of rules (that is, functional regulation).

elements to consider to regulate open banking). Another factor is that, while a risk-based approach should remain the main criteria for regulation, size also matters. Above a certain threshold, concentration or combinations of services, size has an impact and should trigger specific requirements and policy considerations.

Box 7. Components to Take into Account When Designing an Open Banking Framework

1. Components that determine scope:

   TYPES OF SERVICES: Which financial products and services are included in an open banking regime varies. In cases where the scope is clear, there are two approaches:

   1. Broad scope, the scope could include banks (open banking) or other financial service providers (open finance) (for example, Australia, Brazil, India, Japan, Malaysia, Mexico, and Singapore).
   2. Targeted scope, focused on banking and/or payments (for example, Bahrain, Hong Kong SAR, China, the European Union, and the United Kingdom).

   PARTICIPANTS: There are two main types of participants: (i) entities that share data, by mandate or voluntarily—data holders; and, (ii) entities that either have a right to access data or are permitted to access data—data users. General approaches to defining data holders include:

   1. Name specific institutions.
   2. Use entity categories.
   3. Cover a broad range of financial sector entities.

   TYPES OF DATA: Although customer transaction data sharing is at the heart of open banking schemes, the majority regulate access to three main types of data:

   1. Generic services data—publicly available information on specific financial services, such as product pricing and locations of ATMs, agents, and branches.
   2. Customer data—personally identifiable data of a customer required for account opening and administrative purposes, including registration/know your customer (KYC) data.
   3. Transaction data.

   PAYMENT INITIATION

2. Components related to implementation

   - Mandatory versus voluntary participation
   - Market driven, regulation driven or hybrid
   - Revenue scheme (cost of data/free data) (new products and services may also generate new revenue streams)
   - Data protection and consent mechanism to allow data access, portability
   - Data exchange architecture (API centralized standards based, myriad of APIs), reciprocity model, technical specifications for data sharing (APIs)
   - Staged implementation
   - Lead regulator/policy mandate
   - Governance
   - Liability and consumer protection.

Source: CGAP (2020), Open Banking: How to Design for Financial Inclusion.

4.5 Industry-Level Infrastructure Are Critical

Market integration, interoperability, "stacking", standardization, and the corollary/enablers (such as APIs) are key to the overall efficiency of the retail payments market, to leverage most innovations (for example, fast payments, QR code usage for payments) and to enhance competition by enabling a level playing field. The role of industry-level infrastructure is critical and central banks have a key catalyst role to play to instigate and/or stimulate this evolution (for the evolution of the main features of payments infrastructures, please see table 1), and especially to push for the integration of public and industry-level infrastructure, such as ID systems, government data, payment systems, other financial infrastructures (for example, credit-reporting systems), other private and public platforms, hence making the case for and implementing the "stacking" approach. The decision on whether this industry level infrastructure components are in the public or private sector will depend on the specific country context and need not be exclusive. What matters however is ensuring the governance arrangements underpinning such infrastructures prioritize public policy objectives.[74]

Table 1. Taxonomy of Salient Features of Payments Infrastructures, an Evolution

	Traditional	Evolving toward
Architecture	Clear separation between: Large-value (RTGS for large, systemic transactions) and retail (ACH and card switch).	Growing importance of retail fast payments, built on RTGS, ACH, or on card and e-money transactions retail platform. Central banks issuing a wholesale CBDC and letting the private sector develop the transfer mechanism.
Settlement mode	Real-time (gross) settlement (RTGS) vs. Deferred net settlement (ACH).	Hybrid models becoming more prevalent and market/user putting more emphasis on real-time settlement capabilities.
Settlement asset	Central bank money and commercial bank money.	New variations of central bank and commercial bank money.
Organizational structure	System operator, participants and end-users (payers and payees).	DLT technology can challenge the traditional organizational structure of the transfer function and the need for a trusted third party. In non-DLT systems, wider access of non-bank participants, including fintech.

74. World Bank (2021), Governance of Retail Payment Systems (forthcoming).

Table 1 continued

	Traditional	Evolving toward
Transaction flow	Credit transfer, direct debit	Request to pay
Availability	Business hours	24/7/365
Access	Direct vs. indirect participation	API-based access through a direct participant without having any prior agreement; API-based access to a payment system using authorization from a direct participant.
Ownership	Public sector/central bank vs. private sector	Public/private partnerships
International linkages	CLS to connect RTGS for interbank, large-value transactions, international card networks.	Blockchain-based cross-border transactions
Special emphasis		Interoperability, Alias , APIs and API hub, value-added services (for example, proxy look-up, account verification), standards, integration with infrastructure for authentication, installment (buy now pay later functionality).

4.6 Weighting Options on CBDC

Even if they are not contemplating a CBDC, central banks should research and have a stance, based on the national context,[75] if only to be prepared to act as soon as a policy decision is made or circumstances warrant it. With a growing number of countries considering CBDCs, be it for addressing a decreasing use of cash (for example, the case of Sweden) or to boost financial inclusion, all central banks should define their standpoint based on a careful analysis of the country and the central bank's specific circumstances. Irrespective of whether or not a central bank is considering implementing a CBDC, it is critical that it evaluates its potential impact in the financial sector and investigates the design features that may be better suited for the national environment (see in figure 7 policy considerations for CBDCs suggested by the WB framework on CBDC from a payments perspective). In short, central banks need to experiment to understand in detail critical aspects like how a CBDC would fit into and interact with the other components of the NPS, and what would be the implications in terms of legal framework, payment systems design, and institutional arrangements.

75. World Bank (2021), "Governance of Retail Payment Systems: Keeping Pace with Changing Markets".

Figure 7. Policy Considerations for CBDCs

Source: World Bank (2021), "Central Bank Digital Currency - a Payments Perspective".

4.7 Consumer Data is a "Hot Commodity"

In the wake of innovation, consumer data is highly valued and in much demand. As discussed earlier, payments are a major source of data, and data is increasingly seen as a desirable asset. Accordingly, both private firms and public entities are collating and harnessing payments data. Authorities need to update their policies to account for the growing importance of payments-related consumer data, and the impact that access and usage practices can have on users' rights and market dynamics.[76] This is critical to promote market efficiency while protecting users' rights. They should also make sure that the possibilities of open banking, including standardized APIs,[77] become available to all entities active in payments, and that contributors of data include not only banks but also big techs, mobile-money providers, and other relevant players. In this context, the key roles of central banks in APIs include ensuring standardization, data protection, and setting requirements for cyber security.

76. Artificial intelligence and machine learning are not discussed in this paper since their applications in payments are largely for operational enhancements, like fraud detection. Their applications are of course extensive in other financial services and in the promotion of products and services.
77. For example, the revised Payment Services Directive (PSD2) of the European Union and associated regulatory technical standards (EBA (2018)) require the development of common functional and technical API specifications

4.8 Traditional Approaches to Payments Are Still Relevant

Innovation should not contribute to the exclusion of individuals from having and using transaction accounts or any other financial product thereof. Innovative payments require access to technology and knowledge of how to use that technology. Certain groups in society, such as the elderly, groups with different forms of disability, or poor people with limited access to education, digital, and financial literacy and also basic infrastructure like electricity and ICTs, might find it hard to pay with digital forms of payment. These groups are already experiencing discrimination, and authorities should ensure that they are not excluded or overburdened with the additional challenge of not being able to access cash and other transaction means suitable for them. A payments market dominated by private firms may not be able to provide appropriate solutions for all these needs, and central banks need to take this into account when shaping the evolution of their NPS.

Innovation and traditional approaches are not mutually exclusive. The risk of exclusion, in addition to limited hindsight with regard to innovations in payments, their benefits and also their risks, and their necessary mitigating policies, should encourage authorities not to summarily discard traditional approaches to payment-related challenges. While it is evident that innovation holds a lot of promise for payment services, more traditional approaches are also valid—and many have a very positive track record. The entry of non-banks and their issuance of e-money, agent-based models, simplified KYC for basic transaction accounts, and foundational infrastructures like RTGS systems, ACHs, and FPS have proven efficient and have contributed to reducing frictions in payment services. Some are actually key enablers of innovation, as earlier discussed. They should be supported alongside fostering other innovations to take hold in the daily lives of a growing share of the world population.

5. Concluding Remarks

Innovation in payments has far-reaching consequences for users, banks, and other payment service providers, the payments market, and regulators. First, because they offer benefits in terms of costs, convenience, accessibility, and inclusion for individuals and firms. But also because they challenge foundational notions, from the structure of the market to the role of central banks and the very notion of money. The impact of innovation on payments services and markets indicates a radical transformation, but are we faced with a *Leopard*[78] effect? In other words, is everything changing so that everything will stay the same? In many ways, innovation in payments has brought a paradigm shift, changing almost every aspect of the way we pay, to the very notion of money. But on the supply side, one can wonder if innovation in payments is not bringing about a different incarnation of an existing conundrum. It seems quite clear that payments are no longer the moat of banks. Payment business models are changing, from a situation where banks used to be able to charge for payments or to bundle them with other financial services, to another where payments can be bundled with other non-financial services and offered for free. This evolution has allowed the emergence of new players, small fintech, but it also plays to the strength of big tech: while banks might reorient their business models and reduce reliance on payment revenues, new niche players like mobile money providers might have to exit the market if they are unable to establish a sustainable business model. This would leave behind an even more concentrated market. A key question that emerges then from the evolution brought by innovation in payments is, whether one dominant power, the bank, is being replaced by a newer, tech-savvy dominant power—the big tech companies.

This evolution forcefully illustrates the importance of the role of central banks in the payments market, beyond their traditional realm of wholesale, large-value payments, in the space of retail payments. While innovation is sometimes presented as eliminating the need for a trusted third-party, and especially the need for central bank, we believe that innovation is making central banks even more relevant and needed. Central banks are adapting their operational role to the new demands of their citizens for more speed, convenience, and affordability. They are widening and deepening their oversight and regulation role to confront new products, new providers, including those like big tech coming from outside of their traditional purview of the financial sector, and the associated risks. Innovators won't wait for them, but they can stifle or foster innovation in their financial sector, they can shape the rules and standards for cooperation, interoperability, competition, if they grow their knowledge and build their expertise. They have no other choice but prepare for the next wave of innovation, including CBDCs, which may significantly transform the very foundation of their actions.

The role of central banks has not been diminished by innovation, but central banks need to prepare, including through a framework built on a set of strategic policy considerations, and they can't work in isolation. Coordination, with other authorities and with stakeholders, is more important than ever. The rapid changes to payment mechanisms and systems should lead central banks to review and eventually revise core concepts, standards, and procedures, and to look into the potential impact of game changers such as CBDCs, but cornerstones remain, the need for safe and efficient payment systems, integration with industry-level infrastructures, a principles-based regulatory framework that can evolve and cater to new concepts. A framework based on those principles can help EMDEs harness the benefits of innovation in conjunction with more traditional approaches to payments, which will likely remain relevant in the foreseeable future.

78. The Leopard (Italian: Il Gattopardo, alternative title: Le Guépard) is a 1963 Italian epic period drama film by director Luchino Visconti, based on Giuseppe Tomasi di Lampedusa's 1958 novel of the same title. One can also refer to Vilfredo Pareto and his theory of "Circulation of elites" in a society, since what we are witnessing/likely to witness in the future is one set of elites (banks) being replaced with another set of elites (big techs), resulting in likely limited choices to customers.

To conclude, it seems important to reiterate that EMDEs, while creating an enabling environment for innovation in their financial sectors, should not write off proven strategies. While innovation can and will contribute to solve some challenges in the financial sector, there is no turnkey solution, and it is crucial to monitor and manage adequately new risks emerging in parallel to innovation. The answer to many challenges might be a right combination between an environment conducive to innovation and more traditional approaches, fostering new products and providers while managing risks and protecting consumers, and preparing jurisdictions for a not-so-unimaginable cashless future. Individuals and businesses from all strata of society should be ready for this potential new reality, and public authorities should be equipped to preserve their public policy objectives of inclusion and stability.

Appendix 1: CBDC Pilots and Experiments

The Bahamas

In December 2019, the Central Bank of Bahamas (CBB) piloted its Sand Dollar in Exuma island. The CBB is targeting increasing financial inclusion and reducing reliance on cash. Issuance and redemption of the Sand Dollar will be managed by the CBB, while commercial banks and other PSPs will enroll individuals and enterprises into the system and provide them with digital wallets. The CBDC wallet will be accessed via a traditional card or mobile application. The CBDC infrastructure will be linked to a newly developed know-your-customer (KYC) shared database to avoid duplicating the costs and efforts of clients' enrollment. The CBB is also building links between the CBDC infrastructure and existing payment systems and services in the country to ensure full interoperability of the Sand Dollar upon its full launch.

China

The digital currency electronic payment (DCEP) coin, which is planned to be issued by the People's Bank of China (PBC), will target the retail sector. The two-tier design of the system will enable the PBC to issue the digital Yuan, redeem, and distribute it on the first tier to a limited number of wholesale distributors, mainly a few banks plus other PSPs like UnionPay, Alipay, and Tencent. In the second tier, the wholesale distributors will re-distribute DCEP to retail market participants while performing all end-user services, including enrollment, account management, and providing end-user applications. Banks will be required to keep a 100 percent reserve ratio at the PBC for the issued DCEP coins, as the digital Yuan will be pegged to the fiat currency. Meanwhile, users will need to open a digital wallet to send, receive and hold DCEP coins without any linkages to a bank account. The planned DCEP coins will be interest-free, similar to cash. Furthermore, PBC expects to be able to trace M0 money to the end user level and enhance AML/CFT measures.

Uruguay

In early 2017, the Central Bank of Uruguay (CBU) announced its plans to issue the "e-peso". CBU's main targets were to reduce the cost of issuing and managing cash, measured at 0.7 percent of the GDP, and further advance financial inclusion. The CBU outsourced the operation of the system to a domestic switch, agreed with an MNO to provide access to accounts even via USSD, and allowed a significant number of agents to cash-in and cash-out the e-peso for end-users. The CBDC infrastructure allowed a product that is similar to cash (i.e. interest-free digital currency), with anonymous but traceable access to e-peso, available on 24 hours and all days of the year.

Appendix 2: Fast Payments—Variants, Use Cases, and Country Examples

Technological developments and advances in communications and computing technology—leading to lower costs on both demand and supply sides of the market—have been the fundamental driver of fast payments. These, coupled with the catalyst/developmental role played by regulators and the support of financial institutions, accelerated implementation of fast payment systems (FPS). In some countries such as Bahrain and Hong Kong SAR, China, banks are mandated to offer fast payment services.

Most FPSs have been built as new systems. However, some systems, such as in Japan, have been adapted from existing systems. Japan's Zengin system was launched in 1973 and was not a full-fledged FPS. By virtue of a series of upgrades over the years and implementation of 'More Time System' as an overlay, the Zengin system became a 24x7, real-time system. FPSs implemented till now have adopted either ISO 20022, ISO 8583, XML or proprietary messaging standards, though ISO 20022 is emerging as the preferred data/messaging standard due to interoperability ease and rich payment information transmission. New FPSs are considering adopting ISO 20022 (for example, FedNow in the U.S. and PIX in Brazil) and some existing systems (for example, FPS in the United Kingdom) are planning to migrate to it.

Depending on the country, banks and non-bank PSPs (including non-banking financial companies, fintech firms, telecom operators, large technology players, etc.) can become providers of fast payment services. When non-bank PSPs are participants in an FPS, settlement generally takes place through a bank that has a settlement account with the central bank, so that settlement may be executed in central bank money. In Mexico and Nigeria, for example, non-banks themselves have settlement accounts at the central banks.

The various channels through which fast payments can be made are mobile banking, internet banking, branches, kiosks, etc. Some FPS support transactions at branches of providers, such as in Sri Lanka, China, and India. In others, self-service channels like internet banking and mobile banking are already dominant. Further, it has been observed that countries where financial inclusion has been a key driver for the launch of FPS, especially lower middle-income countries have launched USSD channels for payments. Examples include India, Kenya, and Nigeria.

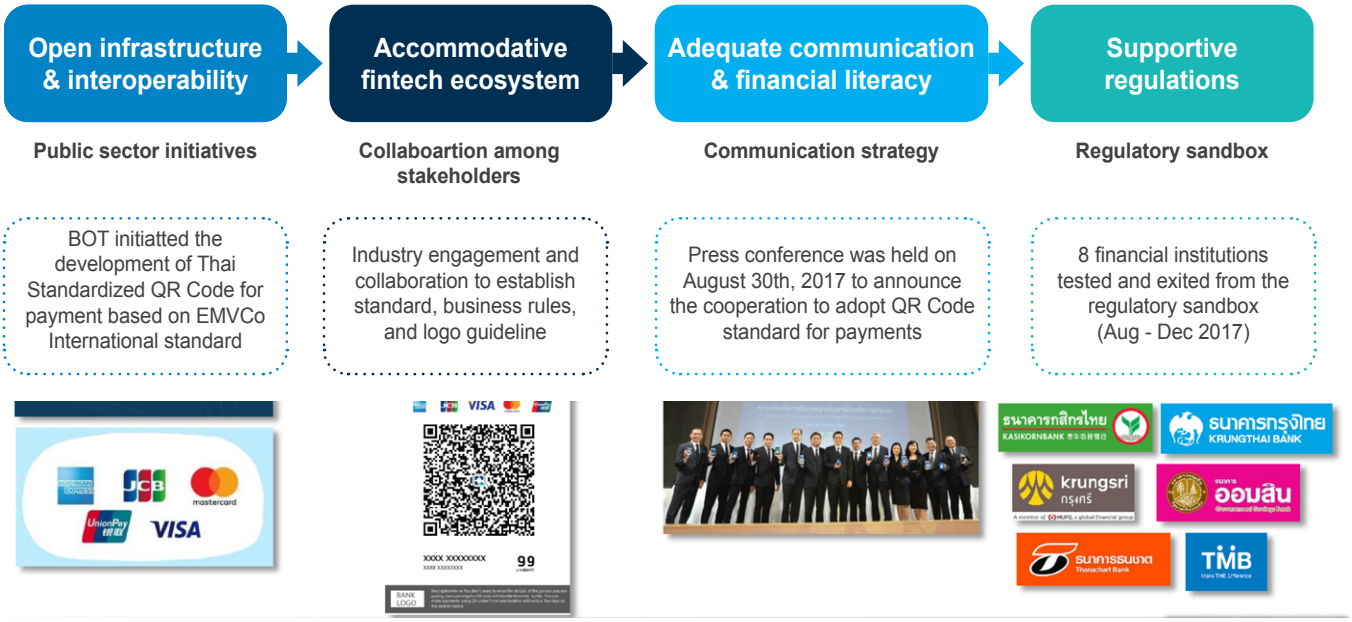
Common use cases of fast payments beyond P2P payments include bill payments, merchant payments, and bulk/batch payments. Some countries, such as the United Kingdom and Poland, also have a provision to schedule future payments. Moreover, cross-border payments are offered in the United Kingdom and the Single Euro Payments Area (SEPA). Poland, Singapore, and Thailand, among others, are in the process of enabling the latter type of payments.

Open banking/open APIs coupled with real-time payments can significantly help drive innovation and develop new use cases. Around one-third of FPSs support open APIs. Australia has announced the launch of an API sandbox for third-party vendors to test new use cases on its real-time payments infrastructure. The U.K. Open Banking initiative and Europe's PSD2 initiative also encourage innovation on top of their existing real-time payments infrastructures through two type of players—Account Initiation Service Providers and Payments Initiation Service Providers.

Appendix 3: Benefits of Adopting Standardized QR Codes: The Example of Thailand

The Bank of Thailand (BOT) has led efforts to standardize QR codes in the country. The process is illustrated in figure 8 below.

Figure 8. Process for the Adoption of Standardized Qr Code for Payments in Thailand



Source: Central Bank of Thailand website

According to BOT, the main benefits of this standardization are as follows:

For the citizen

- Fit to new lifestyle of customers who usually have a mobile phone with them and are willing to use mobile payments.
- Secure, cost-efficient, and convenient e-payment transactions

For merchants

- Ability to accept funds from various payment instruments including bank account, credit card, debit card, and e-wallet account.
- Eases operational burdens and reduces business costs

Benefits for the country

- Supporting open infrastructure and interoperability throughout the ecosystem
- Providing a less expensive and more convenient e-payment channel
- Enhancing card payment security
- Expanding development of financial innovations and e-payments

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